

External Quality Assurance & Reports

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EXECUTIVE SUMMARY

In this activity we are presenting the external monitoring processes and results that were carried out by the two appointed external evaluators. The recruitment of the two external evaluators was based on certain criteria such as knowledge of the Arabic language, experiences on course curriculum evaluations in the field of sustainable development and the issues that the CCSAFS project is dealing with. External evaluation coincided with internal evaluation since external evaluators were also assessing the results of internal evaluation.

External evaluation started at the development phase and continued throughout the piloting and implementation phases. The internally reviewed courses were submitted to the external evaluators for: 1) checking the extent to which the internal reviewers' feedback was taken into consideration by the course developers and 2) on the basis of the updated version, the external evaluators started their own evaluation taking into consideration the instruments used. This was an effective strategy as it provided a mechanism for assessing the extent to which internal peer-reviewing feedback was implemented substantiated by the external reviewers' feedback. External evaluators were part of the MQAG (Monitoring & Quality Assurance Group). Three rounds of external review were carried out that are fully described in this deliverable. Added to that, external evaluation concerned also the online modalities we have used such as the MOOCs, the Online Community of Practice and the Blended Learning Management System. Monitoring and inspection of the ICT Labs was also carried out whenever possible.

The external evaluation proved to be a very fruitful process that contributed much to the quality of the course modules of the MSc. in CCSAFS and the tools used and be used in the future. In the following, we present the reports concerning the external evaluation.

The main criteria used for revision are:

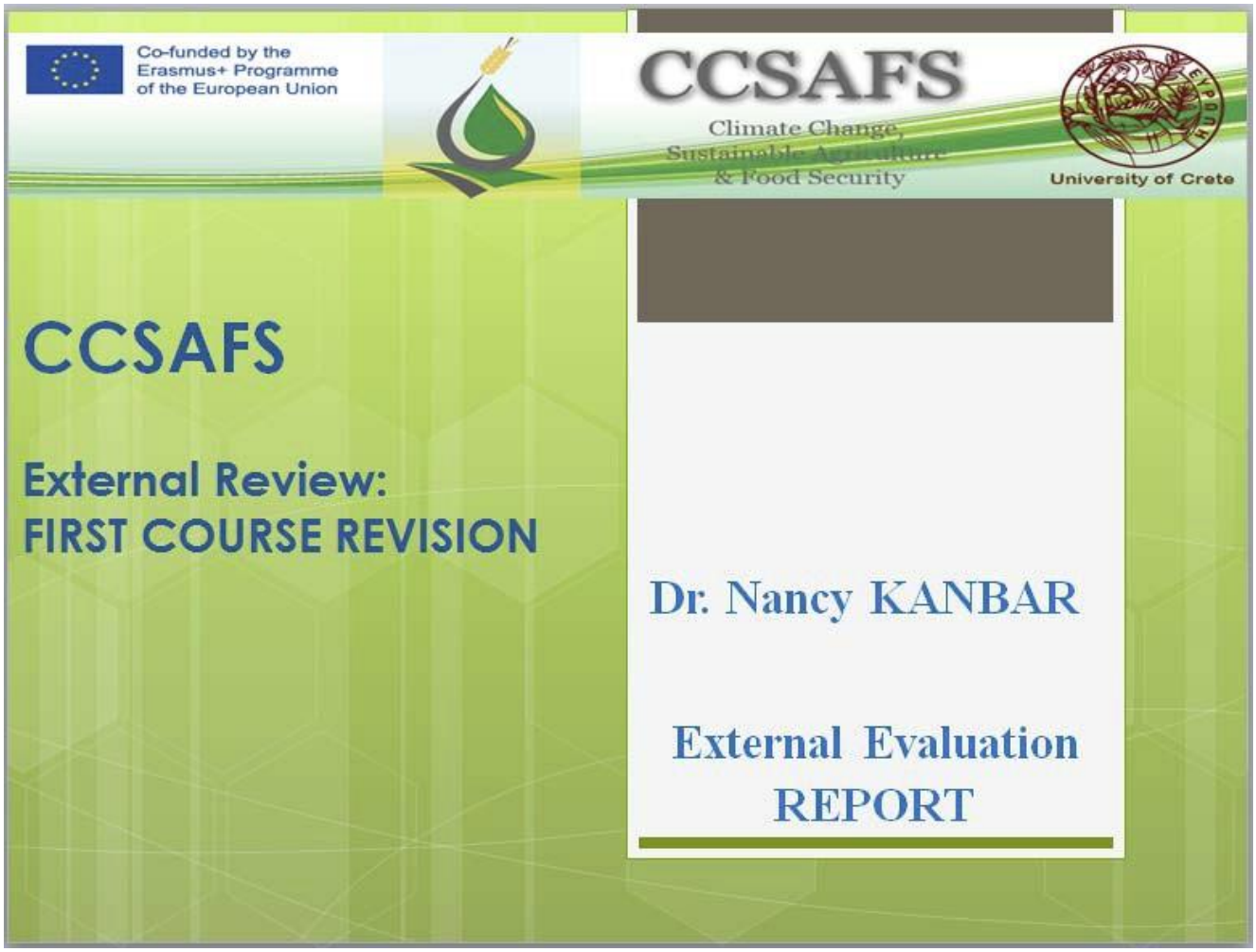
- The extent to which the course content is relevant to the scope of the master program (i.e. addressing the themes of climate change, sustainable agriculture and food security)
- The extent to which the course objectives are SMART
- The clarity of the learning outcomes in terms of reflecting course objectives
- The extent to which different course activities are explained in details with steps of implementation and assessment techniques
- The alignment of the activities designed in the modules with the learning outcomes in each module
- The extent to which course activities connect with the 17 SDGs and the 3 key domains of the CCSAFS MSc. (climate change, sustainable agriculture and food security)
- The suitability of the course content and number of modules to the duration of the course (Make sure the workload calculation is based on ECTS)
- Student workload coverage of all educational components (attending lectures, face-to-face and/or online, seminars, reflections, work placements, dissertations, projects, laboratory work, self-study and examinations)
- The course orientation towards critical thinking, problem-solving or transformative learning (not only knowledge-oriented)
- The combination of the disciplinary concepts related to climate change, sustainable agriculture and food security in the course through the use case studies / activities that support pedagogically the sustainability perspective (ESD methods)
- The references and supporting reading materials (up-to-date, scientific and reliable)
- The extent of in-depth understanding of climate change in a holistic way. Course modules should relate the issues to ethical, political, economic, social and technical dimensions
- The level of integration of the various course topics with policy formation. Make sure that students learn to apply the course concepts to the analysis of real world problems, integrating systematic environmental and socio-economic evaluation into national policy-making
- The extent to which the attitudinal change is brought about in the course in the aim to develop sustainable citizens; sustainability is at the forefront of values and transformative learning
- The use of blended learning techniques.

Taking into account the above described criteria, each course has undergone three rounds of revision. Some course syllabi have been reviewed four times and some other have been designed by with the help of the external evaluation, especially those courses related to environmental governance and courses in economics.

This report will highlight the various rounds of revision undergone by the external evaluator in the chronological sequence as they occurred. Also, it will include some photos of the meetings and workshops where the external evaluator delivered presentations. Towards the end of the report, selected advertisements for the CCASFS program at Suez Canal University will be displayed. This will be followed by selected email communications and CoP posts by the external evaluator and the participants from the various faculty members in the partner universities in Jordan and Egypt. At the end of the report, selected courses are displayed in their various versions until they get in their final forms.

It is important to note that the process of improving the course syllabi is continuous. Faculty members will update their courses to better versions once they teach the courses.

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Climate Change,
Sustainable Agriculture
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University of Crete
CCSAFS
External Review:
FIRST COURSE REVISION
Dr. Nancy KANBAR
External Evaluation
REPORT

FIRST COURSE REVISION

At the beginning of the process of external evaluation, a preliminary review of the course syllabi are sent to the external evaluator by the local coordinators.

To facilitate the process, the CCSAFS courses were listed in a table with the names of the course developers, e.mail contacts, and the university where the course developer belongs.
Two preliminary lists were made; one for Egypt and the other for Jordan in order to be clear about the information and to simplify the communication process with the colleagues in the different partner universities.

After preparing the preliminary lists of course developers and their contact information, the external evaluator draws a primary list of all courses required in the M.S program to show compulsory vs. elective courses.

Egypt CCSAFS Courses and Course Developers

Course Name	Course Developer	Contacts	University
Climate Change, Adaptation and Mitigation	Dr. Khaled Ibrahem Dr. Marwa Kamel	isaoscu@gmail.com Marwa.samir@yahoo.com	SCU
Statistics and Design and Analysis of Biological Experiments	Dr. Abdelrahim Ali Manal Hefny	drrahem@gmail.com	SCU
Sustainable Management of Soil and Water	Dr. Samy Abd El-Malik Mohamed Abd El-Azeem	Sazeem18@gmail.com	SCU
Sustainable Livestock Management	Dr. Atef Kamel	atefkamel1955@hotmail.com	SCU
Applications of GIS and Remote Sensing	Dr. El-Sayed Omran Ebide		SCU
Research Methodologies	Dr. Manal Hefny	manalhefny96@gmail.com	SCU
Environmental Governance	Dr. Esam A. Hussein	husseine13@yahoo.com	AlAzhar University
Precision Farming	Dr. Wagdi Saber	wagdi79@agr.aswu.edu.eg	Aswan University
Applications of Biotechnology in Sustainable Agriculture	Dr. Mohamed Abou-Ellail	Mohamed.abouellail@agr.aswu.edu.eg	Aswan University
Small Scale Farming and Indigenous Knowledge	Dr. Wagdi Saber	wagdi79@agr.aswu.edu.eg	Aswan University
Risk Analysis in Food Chain	Dr. Khaled Elkhwass	Khaledk5912@yahoo.com	Aswan University
Sustainable Fisheries and Food Security	Dr. Said Desouky	Dr_saidesouky@yahoo.com	Aswan University
Sustainability Justice of Food Security and climate change	Assistant: Mohamed Anwar	Mohamed.anwar@hu.edu.eg	Heliopolis University
Economics of Climate Change	Dr. Karim Badr El-Din	karim.badr@hu.edu.eg	Heliopolis University
Social Entrepreneurship in the Organic Food Industry	Ms. Magda Gharib	magda.gharib@hu.edu.eg	Heliopolis University
Consumer Behaviour, Marketing and Food Security	Dr. Omar Ramzy	omar.ramzy@hu.edu.eg	Heliopolis University

Jordan CCSAFS Courses and Course Developers

Course Name	Contacts	Contacts	University
Climate Change Adaptation and Mitigation	Dr. Abbas Al-Omari	abbassm@ju.edu.jo	University of Jordan
GIS Applications in Climate Change, Sustainable Agriculture and Food Security	Prof. Jawad Al-Bakri	jbakri@ju.edu.jo	University of Jordan
Precision Farming (UNIPAD)	Prof. Jawad Al-Bakri	jbakri@ju.edu.jo	University of Jordan
Climate Change, Sustainable Agriculture and Food Security (Sustainable Agriculture-UNIPAD)	Prof. xxxxxxxxxx		JUST
Sustainable Management of Soil and Water (Water Resources Management-UNIPAD)	Prof. xxxxxxxxxx		JUST
Sustainable and Ethical Livestock Management (Sustainable livestock systems-UNIPAD)	Prof. xxxxxxxxxx		JUST
Research Methods and Advanced Statistics Analysis (Advanced statistics-UNIPAD)	Prof. Saif Al-Naimat	saif982@yahoo.com	Mutah
Social Entrepreneurship in the Organic Food Industry (UNIPAD)	Prof. Mohammad Al-Majali	M_r_almajali@yahoo.com	Mutah
Unsaturated Soil in Arid and Semi-arid Region	Prof. Omer Al-Maaitah	maaitah_noor@hotmail.com	Mutah
Sustainability Justice and Food Security	Dr. Ibrahim Al-Tahat	tahat1972@gmail.com	JPU
Small Scale Farming. Indigenous Knowledge and Local Food Supply	Dr. Kamel Sultan	k_sultan54@yahoo.ca	JPU
Risk Analysis in the Food Chain	Dr. Kamel Sultan	k_sultan54@yahoo.ca	JPU
Consumer Behavior, Food Security and Marketing	Dr. Mohamed Altarawneh	m.tarawneh@jpu.edu.jo	JPU
Sustainable Fisheries and Food Security	Dr. Ibrahim Al-Tahat	tahat1972@gmail.com	JPU
Economics of Climate Change, Sustainable Agriculture and Food Security.	Dr.Mohamed Altarawneh JPU	m.tarawneh@jpu.edu.jo	Yes

MSc Climate Change, Sustainable Agriculture and Food Security
CCSAFS

Compulsory Courses

Year	Semester	Course Code	Course Title
1st Year	1st Semester	CSAF801	Climate Change: Adaptation and Mitigation
		CSAF860	Applications of GIS and Remote Sensing
		CSAF802	Sustainable Management of Soil and Water
	2nd Semester	CSAF880	Statistics and Design of Biological Experiments
		CSAF803	Economics of Climate Change
		CSAF820	Sustainable Livestock Management
2nd Year	3rd Semester	CSAF870	Applications of Biotechnology in Sustainable Agriculture
		CSAF890	Social Entrepreneurship in the Organic Food Industry
		CSAF875	Sustainable Fisheries and Food Security

Elective Courses

Course Code	Course Title
CSAF830	Sustainability Justice of Food Security and Climate Change
CSAF835	Small-Scale Farming and Local Knowledge
CSAF840	Risk Analysis in Food Chain
CSAF845	Precision Farming
CSAF850	Consumer Behaviour, Marketing and Food Security
CSAF855	Environmental Governance

University/Faculty Requirement Courses

Year	Semester	Course Code	Course Title
1st Year	1st		Seminars
1st Year	2nd		Seminars
1st Year	2nd	UNI-RESM 870	Research Methodology
2nd Year	3rd		Seminars
2nd Year	3rd		Special Studies
2nd Year	4th		Bioethics

A first version of the designed syllabi was sent to the external evaluator. After a preliminary review of the course syllabi, the external evaluator found it necessary to develop detailed guidelines regarding three main issues (ECTS integration in course curriculum, community-based / service learning activity, and the Sustainable Development Goals (SDGs) in order to facilitate the process. The external reviewer sent detailed information about the three rubrics below:

1) ECTS Student Workload for Assessing ECTS Integration in Course Curriculum
2) CCSAFS Community-Based / Service Learning Activity
3) SDGs

A message was sent to the colleagues through the Community of Practice (CoP)

Each course is being assessed based on three rubrics:

1) ECTS Student Workload Rubric for Assessing ECTS Integration in Course Curriculum
2) CCSAFS Community-Based / Service Learning Activity Rubric
3) SDG Rubric

1) The ECTS table should not be missed. It should be set aside from the course module with clear guidelines on where these activities will be done.

2) The community-based / service learning activities should be improved. Each activity:
- Should clearly define clearly the goals, the purpose of community or service learning component and the expected learning outcomes.
- Should meet an actual need in the community and is coordinated through collaboration with the community.
- Should be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course.
- Should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation.
- Should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in community served.
- Should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

3) Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc.

To ensure proper course syllabi design, reflections / suggestions related to the three main issues (ECTS integration in course curriculum, community-based / service learning activity, and the SDGs) were summarized by the external evaluator in the three rubrics below and sent to the course developers in the partner universities.

Rubric 1

ECTS Student Workload Rubric
For Assessing ECTS Integration in Course Curriculum

The following guidelines related to ECTS Integration in CCASFS Course Curriculum were sent to course developers who were recommended to follow them in order to ensure proper course syllabi design for the CCASFS curriculum.

Include ECTS table (see example below) aside from the course modules with clear guidelines on where these activities will be done
Make sure the workload calculation is based on ECTS
Learning outcomes should be written clearly to reflect course objectives
Student workload should cover all educational components (attending lectures, face-to-face and/or online, seminars, reflections, work placements, dissertations, projects, laboratory work, self-study and examinations)
List up all activities involved in the course modules in line with the learning outcomes in each module
Weight each component in line with learning objectives and outcomes, in total and separately for each module
Alignment: The allocation of student workload should match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.
Balance: There should be strong evidence that the distribution of the working hours is done appropriately between the course modules.
Coverage: The allocation of student workload should match up well with course activities and assessments.
Communication: There should be strong evidence that the student workload allocation is clearly understood and communicated to students.
Monitoring: There should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

The workload

- Reaching the learning outcomes of a course and course modules, in particular is directly linked with the *workload* of a course. The workload is based on ECTS.
- Learning outcomes are sets of competencies, expressing what the student will know, understand or be able to do after completion of a course.
- Workload refers to the expected time an average student might need to complete the required learning outcomes.
- Student workload covers all educational components of a study program (attending lectures, face-to-face and/or online, seminars, reflections, work placements, dissertations, projects, laboratory work, self-study and examinations). Student workload covers all aspects of learning and is not related solely to formal teaching hours.
- *Each of the four CCSAFS full-tine academic semesters consists of 30 ECTS*. *Each ECTS credit stands from 25 to 30 working hours*. In a full-time study year, 60 ECTS credits, that is 30 credits each semester.

ECTS

- ECTS is a student-centered approach of describing learning by allocating credits to learning components in line with learning objectives and learning outcomes, based on the workload of the average learner.
- In the case of the MSc in CCSAFS, the total workload necessary to obtain the MSc degree lasts *four semesters* for full-time students and consists of *90 credits for course work and 30 credits for writing the thesis*, making *the total 120 credits*.
- In case of the Professional Master degree, students are to take only the courses equivalent to 120 ECTS. A 10 ECTS credit course amounts 250 to 300 hours student work.
- The implementation of ECTS is very important, not only for students and instructors, but also for employers as it provides a good and transparent measurement of the student work.

Calculating workload

- Calculating workload is critical to understand the real learning achievements.
- To ensure students that are in track of their learning, it is important to list up all activities involved in the course modules in line with the learning outcomes in each module.
- It is essential to identify the learning components that a course consists of.
- It is critical to weigh each component in line with the learning objectives and outcomes, in total and separately for each course module.

Example of the workload calculation for a typical 10 ECTS course: ECTS Student Workload

The calculation method used is based on the whole course and in each course module. The workload is divided into a series of learning components, each involving an estimated number of hours of work (time factor). The total workload should match the learning hours indicated by the credit value of the course.

Table 1: An Example of a 10 ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	10	3	30	3	3	6	6	6	6	30
Online	4	3	12	3	-	4	2	-	3	12
Lab work	6	2	12	2	4	-	2	2	2	12
Reading articles (3 pages per hour)	200	0,3	60	7	8	10	10	12	13	60
Reading book chapters (5 per/h)	150	0.2	30	4	5	6	5	5	5	30
Preparing course activities	6	15 (M)	75	11	20	14	30	-	-	75
Project work	1	20	20					5	15	20
Preparation for exam	1	50	50					20	30	50
Writing the exam	1	3	3						3	3
Total			292	30	40	40	55	50	77	292

The total workload should match the learning hours indicated by the credit value of the course and be consistent with the ECTS Assessment Rubric below:

ECTS Assessment Rubric

a) Alignment:

The allocation of student workload should match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.

b) Balance:

There should be strong evidence that the distribution of the working hours is done appropriately between the course modules.

c) Coverage:

The allocation of student workload should match up well with course activities and assessments.

d) Communication:

There should be strong evidence that the student workload allocation is clearly understood and communicated to students.

e) Monitoring:

There should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

Rubric 2

CCSAFS Community-Based / Service Learning Activity Rubric

Each CCSAFS course must contain at least one community/service learning activity. Comments aiming to improve the community/service learning activities are provided to course developers.

a) The activity should clearly define the goals, the purpose of community / service learning component and the expected learning outcomes.

b) When designing the community- based/service learning activity, the course developer should keep in mind the importance to connect academic achievement, civic engagement, and personal growth supporting transformative learning.

c) The activity should meet an actual need in the community and should be coordinated through collaboration with the community.

d) The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. It should be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course.

e) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. It should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation. f)

The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in community served.

g) The activity should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved.

Each CCSAFS course must contain <u>at least one</u> community/service learning activity, preferably at the last module of the course.
Define Activity Goals, Objectives and Outcomes. The activity should clearly define the goals, the purpose of community or service learning component and the expected learning outcomes. Also, the connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.
Meet Actual Community Needs Collaboratively. The activity should meet an actual need in the community and is coordinated through collaboration with the community.
Merge Theory with Practice & Course Curriculum Connection. The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. It should be structured in a way that provides opportunities for students to apply new knowledge and skills in a real life context and shows a strong connection to the whole course.
Enhance Active Student Reflection. The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. It should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation.
Develop Learning to give and share. The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in community served.
Make a Difference in Community. The activity should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved.

Rubric 3

Sustainable Development Goals (SDGs)

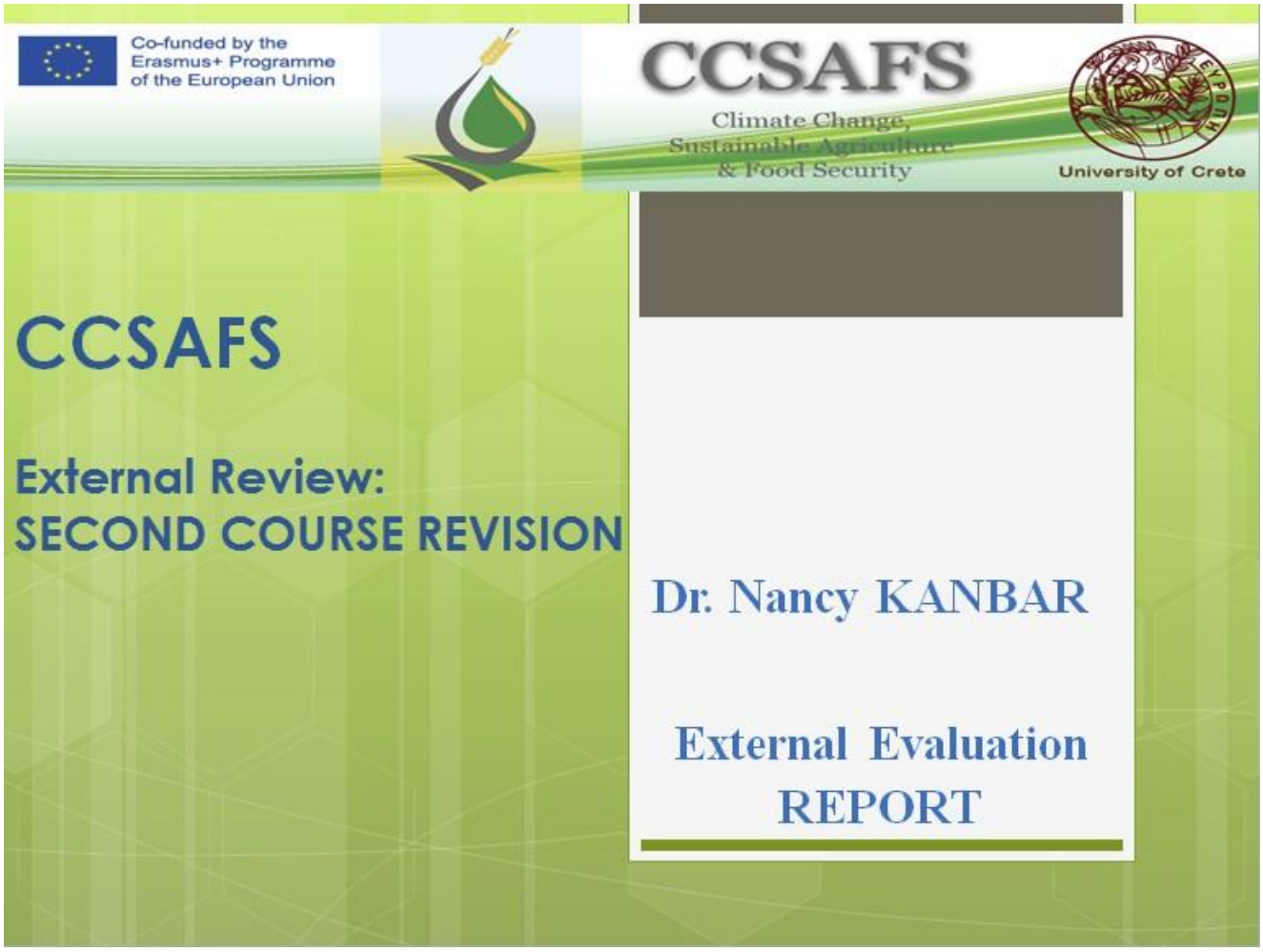
The course activities should connect the 17 SDGs with the 3 key domains of the CCSAFS MSc. The following steps should be taken into consideration for course external evaluation:

- Did the course developer use open access resources in his class? (Through using an Internet searching machine, such as Google, putting the name of the SDG and the domain (ex. End poverty and climate change).
- After reviewing the downloaded resources, what did the course developer suggest in terms of activities for each of the three domains in the table below (Climate Change, Sustainable Agriculture and Food Security) in connection to a course module?

[1]

	SDGs	CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

[1] Course developers are asked to include this table (end of the syllabus) and put a check mark in the appropriate box.


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SECOND COURSE REVISION
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External Evaluation
REPORT

SECOND COURSE REVISION

The suggestions related to the three main rubrics discussed above (ECTS integration in course curriculum, community-based / service learning activity, and the (SDGs) were sent to course developers in each partner university to improve the MSc CCSAFS course curriculum. After this first important communication, faculty members engaged in the course development have sent a first version of their revised syllabi to the external evaluator.

Here, the evaluation approach stressed on the three issues discussed above. The external evaluator places a focus on a number of ESD learning processes:

1. Learning to clarify one's own values
2. Learning to think critically
3. Learning to reflect on own practices
4. Learning to think systemically
5. Learning to envision
6. Learning to merge the head, the heart and the hand.

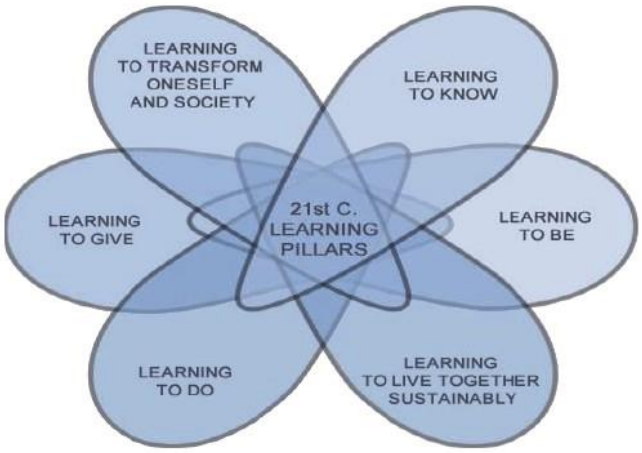


Figure 1: The Six Pillars for 21st Century Learning (Makrakis & Kostoulas-Makrakis, 2012b; Makrakis, 2016;17)

Learning to know	This type of learning concerns all the processes and practices that lead people to experience, construct and transform knowledge for making sustainability a mode of life and being.
Learning to be	This type of learning concerns all the processes and practices that lead to human self-actualisation, self-understanding, self-regulation and cultivating a sense of being versus having.
Learning to live together sustainably	This type of learning concerns all the processes and practices that lead to a peaceful and non-discriminatory society and human co-existence with the natural world.
Learning to do	This type of learning concerns all processes and practices that lead to merging knowledge with action for building a sustainable future.
Learning to transform oneself and society	This type of learning concerns all the processes and practices to transform their unsustainable values and behaviours and collectively engage to change society towards sustainability.
Learning to give & Share	This type of learning promotes solidarity and caring attitudes to meet human needs as learners gain autonomy and purpose for their learning and civic engagement.

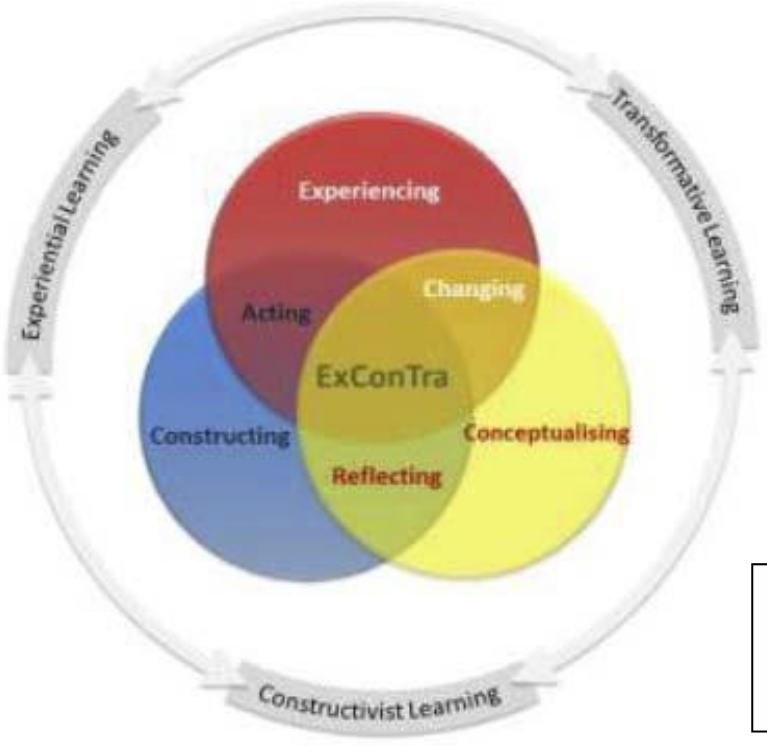
These six processes defined as key learning pillars for the 21st century can be enabled by the 10Cs (Makrakis & Kostoulas-Makrakis, 2014), which extends the 4Cs of critical thinking & problem solving, communication, collaboration and team building, creativity and innovation. Makrakis & Kostoulas-Makrakis (2014) argued that in a world of rapid change highly driven by new technologies and expansion of knowledge, along with the current sustainability crisis that threatens the existence of humankind, education must go beyond the focus on the 4Cs to what they have termed the 10Cs that could be enabled by ICTs[2]. These critical 21st century skills enabled by ICTs merged with the 21st century learning pillars can be used as powerful means to transform school curricula towards sustainability justice. All these learning processes are inherent within an experiential, constructivist and transformative learning paradigm abbreviated as ExConTra[3].

[2] Makrakis, V. & Kostoulas-Makrakis, N. (2016). Bridging the qualitative-quantitative divide: Experiences from conducting a mixed methods evaluation in the RUCAS programme. *Evaluation and Program Planning* 54, 144-51. doi: 10.1016/j.evalprogplan.2015.07.008

3 Makrakis, V. & Kostoulas-Makrakis, N. (2012). Course Curricular Design and Development of the M.Sc. Programme in the Field of ICT in Education for Sustainable Development. Journal of Teacher Education for Sustainability, 14(2), 5-39.



ICTs as enabling tools for the 10Cs (Makrakis, 2016)



The ExConTra Learning Paradigm (Makrakis & Kostoulas-Makrakis, 2012)

The ExConTra learning paradigm is associated with educational approaches such as inquiry and discovery-based learning, service learning, place-based learning and reflective/reflexive learning, all of which are associated with teaching methods and strategies that are suitable to education for sustainability. Course developers are already familiar with these models as they were exposed to them during the workshops and they are available in the CCASFS toolkit available on the Community of Practice (CoP).

Taking into account the above models, the external evaluator was particularly reviewing the learning activities. These should be structured to guide and help students to focus on what-to-do rather than how-to-do. While going through the syllabi, the external evaluator was asking questions such as:

1) Does the course developer use active teaching techniques that are designed to get students more involved in learning?
2) Do course learning objectives match the course content?
3) How does the course developer assess students' performance?
4) Are learning activities and intended outcomes supported by the use of media?
5) Does the course designer choose cases that connect to real-world problems so that students grapple with issues that they would likely encounter in the field or profession?
6) Is service learning used by the course developer connecting field work and coursework through reflection assignments? etc.

In matching strategies and methods, the following questions about planned activities are further considered:

- Is the activity cooperative rather than competitive?
- Does it provide opportunities for getting students actively involved?

Does it connect global with local?

- Does it examine root causes?
- Does it examine the historical context of a situation?

Does it examine power issues?

- Is it experiential, constructivist and transformative and does it address various learning styles?

- Does it address the whole student (intellectual, social, psychological, spiritual) and encourage connection with personal experience?
- Does it include a futures orientation?
- Does it allow recording processes related to head, heart and hand?

In order to unify the process, the external evaluator prepared rubrics for assessing the ECTS and the community - based / service learning activity as shown below:

ECTS Assessment Rubric

Name of University:	**Title of Course:**				
Name of evaluator:					
ECTS/Workload Integration Assessment	**Strong Impact (4 points)**	**Good Impact (3 points)**	**Some Impact (2 points)**	**Minimal Impact (1 point)**	**Grade**
Alignment	The allocation of student workload matches up well with learning objectives, outcomes, so students learn what they intend to learn accurately.	The allocation of student workload matches up mostly with learning objectives, outcomes, so students learn what they intend to learn accurately.	The allocation of student workload does not match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.	The allocation of student workload does not match up with learning objectives, outcomes, so students learn what they intend to learn accurately.	
Critical comments: constructive /critical comments to improve the activity:					
Balance	There is strong evidence that the distribution of the working hours is done appropriately between the course modules.	There is not so strong evidence that the distribution of the working hours is done appropriately between the courses modules.	There is weak evidence that the distribution of the working hours is done appropriately between the course modules.	There is no evidence that the distribution of the working hours is done appropriately between the course modules.	
Critical comments:					
Coverage	The allocation of student workload matches up well with course activities and assessments.	The allocation of student workload matches up mostly with course activities and assessments.	The allocation of student workload does not matches up well with course activities and assessments.	The allocation of student workload does not match up with course activities and assessments.	
Critical comments:					
Communication	There is strong evidence that the student workload allocation is clearly understood and communicated to students.	There is not so strong evidence that the student workload allocation is clearly understood and communicated to students.	There is weak evidence that the student workload allocation is clearly understood and communicated to students.	There is no evidence that the student workload allocation is clearly understood and communicated to students.	
Critical comments:					
Monitoring	There is strong evidence that the way student workload is allocated makes easier to monitor student progress to see whether workload is actually implemented.	There is not so strong evidence that the way student workload is allocated makes easier to monitor student progress to see whether workload is actually implemented.	There is weak evidence that the way student workload is allocated makes easier to monitor student progress to see whether workload is actually implemented.	There is no evidence that the way student workload is allocated makes easier to monitor student progress to see whether workload is actually implemented.	
Critical comments:					

CCSAFS Community-Based / Service Learning Activity Rubric

Name of University:	Title of Course:	Title of module
Name of evaluator:		

Community/service-based learning goals and domains	Strong Impact (4 points)	Good Impact (3 points)	Some Impact (2 points)	Minimal Impact (1 point)	Grade
Define Activity Goals, Objectives and Outcomes	The community-based activity goals, purpose and expected learning outcomes clearly identified as well as connections between academic achievement, civic engagement, and personal growth supporting transformative learning.	The community-based activity goals, purposes and outcomes are clearly defined and include: academic achievement, civic engagement, personal growth in line with transformative learning.	Certain goals, purposes and outcomes are defined, but academic achievement, civic engagement, personal growth are not adequately defined.	Activity goals and learning outcomes are not clearly defined or do not address academic achievement, civic, personal outcomes.	
Meet Actual Community Needs Collaboratively	The community-based activity is based on a thorough review of needs and collaboration with the community	The activity is decided upon basic research and collaboration between the responsible instructor and community.	The activity is based on a guess as to what the community needs may be. No collaboration with faculty instructor or community.	The community needs are not taken into consideration and no collaboration is evidenced.	
Merging Theory with Practice & Course Curriculum Connection	The community-based activity is structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course.	Through the activity students have some active application of new knowledge and skills, showing a good connection to the whole course.	Through the activity students can experience some application of new knowledge and skills, showing minimal connection to the whole course.	Through the activity student do not apply any new knowledge and skills without connection to the whole course.	
Enhance Active Student Reflection	In the community-based activity, it is evident that students can actively reflect on their learning experiences that can eventually lead to personal and societal transformation.	Through the activity students have opportunities to reflect on provides their learning experiences that can reinforce some personal and societal transformation.	Through the activity student reflection is minimal and there is no clear evidence of personal and societal transformation.	There is absence of true active student reflection and any potential for personal and societal transformation.	
Develop Learning to Give and share	The community-based or service learning activity helps solve a real-life problem, meet a need or address an issue in community served.	Service activity provides some change or insight. Service enhances an already good community situation.	Service mainly decorative, but activity provides some benefit to community served.	Service mainly decorative, but service provides limited community benefit or does not offer any new or unique opportunity.	
Make a Difference in Community	The community-based activity includes actions that empower students to make a difference, in relation to the community problem or issue to be solved.	The students are given the opportunity to engage in actions that ensure to a good extent to make a difference.	The students show limited understanding of the importance of service in making a difference.	The students show no understanding of what making a difference means.	

The rubrics for assessing the ECTS and the community - based / service learning activity were sent to the course developers along with information related to the structuring of syllabus, the course modules and the learning resources.

A syllabus is a "learning contract" between the instructor and the students. It sets the basic rules and commitments regarding the course goals, objectives, as well as road map to monitor and assess the teaching and learning process. In the CCSAFS project, we will use the RUCAS syllabus template that serves as a planning tool for structuring the course modules, course implementation and assessment.

After developing the syllabus for the revised course, a list of the modules should be structured taking into consideration the following:

a) The weekly structure of topics in the syllabus

b) The supported literature listed in the syllabus.

This process of properly structuring the course modules helps university instructors to clarify the syllabus. It implies a re-organization of the weekly topics in the syllabus and it aligns the course goals/objectives and learning outcomes to course modules structure. It is important to note that a module can run for a week or more, depending on the topic. As the weekly topics are placed in a logic sequence, this should also be reflected in the modules. The revised course content could be broken into manageable and meaningful modules. The general practice is that a 14 weeks syllabus can be composed of 5-10 modules. However, exceptions are allowed depending on the course.

The course developer should be careful when reviewing the learning resources. It is suggested that he reviews the readings that are provided in the syllabus and prepares the supporting readings and resources in each module. More specifically, he should provide the corresponding pages of readings, tools and other resources necessary for each module.

To set-up the module units, the course developer should break-up each module on a set of units. All units of each module and all modules should reflect the course objectives and learning outcomes. Thus, for the development of each module aims and learning outcomes, the course developer needs to consider course aims and learning outcomes provided in the syllabus for the whole course. Each module should have 1-3 aims and no more than 6 learning outcomes. As the course developer writes the learning outcomes, he /she needs to deliberate on the learning activities that will allow students to achieve them as well as the assessment techniques to measure success.

The course modules template developed for RUCAS and CLIMASP formulates the module overview, aims, objectives, learning outcomes, and key concepts. An overview is a general introduction to the course, basically in a narrative form (between 100-150 words), supplemented by an outline and/or mind map. It may also include video and/or audio clips as well as graphics, slides or other images. The key concept is usually the main idea that should be explored in the module.

Developing learning activities/assignments

As for designed learning activities for each module, they should provide opportunities for the learners to immediately apply new knowledge that they gained from the learning process. When planning learning activities, the course developer should keep in mind the following:

- A learning activity/assignment addresses one or more than one learning outcomes of the module.
- If an important activity does not relate to a module learning outcome, consider writing an additional learning outcome.
- Take into consideration the tools, methods that can be used and can be combined in the learning activities.
- Give clear and appropriate instructions for the activities. For every activity/assignment, the course developer must write:

1) An overview: refers to the content of the activity/assignment, the length, the date of completion and what it includes.

2) Students instructions: refers to a more detailed description of the activity/assignment and what must be done.

3) Explanation: shows the meaning of the activity/assignment.

When the external evaluator assessed the revised syllabi, feedback was provided through emails and by specific Track Changes and Comments on the syllabi versions that were submitted for each course. However, a thorough analysis of the course content, modules and structure shows some weaknesses that were common in the syllabi designed. The external evaluator prepared some Reflections and Suggestions for Improving The MSc CCSAFS Course Curriculum in Egypt and Jordan. These reflections were sent to the course developers to improve their syllabi. These are described in the section below.

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 In some reviewed courses, there is no strong evidence that the courses are structured at the Master level. More knowledge-oriented rather than critical thinking, problem-solving or transformative learning.

 In many reviewed courses, the disciplinary concepts related to climate change, sustainability, food security and agriculture are not clearly intertwined through the course work. I suggest bringing these concepts together through the use of case studies or class activities that support problem-solving and critical thinking. These concepts should be brought more to the forefront from a sustainability perspective as examples of how disciplinary concepts can be combined in a pedagogically resourceful manner.

 The readings assigned in the designed courses as related to the concepts of climate change, sustainable agriculture and food security should better reflect how disciplinary concepts can be blended in a meaningful way. A suggestion might be to make this more explicit in the course learning outcomes; and this would improve connecting the course modules in a more significant way. There is an extensive literature on climate change, sustainable agriculture and food security that highlight the way human decisions affect environmental quality; i.e. how human values shape humans' demands for food quality improvement; how to design effective development policies to bring about these improvements. The relatedness of such issues to ethical, political, economic, social and technical dimensions is not clearly identified in the revised courses. The course modules should better lead towards a more in-depth understanding of climate change in a holistic way.

 The integration of the different disciplinary insights should lead to greater awareness around the impacts on human-environment interactions, climate change, sustainable agriculture and food security. Also, I suggest integrating in the various courses a module on policy formation and its impact addressing climate change. Thus, students learn to apply the course concepts to the analysis of real world problems. I base my evaluation on not only the course design and structure, but also on the requirement of addressing the issues of interest relevant to climate change, sustainable agriculture and

food security in a way that can contribute to the awareness-raising of students concerning the importance of climate change, as well as promote environmental assessment principles and integrate systematic environmental and socio-economic evaluation into national policy-making.

 The revised courses focus more on content and are more focused on the discipline itself. My suggestion is to foster the connection between ensuring that the course content is covered in depth at the competences, skills, and knowledge levels while also looking at the notion of bringing about attitudinal change and ensuring sustainability is at the forefront of values and transformative learning. I would advise a greater emphasis should be made in the various modules on the key links between climate change, sustainable agriculture and food security at both the knowledge and the attitudes/values levels. Don't neglect the attitudinal aspect of learning and its relevance in developing sustainable citizens.

 In many of the reviewed courses, I feel more opportunities should be explored from the perspective of course design, reading materials, course delivery and assessments to bring about more original and innovative insights. Some of the reading materials or references are not scientific references (i.e. Wikipedia). Better reading materials and open access resources are available.

 Based on the revisions of some course modules and course content, I could not see a real match between the topics addressed in the course; i.e. the course content seems to be not matching clearly with the course modules, the activities, the reading list provided and the community-based activity. I believe a more advanced level can be achieved in this regards. However, it is difficult to comment on this issue without access to all assignments, class discussions, and debates.

 The ECTS in the courses are not clearly calculated. It is not obvious to the evaluator to assess whether the learning outcomes are achieved. Each course should include the ECTS table (see table above). The instructor should focus on: 1) alignment: the allocation of student workload should match up well with learning objectives and outcomes, 2) balance: there should be strong evidence that the distribution of the working hours is done appropriately between the course modules, 3) coverage: the allocation of student workload should match up well with course activities and assessments, 4)

communication: there should be strong evidence that the student workload allocation is clearly understood and communicated to students, 5) monitoring: there should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

 Reinforcing the Sustainable Development Goals (SDGs) as pillars of sustainability could be developed into a really more meaningful way throughout the varying aspects of the course modules. In the reviewed courses, SDGs were just checked in the table (sometimes in the modules themselves), but there is no clear balance in all disciplines and they do not flow logically throughout all the modules. More efforts are needed in this regards. A possible method to clearly strengthen and link the 17 SDGs to the concepts of climate change, sustainable agriculture, as well as food security is to link those to the Human Development Index (HDI), for instance. The integration of these concepts could serve as a strong model for the designed courses in the CCSAFS Master. It would give an emphasis on the program objectives by highlighting the multiple definitions of development as recognized from a range of disciplines and allows for an in-depth analysis of how the SDGs can be understood using the classic theories of development.

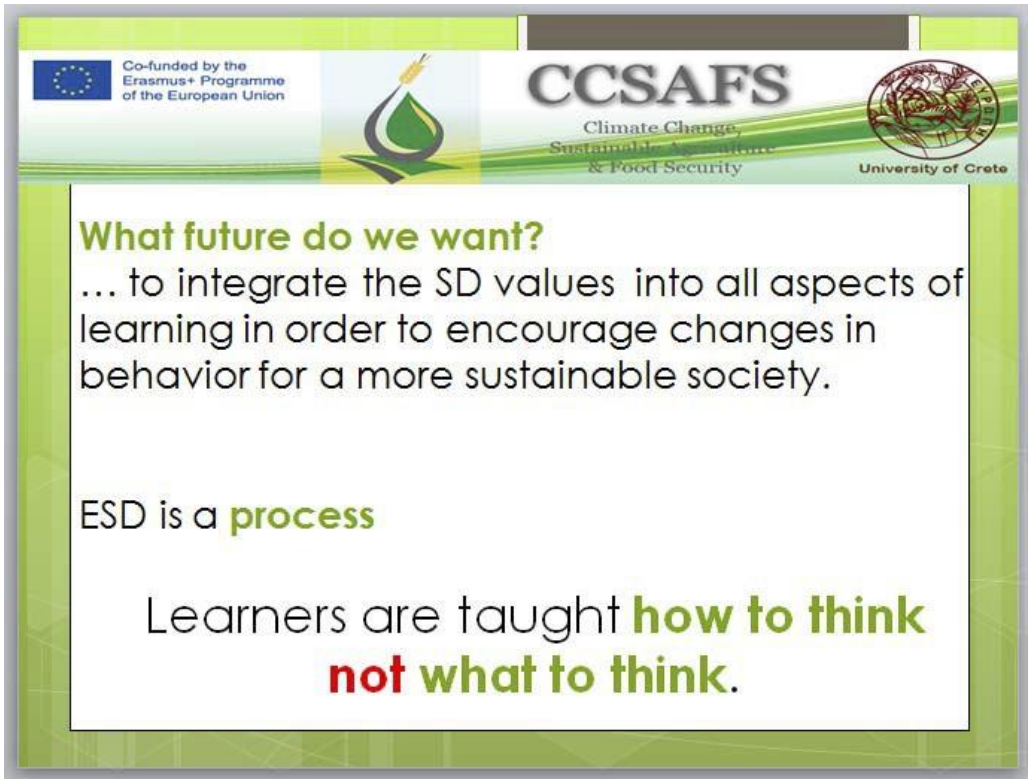
 In addition to a well-designed course, the instructor is invited to use various set of methodologies including case studies, debates and current readings in the field to develop students' understanding and promote deep learning. At the core of each course, the concept of human activities and their impacts on the natural environment and development policies should be more emphasized.

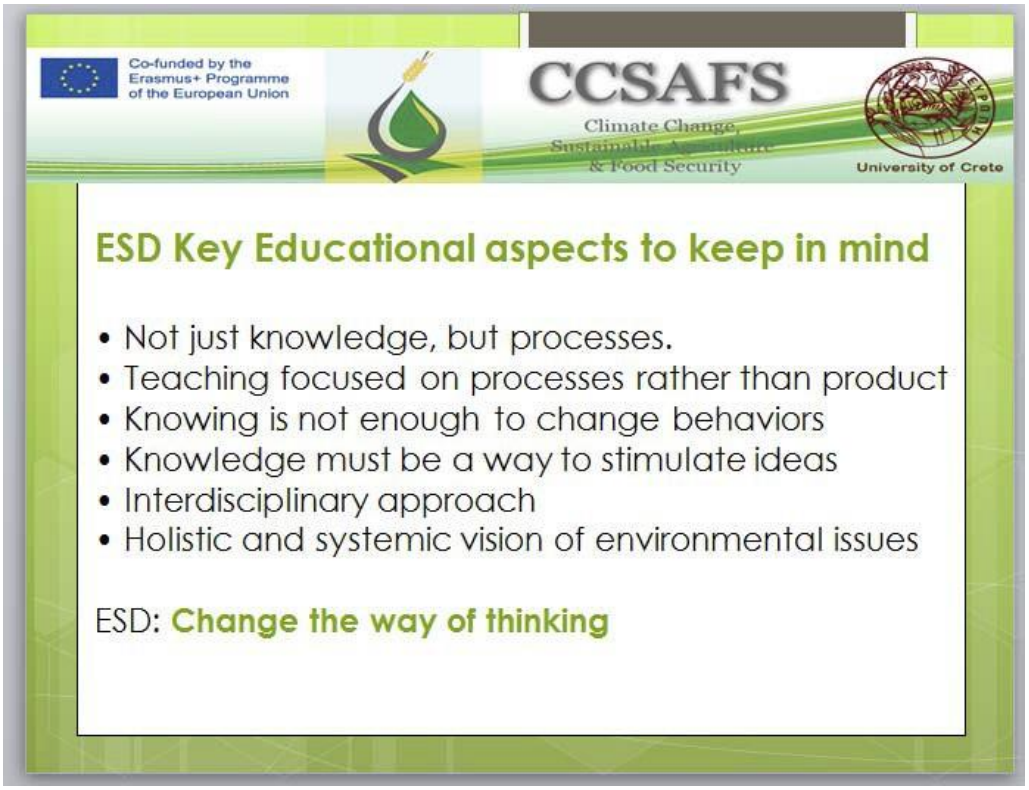
 For instance, in some revised courses, there is an ambiguous sense of balance in the various parts of the course, i.e. learning outcomes, methodologies used, and assignments /activities presented. This lack of coherence shows some weaknesses in that these courses do not use an integrative approach to further their aims and objectives. A more integrative and critical approach to the course content in the context of global issues, such as climate change, is desirable. It is suggested to examine challenges, such as sustainable agriculture and food security using a multi-disciplinary methodology. Each of the courses designed within the framework on this Master program should aim to raise awareness of the role of learners to reflect critically on possible sustainable solutions for today's

environmental problems; thus preparing for a sustainable future for all and to use relevant case studies as tools to help learners identify risks related to environmental issues. In many revised courses, such objectives are not attainable given the methodologies adopted. In particular, I think that the community-based / service learning activity is an excellent opportunity to link theory and practice. My suggestion would be to find a means of bringing the activity to a larger audience through online debate and sharing of best practice. On a more real-world setup, this may also support governments to reach practical decisions. The aims of the community-based activity are to be kept in mind: a) contribute to the awareness-raising; b) promote the progressive appropriation of environmental assessment principles and integration of systematic environmental / social / economic evaluation into national policy-making; c) contribute to the elaboration of assessments methods that can be adapted to other countries in the region. This clear association of theoretical learning to practical and ongoing personal and professional practice can ensure that all interrelated disciplines are studied and evaluated as knowledge and research, but also can contribute to policy and decision-making.

 Some revised courses involve traditional concepts in economics, agriculture, climate change; and these concepts are obviously related to a number of areas including sustainability, food security, environmental assessments, etc. in the context of society, the environment, and the economy. While this is clearly defined at the outset, some of these aspects are only touched on in the actual modules. In these courses, the range of concepts and methods are presented in a somewhat disjointed, fragmented way. It is clear that the discipline of economics, agriculture (or other) is the key discipline in the designed course and this should form the background and theoretical foundation for the course. In these courses, the set of aims and objectives, as well as the learning outcomes are clear. There are clear references to knowledge and skills breadth. What is missing is the values and societal aspect of the course. This can in turn be linked in a meaningful way to reflect critical thinking and problem solving. I would advise returning to the learning outcomes and grounding the modules in these outcomes. In the current approach used to design the course, there will be surface learning; however, there is an opportunity being missed for deeper learning that is based on critical thinking. More work on the methodologies used and the assessment procedures would support such learning. The suggestion is that the instructor needs to develop more critical thinking in the students to approach the course topics from an all-inclusive perspective.


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The debate is no longer about:
Will our climate change?
but rather about
How can we cope with its impacts and how can we limit future damage?


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What future do we want?
… to integrate the SD values into all aspects of learning in order to encourage changes in behavior for a more sustainable society.
ESD is a process
Learners are taught how to think not what to think.


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ESD Key Educational aspects to keep in mind
• Not just knowledge, but processes.
• Teaching focused on processes rather than product
• Knowing is not enough to change behaviors
• Knowledge must be a way to stimulate ideas
• Interdisciplinary approach
• Holistic and systemic vision of environmental issues
ESD: Change the way of thinking


Role of Higher Education
New challenges to universities
How can curricula be improved to change the way of thinking of new generations?

Role of Higher Education

If students are only taught to think in particular disciplines without integrating various disciplines into a coherent framework to study sustainability in its social, environmental, economic, cultural and political dimensions, it is unlikely that they will truly understand the need for personal and social transformation towards a sustainable society.

Universities have a responsibility to lead society towards a sustainable future

- Educational programs in terms of curricula and teaching methods should be improved (and new programs should be created)
- Need for a shift from a strict disciplinary orientation / focus on science, educational, economic, sociological and policy orientation.

Universities need to:

1. **Increase awareness of sustainability.** Raise public awareness by openly addressing urgent needs.

2. **Create an institutional culture of sustainability.** Encourage faculty members to engage in education, research, policy formation, and information exchange on sustainability.

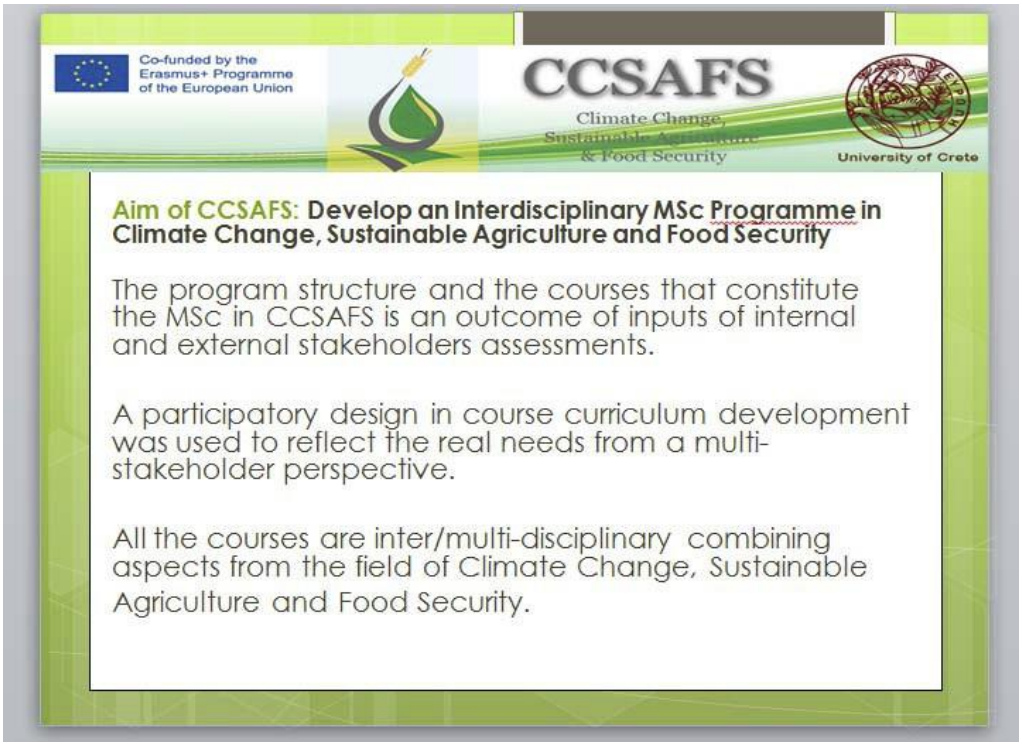
3. **Educate Environmentally Responsible Citizens.** Establish programs / curricula to ensure that graduates have the awareness and understanding to be responsible citizens.

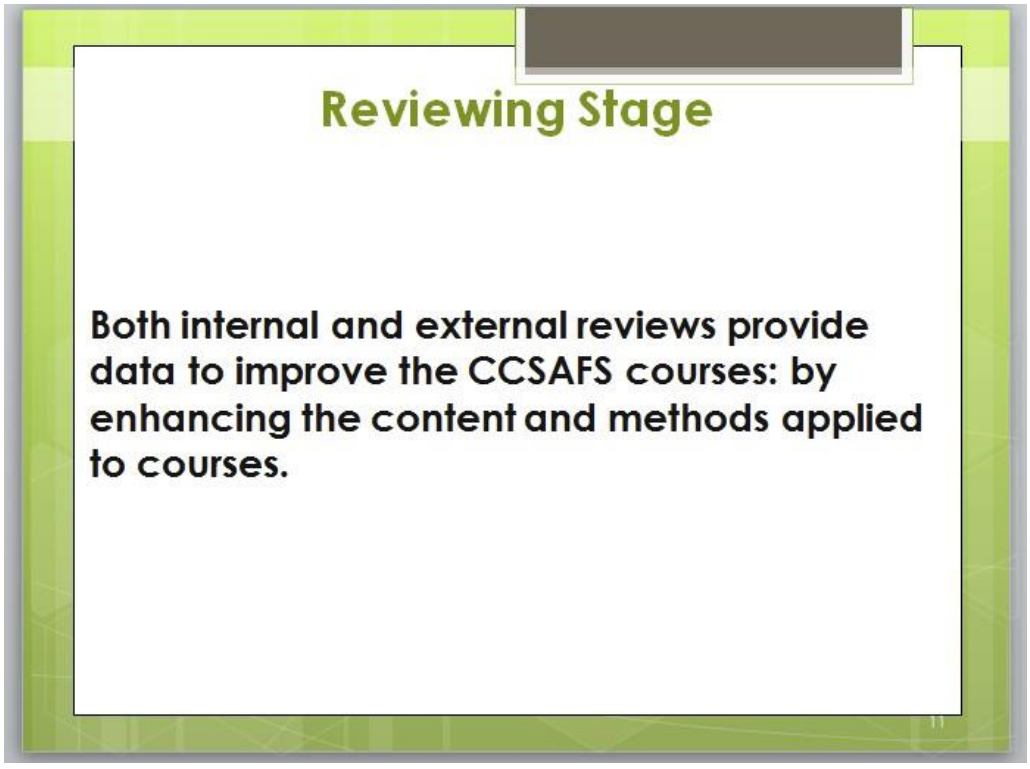
4. **Foster Environmental Literacy For All.** Create programs to develop capabilities of faculty members.

5. **Practice Institutional Sustainability.** Set an example of environmental responsibility by establishing sustainable institutional policies and practices.

6. **Collaborate for Interdisciplinary Approaches.** Support interdisciplinary research, education, policy formation, and information exchange.

7. **Outreach Nationally / Internationally.** Expand work with community and NGOs to assist in solving problems


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Aim of CCSAFS: Develop an Interdisciplinary MSc Programme in Climate Change, Sustainable Agriculture and Food Security
The program structure and the courses that constitute the MSc in CCSAFS is an outcome of inputs of internal and external stakeholders assessments.
A participatory design in course curriculum development was used to reflect the real needs from a multi-stakeholder perspective.
All the courses are inter/multi-disciplinary combining aspects from the field of Climate Change, Sustainable Agriculture and Food Security.


Reviewing Stage
Both internal and external reviews provide data to improve the CCSAFS courses: by enhancing the content and methods applied to courses.

MY ROLE: External Reviewer

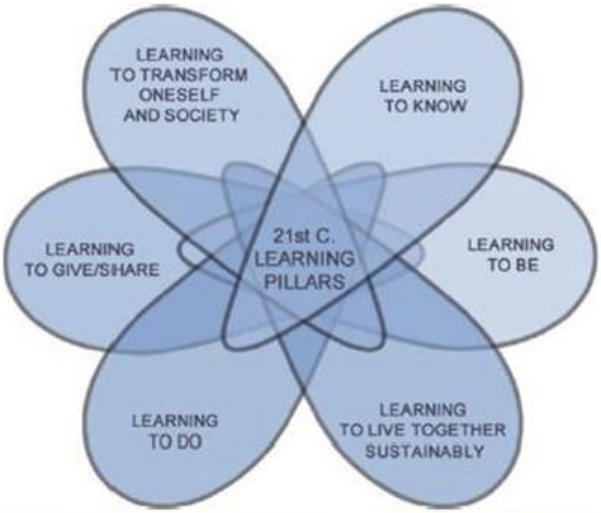
- Assess MSc course syllabi and modules
- Provide feedback and revise – until reaching an improved version

The external review process is based on standards, principles and indicators as well as rubrics.

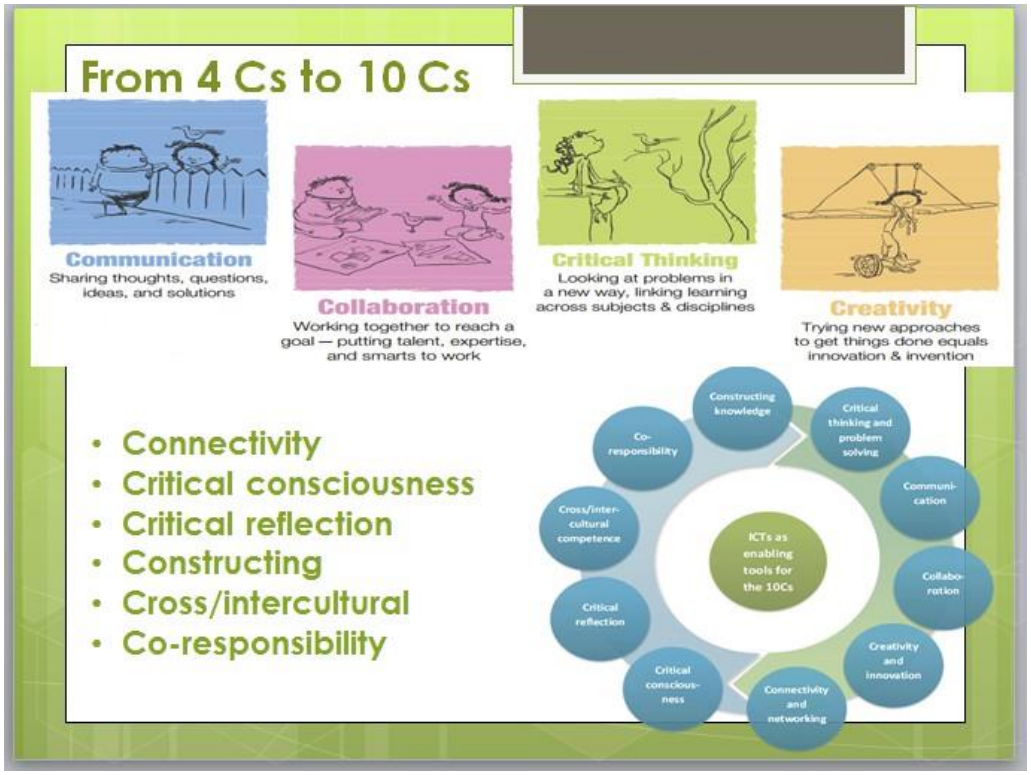
Main criteria for course review

- The six pillars of learning
- The 10 Cs and Problem Based Learning
- The relevancy of the course content and number of modules to the course duration (ECTS).
- The integration of at least one community/service learning activity
- The activities detailed with the steps of implementation and the assessment techniques.
- The link between the course content and the SDGs.
- The references and supporting reading material.
- The use of effective learning and teaching methodologies (active learning).

21st Century six Learning Pillars



Learning to know	This type of learning concerns all the processes and practices that lead people to experience, construct and transform knowledge for making sustainability a mode of life and being.
Learning to be	This type of learning concerns all the processes and practices that lead to human self-actualisation, self-regulation and cultivating a sense of being versus having.
Learning to live together sustainably	This type of learning concerns all the processes and practices that lead to a peaceful and non-discriminatory society and human co-existence with the natural world.
Learning to do	This type of learning concerns all processes and practices that lead to merging knowledge with action for building a sustainable future.
Learning to transform oneself and society	This type of learning concerns all the processes and practices to transform their unsustainable values and behaviours and collectively engage to change society towards sustainability.
Learning to give	This type of learning promotes solidarity and caring attitudes to meet human needs as learners gain autonomy and purpose for their learning and civic engagement.



Problem Based Learning

An instructional method which focuses on the investigation and resolution of "real world" problems as a context for students to learn critical thinking and problem solving skills

"Students work individually and/or in groups to solve challenging problems that are authentic, curriculum-based, and often interdisciplinary"

Advantages of Problem Based Learning

- Makes learning relevant to real world
- Moves learning from a passive to an active activity -learning
- Better engage students
- Promotes interdisciplinary approach
- Promotes transformative learning
- Requires advanced cognitive skills, higher order thinking & investigative skills
- Requires the 10Cs and the 6 pillars of 21st learning

ECTS Student Workload Rubric for Assessing ECTS Integration in Course Curriculum

- Reaching the learning outcomes of a course and course modules, in particular is directly linked to the *workload* (based on ECTS).
- Workload: Expected time an average student might need to complete the required learning outcomes.
- ECTS is a student-centered approach of describing learning by allocating credits to learning components in line with learning objectives and outcomes, based on the workload of the average learner.

Calculating workload

- Calculating workload is critical to understand the real learning achievements.
- To ensure students that are in track of their learning, it is important to list up all activities involved in the course modules in line with the learning outcomes in each module.
- It is essential to identify the learning components that a course consists of.
- And to weight each component in line with the learning objectives and outcomes, in total and separately for each course module.

ECTS Workload Rubric for Assessing ECTS Integration

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	10	3	30	3	3	6	6	6	6	30
Online	4	3	12	3	-	4	2	-	3	12
Lab work	6	2	12	2	4	-	2	2	2	12
Reading articles (3 pages per hour)	200	0,3	60	7	8	10	10	12	13	60
Reading book chapters (5 per/h)	150	0.2	30	4	5	6	5	5	5	30
Preparing course activities	6	15 (M)	75	11	20	14	30	-	-	75
Project work	1	20	20					5	15	20
Preparation for exam	1	50	50					20	30	50
Writing the exam	1	3	3						3	3
Total			292	30	40	40	55	50	77	292

Example of the workload calculation for a 10 ECTS course. The calculation method based on the whole course and in each course module. The workload is divided into a series of learning components, each involving an estimated number of hours of work (time factor). The total workload should match the learning hours indicated by the credit value of the course and be consistent with the rubric

ECTS Assessment Rubric

- **Alignment:** Allocation of workload should match up well with learning objectives, outcomes.
- **Balance:** *There should be strong evidence that evidence* that the distribution of the working hours is done appropriately between the course modules.
- **Coverage:** The allocation of workload should match up well with course activities and assessments.
- **Communication:** There should be strong evidence that the workload allocation is clearly communicated to students.
- **Monitoring:** There should be strong evidence that the way student workload is allocated makes easier to monitor student progress and assess implementation.

Integrating Community-Based / Service Learning into CCSAFS Course Activities

- Community Based-Learning refers to any pedagogical tool in which the community becomes a partner in the learning process.
- Service-Learning is a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities.

Community/service learning activities are evaluated on the basis of:

The activity should:

- Define the goals and expected learning outcomes.
- Connect academic achievement, civic engagement, and personal growth to support transformative learning.
- Meet Actual Community Needs Collaboratively.
- Merge Theory with Practice
- Enhance Active Student Reflection.
- Develop Learning to give and share.
- Make a Difference in Community

SDG Rubric: Activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc.

	SDGs	CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

SDG 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture"



Master Degree Structure
Compulsory Courses

Year	Semester	Course Code	Course Title
1st Year	1st Semester	CSAF801	Climate Change: Adaptation and Mitigation
		CSAF860	Applications of GIS and Remote Sensing
		CSAF802	Sustainable Management of Soil and Water
	2nd Semester	CSAF880	Statistics and Design of Biological Experiments
		CSAF803	Economics of Climate Change
		CSAF820	Sustainable Livestock Management
2nd Year	3rd Semester	CSAF870	Applications of Biotechnology in Sustainable Agriculture
		CSAF890	Social Entrepreneurship in the Organic Food Industry
		CSAF875	Sustainable Fisheries and Food Security

Master Degree Structure
Elective Courses

Course Code	Course Title	
CSAF830	Sustainability Justice of Food Security and Climate Change	1
CSAF835	Small-Scale Farming and Local Knowledge	2
CSAF840	Risk Analysis in Food Chain	3
CSAF845	Precision Farming	4
CSAF850	Consumer Behaviour, Marketing and Food Security	5
CSAF855	Environmental Governance	6

Master Degree Structure
University/Faculty Requirement Courses

Semester	Course Code	Course Title	
1st		Seminars	1
2nd		Seminars	
2nd	UNI-RESM 870	Research Methodology	2
3rd		Seminars	
3rd		Special Studies	3
4th		Bioethics	4

Main comments relate to:

- More knowledge-oriented rather than critical thinking, problem-solving or transformative learning
- The disciplinary concepts related to climate change, sustainability, food security and agriculture are not clearly intertwined through the course work
- The assigned readings should lead towards a more in-depth understanding of climate change in a holistic way.

Main comments relate to:

- Some courses focus more on content. The attitudinal aspect should not be neglected as it is relevant in developing sustainable citizens.
- In some courses, content does not match with the modules, the activities, and the readings.
- The ECTS in some courses were not clearly calculated. It was not obvious whether the learning outcomes are achieved.
- More work on the methodologies used and the assessment procedures would support critical thinking.

Strengths of revised courses

- Prepare students to become inquirers and problem solvers (creativity skills, critical thinking, communication, and collaboration).
- Prepare students to explore intersections of disciplines.
- Prepare students to play an active role in society at local and global level.
- Provide opportunities for students to reflect on moral, ethical, spiritual, social and cultural dimensions.

32

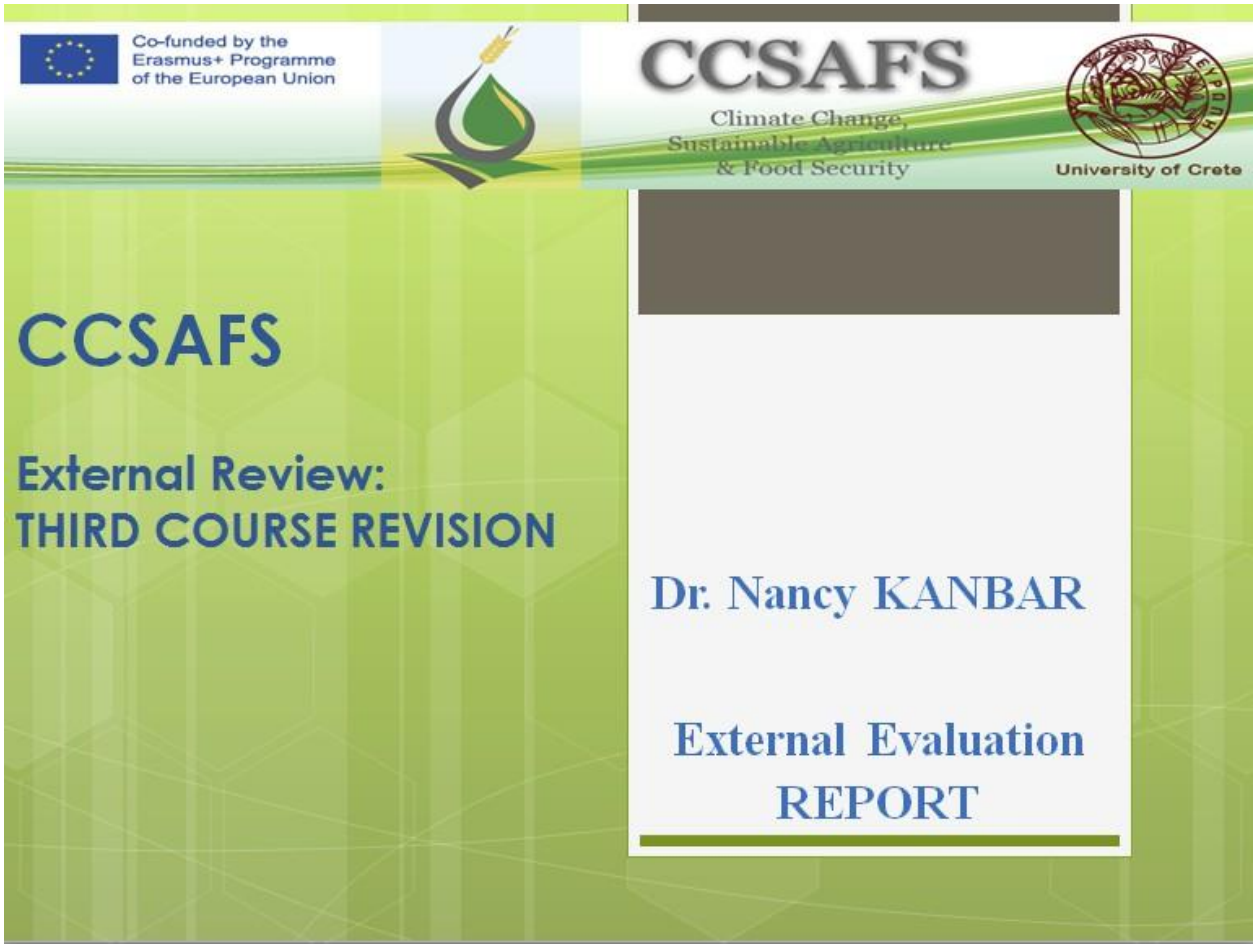
Strengths of revised courses

- Ensure the transition from teacher-directed to more student-directed learning.
- Encourage active citizenship. Help students take greater individual and group responsibility for their learning.
- Help teachers to merge theory with experiential, constructivist and transformative practices, incorporating community service and civic engagement.
- CCSAFS brings together multiple perspectives to address real world problems such as CC that are complex, and where no single discipline can resolve.

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Lessons to Be Learned
Build new projects to capitalize on CCSAFS in terms of sustainability and curriculum development.
Encourage regional cooperation through interdisciplinary collaborative research.
Ensure engagement of faculty members to safeguard the project sustainability after the funding period.
Ensure involvement and commitment at the administrative level of the institution of higher education
34


COMMITMENT TO:
Provide comprehensive quality education that fosters excellence in scholarship, lifelong learning and enlightened citizenship.
Promote respect for human dignity and rights, and concern for the common good.
Prepare students to be future leaders who can exercise reason upon knowledge and shape a more sustainable world
MISSION


Co-funded by the
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CCSAFS
Climate Change,
Sustainable Agriculture
& Food Security
University of Crete
CCSAFS
External Review:
THIRD COURSE REVISION
Dr. Nancy KANBAR
External Evaluation
REPORT

THIRD COURSE REVISION

When returning from Crete, the below checklist was sent to course developers to help finalize their courses.

Checklist: General suggestions to finalize CCASFS courses

1) Master level courses should be oriented towards critical thinking, problem-solving or transformative learning (not only knowledge-oriented)
2) Bring together the disciplinary concepts related to climate change, sustainable agriculture and food security through the course work. Use case studies / class activities that support problem-solving / critical thinking. From a sustainability perspective, disciplinary concepts should be combined in a pedagogically resourceful manner.
3) The readings assigned as related to the concepts of climate change, sustainable agriculture and food security should better reflect how disciplinary concepts can be blended in a meaningful way. Make sure to relate these issues to ethical, political, economic, social and technical dimensions. The course modules should lead towards a more in-depth understanding of climate change in a holistic way.
4) The integration of the different disciplinary insights should lead to greater awareness around the impacts on human-environment interactions. Integrate the various course topics with policy formation. Students should learn to apply the course concepts to the analysis of real world problems, addressing these issues in a way that can contribute to awareness-raising, as well as promote environmental assessment principles and integrate systematic environmental and socio-economic evaluation into national policy-making
5) Course content should be covered in depth at the competences, skills, and knowledge levels. Nevertheless, course developers should not ignore the attitudes / values levels. They should bring about attitudinal change as sustainability is at the forefront of values and transformative learning (to develop sustainable citizens).
6) Reading materials or references should be up-to-date, scientific and reliable references.
7) Make sure to match (connect) the course content with the course modules, the activities, the reading list provided and the community-based activity.
8) Use various set of methodologies including case studies, debates and current readings in the field to develop students' understanding and promote deep learning.
9) Use a multi-disciplinary methodology to examine challenges related to climate change, sustainable agriculture and food security. The community-based (service learning) activity can help link theory and practice. The clear association of theoretical learning to practical and ongoing personal and professional practice can ensure that all interrelated disciplines are studied and evaluated as knowledge and research, but also can contribute to policy and decision-making.
10) Even though courses involve traditional concepts in economics, agriculture, climate change, etc.; yet make sure to relate these concepts from a sustainability perspective, i.e. in the context of society, the environment, and the economy. The range of concepts and methods cannot be presented in a disjointed or fragmented way. A critical thinking approach to connect course topics from an all-inclusive perspective is a must, while emphasizing on the values and societal aspect of the course. This will foster deeper learning based on critical thinking.

Course Developers sent a final version for their revised courses to the external evaluator to approve. Some courses needed further revisions. The syllabi were then approved and the program was **advertised** in the various faculties in the partner universities.

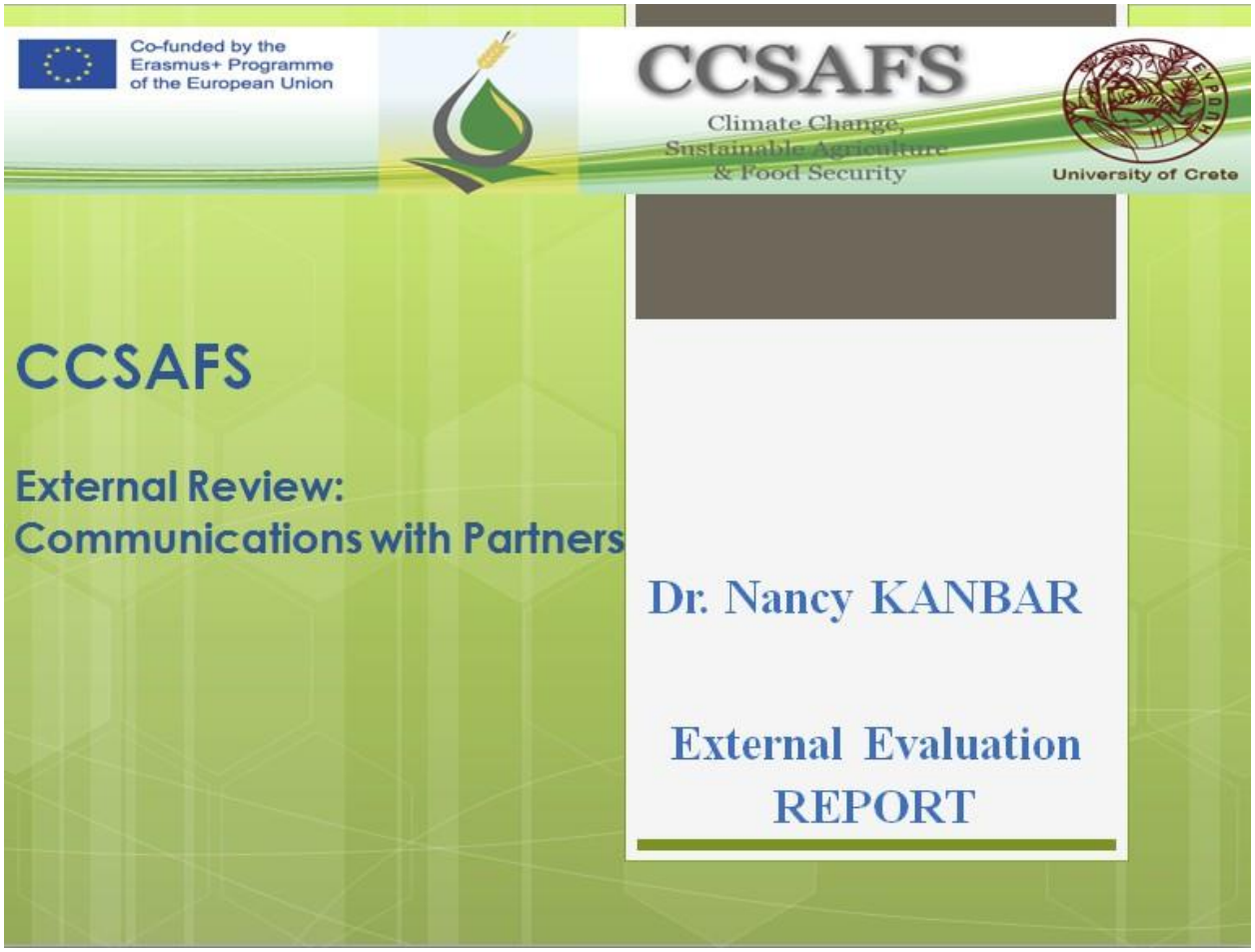


CCSAFS program advertisement at Suez Canal University



CCSAFS advertisement in Suez Canal University




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University of Crete
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External Review:
Communications with Partners
Dr. Nancy KANBAR
External Evaluation
REPORT

Dear colleagues,

As you know I am responsible for the external evaluation and monitoring for your CCAFS courses. I have communicated with Dr. Manal Hefny who informed me that about 15 revised syllabi were updated after the evaluations of colleagues in the University of Padova and they were uploaded on the CoP.

I have got the revisions from Dr. Paolo but I could not match all the syllabi you have uploaded on the CoP with those revised by colleagues at University of Padova. Some syllabi do not have the name of the instructor, the name of the university, etc. On the CoP, I am present in 16 groups and I was trying to look into each group for the updated syllabi. However, most of them were uploaded into one category (the research methods). Other categories are empty, which makes the follow-up harder, especially when I do not know all the colleagues and when most courses are uploaded by one person. **Maybe Manale can help me to fill the attached list of names, emails of professors and their revised courses. And, I would appreciate if a similar table can be done for Jordan.**

On another hand, Professor Makrakis sent you the **ECTS Student Workload and a Rubric for Assessing ECTS Integration in CCSAFS Course Curriculum**. All the syllabi uploaded on the CoP do not have this rubric. As you know, this guideline is an important tool for me, as an external evaluator, to better comprehend and assess student workload when reviewing and revising the CCSAFS courses.

One last point, on Aug 18, we got an invitation from Heliopolis University who is hosting the **conference** "Dignity and Innovation - Strategies for a Sustainable Future, with a Special Focus on Agriculture and Water" 21st – 24th September 2018. This is a good way to disseminate the project. I communicated with few colleagues from Egypt and I was informed they are not attending for various reasons (university starting, transportation issues, etc.). I need to make sure colleagues from all partner universities in Egypt will be there, otherwise there is no justification for me to travel to Egypt. Also, we need the conference agenda.

Regarding Jordanian colleagues, I have no updated syllabi at all. Haven't you got the feedback from Padova University yet? Any updates?

Best regards to all,
Nancy

Dear all,

Thanks Dr Mamdouh for the Al azhar university courses. There are only two courses attached in your email. That's all for Al Azhar university?

Yes of course, please upload to the CoP so other colleagues can check them. I recommend the upload of updated courses to be in the right category. Remember the CoP is being monitored for activity by Brussels.

Please add the university name and date of the course in the name of the document so I know which ones are new.. It has been so confusing for me to know what you are doing as the names of the courses are being even changed...let's follow these examples:

Al azhar-Climate change economics- sept 15 2018

SCU-title of course- sept 20 2018

Heliopolis - title- date

It would be also great if the institutional coordinator in each partner university would send them directly to me by email so I ensure to get them all.

Thank you,

Nancy Kanbar

Post on CoP- Sept 18 2018 3:05 pm

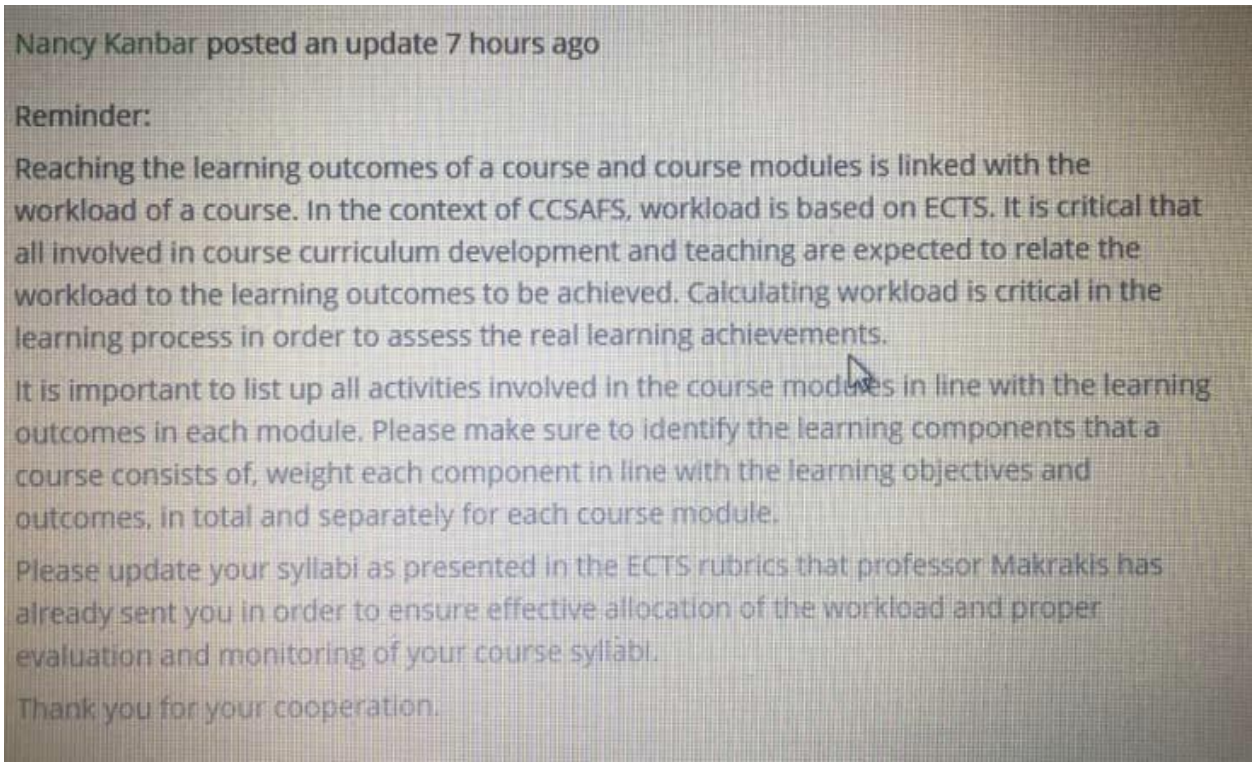
Reminder:

Reaching the learning outcomes of a course and course modules is linked with the workload of a course. In the context of CCSAFS, workload is based on ECTS. It is critical that all involved in course curriculum development and teaching are expected to relate the workload to the learning outcomes to be achieved. Calculating workload is critical in the learning process in order to assess the real learning achievements.

It is important to list up all activities involved in the course modules in line with the learning outcomes in each module. Please make sure to identify the learning components that a course consists of, weight each component in line with the learning objectives and outcomes, in total and separately for each course module.

Please update your syllabi as presented in the ECTS rubrics that professor Makrakis has already sent you in order to ensure effective allocation of the workload and proper evaluation and monitoring of your course syllabi.

Thank you for your cooperation.



Dear colleagues,

As you know, my task as an external evaluator is based on two levels: 1) monitoring and 2) evaluation.

At the monitoring level, I need to follow-up the implementation of tasks, such as the integration of the workload based on ECTS in every course module. Professor Makrakis has attached to you the guidelines and rubric for this matter. Course developers on this task must work in line with these guidelines. The 15th of September was the deadline given for that. Checking the few syllabi that were uploaded on the CoP, only 4 courses (2 from Al Azhar and 2 from Jerash), I realize that the ECTS allocation was not clear. **Besides each activity in the module, you should indicate the ECTS equivalent. A table for ECTS for the whole course cannot be assessed - as I am not sure which activity you're talking about and which Learning outcome you are considering.**

At the evaluation level, the integration of ECTS has not been implemented properly using the guidelines and rubric.

Since I am not able to communicate with all, I am sending this email to you so you can disseminate it with colleagues in other Partner universities.

To facilitate communications:

I have uploaded a post regarding this on the CoP on all 16 groups I am in. And, with the help of Nikos we have created a group discussing "general issues" and inviting everyone to accept the invitation to be a member in the group so I can send general comments there. Also, I have sent individual friend requests on the CoP for all members to facilitate communications. **Please go to the CoP and accept the invitations.**

Please note: Many courses were uploaded in the CoP in the wrong categories... This makes it impossible to make suggestions to the course developers- as any comment I will suggest as a moderator will be seen only by the group members. So, if your syllabus is in another group, you will not receive my comments, because you are not a member in all groups (Except for the general issues group that we have created today). Also, it is imperative to make the title of the uploaded document indicative. The way we will go is:
Name of University- title of the course- date of updates
Example: Heliopolis-climate change economics- sept 19 2018

I hope this helps and if you have any question, please do not hesitate to ask.

Best of luck,
Nancy

COMMUNICATIONS EXAMPLES

Dear Vassilis,

Thanks for your email. I am following up with members on the CoP and sent invitations for discussion a month ago. Only 3 colleagues accepted the invitations. So, I am not able to make any discussions on the CoP.

As for the courses, I have received the following:

- Economics of Climate Change, Sustainable Agriculture and Food Security. Jerash University. Dr Mohamed AlTarawneh. Learning goals, SDGs and ECTS workload in the modules are completed.
- Consumer Behaviour and Food Security and Marketing. Jerash University Dr Mohamed AlTarawneh. Learning goals, SDGs and ECTS workload in the modules are completed
- Sustainable Management of Soil and Water. University of Suez Canal, Faculty of Agriculture, Dr. Samy Abd El-Malik Mohamed Abd El-Azeem. Learning goals, SDGs and ECTS workload in the modules are completed.
- Risk Analysis in the Food Chain. Al-Azhar University. Prof. Dr. Khaled El-Khawass Dr. Said Desouky. Learning goals, SDGs and ECTS workload in the modules are missing.
- Sustainable Fisheries and Food Security. Al-Azhar University. Prof. Mamdouh Ahmed Omar, Dr. Mohamed Ali El Badry Hafez. Learning goals, SDGs and ECTS workload in the modules are missing.
- Risk Analysis in the Food Chain. Jerash University. Dr. Kamel Sultan. No syllabus is provided. I only got the workload allocation and the ECTS Assessment Rubric that I should be doing not Dr. Sultan. Maybe there is a misunderstanding of what is required. Learning goals, SDGs are missing. Modules are missing.
- Climate Change, Mitigation and Adaptation. Professor Abbas Al-Omari. I need the file in Word (not in PDF) so I can provide comments by track changes. Learning goals and ECTS workload in the modules are missing.

I am pretty sure that's all the courses uploaded recently after you have sent the syllabi to all as examples to follow. I have many versions of other courses, but they are not at all completed. It is very difficult to follow-up this way.

If you can send an email to the coordinators in each university to collect all syllabi that are completed in their institutions and send them directly to me by email on nancykanbar@yahoo.com, that would be greatly appreciated.

Hope to get answers from the coordinators,
Nancy

COMMUNICATIONS EXAMPLES

Jul 5 at 2:21 AM

Dear Dr Wagdi Saber Soliman

Attached are my comments to your course on precision farming (and to the community-based activity). These were sent to me in two separate files. It is appreciate if you can merge them into 1 document. You can check TRACK changes, and press FINAL SHOW MARK UP and you will be able to see my comments.
You can work on the same file so you do not miss the changes done. Please press ACCEPT on each change done and address the comment (and delete it afterwards) so you can have a clean version of the file. Once done, you can send it to me and to Dr. Hefny who will send it to the person in charge.

If you have questions, do not hesitate to let me know.

General comments:

1) The community-based activity goals, purpose and expected learning outcomes are clearly identified. The connections between academic achievement, civic engagement, and personal growth are obvious in the activity that is structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course. Also, it is evident that students can actively reflect on their learning experiences that can eventually lead to personal and societal transformation. There is clear evidence that the activity helps solve a real-life problem, and it meets a need or address an issue in the community. But, please include the activity in the syllabus (it is now in another word document). They should be in one document (syllabus and activity at the end of the modules).

2) The readings assigned in the course should follow the same style in referencing. Also, the readings should reflect how disciplinary concepts can be blended in a meaningful way. More efforts are needed here.

3) I suggest that the course learning outcomes be improved in a way to match those in the modules. This will improve connecting the course modules in a more significant way.

4) The economic aspect (in module 6) needs to be more emphasized and the interrelatedness of social, economic and technical dimensions should be clearly identified.

5) Please be careful to address the issues of: climate change, food security, and sustainable agriculture. They are not highlighted in a clear way in the course, and I believe that they could be better revealed. in a way that can contribute to the awareness-raising of students concerning the importance of climate change, as well as promote environmental assessment principles and integrate systematic environmental and socio-economic evaluation into precision farming.

6) All course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc. In the designed course, only 5 SDGs were addressed as checked in the table (sometimes in the modules themselves), but there is no clear balance. What about the other SDGs? I believe you can target more SDGs when you address my comments (numbers 4 and 5).

All the best,
Nancy

COMMUNICATIONS EXAMPLES

Small Scale Farming- Aswan University- Dr Wagdi Saber Soliman

Jul 7 at 11:31 PM

nancykanbar@yahoo.com <nancykanbar@yahoo.com>
To: Wagdi Saber <wagdi79@agr.aswu.edu.eg>
Cc: Manal Hefny <manalhefny96@gmail.com>
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>
2 Files340.7kBDownload All

NK comments- july 7 2019- Small Scale Farming Syllabus.docx

NK comments- july 7 2019- Small Scale Farming- CCSFS Community-based or service-learning activity.docx

Dear Dr Wagdi,

MY COMMENTS:

1) IMPORTANT: The same community-based activity proposed in this course (small scale farming) was proposed in your first course: 'precision farming'. It is recommended to design an activity well-targeted towards small scale farming in particular. Please note the community-based activity goals and expected learning outcomes should be well identified and should link to the course objectives. And, this is not obvious in your designed community-based activity.

I propose for you an example of a community-based activity that you might help you to start and develop further.

The students can develop a questionnaire and survey small community farmers. The questionnaire can target economic, managerial and marketing issues- in terms of production (local food supply), yield, marketing agricultural products, etc. Also, information about indigenous knowledge... Through the survey, the students will analyze the data to find out the real problems- addressing the main themes: climate change (water shortage, drought, high temperatures, etc.), sustainable agriculture, and food security--- that the farmers face in their small farms. Also, students can be involved in recommending specific solutions to the identified problems. In this way, the activity helps solve a real-life problem, meet a certain need or address an issue in the local farmers' community.

2) This course should include various disciplinary concepts related to economic theory, management, climate change, sustainable agriculture and food security. The course objectives are:

- Gain a valuable understanding of the myriad of economic, managerial and regulatory issues involved in starting and managing a small farm
- Achieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community
- Engage and collaborate with local, small farms and their entire ecosystem (e.g. local supply chains, farmers' markets, farming communities, etc.)

The objectives focus on the achievement of concepts and skills related to the main topic (small scale faming). However, the achievement of cognitive, psychological, and social skills among learners (life-learning skills, transferable skills, active participation in the community, responsible citizenship) is not well-highlighted much in the course. These skills are important in ESD and it is recommended to reflect them in the objectives and learning outcomes. Also, these are important as they support problem-solving and critical thinking.

3) The use of case studies and field visits are important to bring together several of these skills as well, but they need to be brought more to the forefront from a sustainability perspective to show how disciplinary concepts can be blended in a meaningful and pedagogical clever manner.

4) The readings in the field of climate and sustainability should also reflect this approach. A suggestion might be to make this more explicit in the learning outcomes of the course and this would help to anchor the modules in a more meaningful way.
I would suggest more recent bibliography and newer publications. Why IPCC (2007)? The IPCC has published much recent reports. The readings assigned in the course should follow the same style in referencing. Also, the readings should reflect how disciplinary concepts can be blended in a meaningfully.

5) It is imperative to relate the course content to the main themes of CCSAFS (climate change, sustainable agriculture and food security). The small scale farming should be designed while addressing these themes. They are not highlighted clearly throughout the course modules.

6) The course objectives focus on economic, managerial and regulatory issues involved in starting and managing a farm. However, aside from 'production' and 'management', the course lacks the economic, managerial and regulatory aspects which should be reflected in the course modules to emphasize the interrelatedness of the social and economic dimensions of small scale farming with the technical dimensions to operate a small farm. Also, it is important that the course emphasizes the main themes in the course title: local food supply and indigenous knowledge.

7) Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc. In the designed course, only 4 SDGs (SDG numbers: 1, 2, 8 and 9) were addressed. What about the other SDGs? I believe that through the course objectives, more SDGs could be targeted (am particularly thinking of SDGs numbers 5, 6, 15).

8) The teaching methodology is based on a traditional approach, more centered on transmitting theoretical contents. It is recommended to integrate well-designed activities that can enhance the active role of students and promote the achievement of critical thinking and problem-solving skills. I suggest planning activities that can link theory with practice, considering local communities of small farmers. It is important to emphasize the connections between academic achievement, civic engagement, and personal growth and provide students with new knowledge and skills that they can apply in a real life context keeping the three main themes (climate change, sustainable agriculture and food security) well connected throughout the course.

9) Please include the community-based activity in the same document of the syllabus (insert the activity at the end of the modules).

Regards,
Nancy

COMMUNICATIONS EXAMPLES

Approved CCSAFS courses

Jul 13 at 9:34 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Manal Hefny <manalhefny96@gmail.com>
makrakis <makrakis@edc.uoc.gr>, Nelly Kostoulas <nkostoula@edc.uoc.gr>

Dear Manal,

It just came to my attention that you are sending the courses to Dr. Kleisarchakis for upload through LMS without accepting the track changes. This will be very confusing.

The course Climate Change Mitigation and Adaptation should be cleaned up from changes and comments.
Please make sure all courses are clean versions without track changes.
Go to TRACK CHANGES Under REVIEW, check FINAL SHOW MARK UP and accept the changes ONE AT A TIME so you are sure of what is being changed.

Best,
Nancy

COMMUNICATIONS EXAMPLES

Economics of Climate Change, Sustainable Agriculture and Food Security-Heliopolis University
Jul 15 at 1:52 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Manal Hefny <manalhefny96@gmail.com>
Cc: Mohammed Anwar <mohammed.anwar@hu.edu.eg>

NK comments july 14 2019-heliopolis-Economics of Climate July 8.doc

Dear Manale,

I am done with the syllabi sent by Heliopolis on July 8. Unfortunately, the two courses are NOT updated according to the comments I sent to you.

I will send you two different emails for ease of sending to the course developers.

COURSE NAME: Economics of Climate Change, Sustainable Agriculture and Food Security

The first revision made by Associate Professor Samuele Trestini, Department of TESAF, University of Padova - Italy on 09/03/2018.
Unfortunately, this course is sent to me on July 8 of 2019 in the same format and content as sent to Padova University for the first review.
After reviewing the syllabus, I agree with the first evaluator. The course developer has not updated his syllabus to address the comments sent by the University of Padova.

Please check attached document and see my detailed suggestions in track changes in the document. Also, at the end of the document, I have developed new course outline / schedule and new modules - I WROTE ABOUT 10 PAGES BY MYSELF AT THE END OF THE DOCUMENT (knowing that this is NOT my responsibility TO RERWRITE THE COURSE). The instructor needs to review the new modules I SUGGEST and combine them with some of the information he / she has in his original syllabus!

The main issues remain:
-The objective of the course is quite ambitious. The provision of the conte...s described by the syllabus would require more hours of teaching.
-The correspondence between the objectives and the outcomes is not clear.
-The description of the course schedule does not seem to be consistent with the description of the modules.
-The schedule associates large disciplinary macro-areas with each week (e.g. microeconomics, agricultural economics). These would represent courses alone. It is suggested to propose a brief description referring to the contents described in the modules.
-The concepts in the modules should be updated
- It is suggested to introduce some principles of Economics Policy, discussing how a Policy can be developed and the tools that can be applied. Particular attention should be given to policy tools aiming to reduce market failure as in the case of commons (e.g. natural resources) or negative externalities (e.g. pollution, GHG emission).

The course design and structure lack:
1) A thread that contributes to the awareness-raising regarding policy-making as related to climate change,
2) A discussion of the environmental assessment principles and integration of systematic environmental and socio-economic evaluation into national policy-making;
3) The elaboration of methods and economic techniques for such socioeconomic assessments, cost benefit analysis, contingent valuation methods.

There no clear link between theoretical learning of economics and the focus on climate change economics that ensures that interrelated disciplines (environmental science, agriculture, food security, and economics). These should be examined in a holistic view. The course developer has distinct sections on microeconomics, and agriculture economics, climate change, but the contribution of the course to policy and decision making is still weak because the aspects of the interrelated disciplines have not been given a coherent prominence in the course c...sign and are not well blended in the final assignment.

It is important to note that macroeconomic principles are not major elements in this course. All environmental economics is basically based on microeconomic principles. In the course schedule the third week is focused on macroeconomics and I don't see this useful in this course.

This course, as described, aims to provide an introduction to the complex world of "Economics of Climate Change, Sustainable Agriculture and Food Security Agrifood Economics and Policy- UNIPAD)". And, this is mainly about the way human decisions affect the quality of the environment (anthropogenic greenhouse gases that contribute to climate change), how human values and institutions shape our demands for quality (consumption); and, about how to design effective economic and development policies to bring about these improvements. The relatedness of environmental issues to ethical, political, economic, social and technical dimensions is not identified clearly.

Modules (3) and (4) that I am suggesting (see end of document attached in track changes) can help towards an in-depth understanding of climate change economics and sustainability policy. I invite the course developer to integrate those in the syllabus. The other modules (5) through (7) in my suggestions are also necessary for this course. I am not seeing these modules in isolation but would like to see them linked to other modules and concepts discussed by the course developer in the course designed above.

- I SUGGEST MORE MODULES TO BE ADDED or COMBINED with the course design above to improve the course- as the scope of the course needs a wider perspective.
- In the modules, I have suggested other relevant readings and activities.
- The course developer can use my newly designed modules in combination with the modules he / she believes are important in the course design (the origir syllabus sent to me) and come up with a more comprehensive syllabus.
- Once the final version of the syllabus is done, he / she should rearrange the SD pillars, 21st ESD, SDGs, ECTS, and vision 2030 as you see fit your final course syllabus.

- Please provide to us a clean updated version of the syllabus-with all changes addressed.

Good luck,
Nancy

COMMENTS- Jerash University-Economics of Climate Change, Sustainable Agriculture and Food Security- Dr.Mohamed Al Tarawneh

Jul 16 at 1:43 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: tahat1972@gmail.com
Cc: m.tarawneh@jpu.edu.jo
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>
1 File459.5kB

Dear Professor Tahat

I am attaching my comments in Track changes for the course: Economics of Climate Change, Sustainable Agriculture and Food Security- Dr.Mohamed Al Tarawneh. If you click on REVIEW- TRACK CHANGES- FINAL: showing mark-up, my comments can be seen and the changes / deletions and additions. This way makes it easier to Dr. Al Tawarneh to follow through and ACCEPT the changes and address the comments.

Also, at the END of THE DOCUMENT, you can find my suggestions to the course Schedule and 7 new modules that I have developed to emphasize the economic and Policy aspects that are somehow weak in the course sent to me.
Dr. Al Tawarneh can use some of the modules I am suggesting or all of them in combination with the ones he has developed to give the course a more holistic view (he has developed only 3 modules and this is not enough to cover the topics in the course).

My general comments to the course are summarized below:

- Only two objectives relate to economics (# 3 and 4)
  3. Using Cost Benefit Analysis as an integral part of project selection.
  4. Understanding economic assessment of the environmental impacts of the project.
- Course resources and readings need update especially when it comes to economics of climate change. Follow APA style in referencing for consistency
- The community service activity needs more elaboration
- It is suggested to improve the correspondence between the objectives and the outcomes.
- Your course should emphasize the economics and policy aspect of climate change, with emphasis on sustainable agriculture and food security. However, the concepts related to economics and policies are not well developed.
- The modules described are not enough to cover the course objectives and learning outcomes. More modules should be added in way that the course outline and objectives show consistency with the topics in the modules. The modules to add should examine environmental assessment principles and integration of systematic environmental and socio-economic evaluation into national policy-making.
- The elaboration of methods and economic techniques for socioeconomic assessments, cost benefit analysis, contingent valuation methods is most needed.
- It is suggested to introduce some principles of economics policy, discussing how a policy can be developed and the tools that can be applied. Particular attention should be given to policy tools aiming to reduce market failure as in the case of commons (e.g. natural resources) or negative externalities (e.g. pollution, GHG emission).
- There focus on climate change economics should ensure that interrelated disciplines (environmental science, agriculture, food security, and economics) is not missing. These disciplines should be examined in a holistic view, and not in separate sections as in the syllabus provided. The course developer has distinct sections on climate change, sustainable agriculture and food security, but the contribution of the course to climate change economics in relation to policy and decision making is still weak because the aspects of the interrelated disciplines (sustainable agriculture and food security) are not well blended.
- This course, as described, views climate change as a "fundamentally economic problem; however, climate change has a unique set of attributes that makes standard economic analysis hard to apply"..... "It is pervaded by uncertainty in every step of the process of translating global emissions into local damages. The costs and benefits of its mitigation are highly mismatched geographically as well as temporally, and its damages are largely irreversible". The description obviously shows that the course should focus about the way human decisions affect the quality of the environment (anthropogenic greenhouse gases that contribute to climate change), how human values and institutions shape our demands for quality (consumption); and, about how to design effective economic and development policies to bring about these improvements. The relatedness of environmental issues to economic, social, political, and technical dimensions is not clearly identified.
- The course includes only 3 modules: climate change, sustainable agriculture and food security. I suggest more in-depth understanding of climate change economics and sustainability policy and I ask the course developer to integrate those in the syllabus and link the concepts discussed in a comprehensive way.
- I AM PORPOSING BELOW detailed MODULES TO BE ADDED or COMBINED with your course syllabus to improve the scope and give it a broader perspective. In the modules below, I have suggested other relevant readings and activities. You can use the modules below in combination of the modules you believe are important in your original syllabus you sent me- and am sure you can come up with a more comprehensive syllabus.
- Also, please check my recommendations regarding course outline and detailed modules below.
- Once you have a final version of the syllabus, you should rearrange the SD pillars, 21st ESD, SDGs, ECTS, and vision 2030 (the vision 2030 is missing- please refer to the template of Dr. Makrakis) to fit your final syllabus.
- Provide us with a clean version of the syllabus- without comments and with changes addressed.

If you have questions, please do not hesitate to ask.
Best,
Nancy

NK comments-Consumer Behavior and Food Security and Marketing-Dr. Mohamed AlTarawneh- Jerash University

Jul 20 at 2:29 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Ibrahim Tahat <tahat1972@gmail.com>
Cc: m.tarawneh@jpu.edu.jo
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>
NK comments- july 19 2019-Consumer Behaviour and Food Security and Marketing.docx

Dear Professors Tahat and AlTarawneh,

I am attaching my comments in Track changes for the course: Consumer Behaviour and Food Security and Marketing- The course is developed by Dr. Mohamed AlT arawneh.

Please click on REVIEW- TRACK CHANGES- FINAL: showing mark-up, to check my comments / changes / deletions and additions. Follow through the file, ACCEPT the changes and address the comments.

The course includes only 3 modules and this is not enough to cover the topics. I am suggesting adding two other modules in combination with the ones already developed to give the course a more comprehensive perspective.

At the END of THE DOCUMENT, you can find my suggestions to the course Schedule and 7 new modules that I have developed to emphasize the economic and Policy aspects that are somehow weak in the course sent to me.

My general comments to the course are summarized below:

1) I SUGGEST THE FOLLOWING course description:

All of us are consumers. On daily basis, we are faced with situations where we must decide how to spend our time and money. This course is designed to shed light on why we behave as we do as consumers. Topics covered in this course will include: external and internal influences on consumer behavior, the consumer decision process, organizations as consumers, and marketing regulation/ethics.

This course focuses on the study of what it means to be a consumer in a global, information-oriented (technology-oriented, market-oriented) culture. We will examine concepts, processes and approaches that inform marketing strategy as to what, how, when, where and why people consume. The course emphasizes marketing strategy implications of the propositions that compose consumer decision-making processes. The course topics provide a managerial oriented understanding of consumption in post-modern life, where climate change becomes a major threat. In this sense, the course integrates the themes of sustainability in the context of consumer behavior. It considers the impact that global and local social and economic issues have on marketing and food security. It is the aim of the course to equip students with current knowledge about sustainable development topics and the promotion of critical thinking skills and competences of how individual psychology (motivations, perceptions, attitudes), and socio-cultural factors (cultural and cross cultural influence, reference group) influence consumer behavior in an ESD framework.

2) I SUGGEST THE FOLLOWING LEARNING OBJECTIVES:

The goals of the course are to introduce students to main concepts in consumer behavior and to demonstrate their practical use. The course is designed to give students a clear understanding of the ways consumers process the marketing messages directed at them by sellers; how they're likely to respond to those messages; and the many ways they can use this information to formulate a comprehensive marketing strategy. At the end of this course, students should be able to:

- Understand the role of the consumer in marketing from a variety of disciplinary approaches (e.g., cultural, sociological, psychological, postmodern consumption patterns)
- Demonstrate how the study of consumer behavior can be used in marketing strategy formation using consumer behavior analysis (brand equity, customer satisfaction and loyalty, consumer impact on marketing strategy, database marketing, market segmentation, diffusion of innovation, qualitative field research: shopping behavior)
- Develop an understanding of why people consume and the socio-cultural and psychological processes influencing consumption behavior decision-making, household influence, marketing cultural influences, personality and lifestyle, perceptions, learning, memory, motivation and values, consumer involvement, attitudes, communications, purchase situation, post-purchase evaluation, group influence and opinion leadership.
- Develop an appreciation of how the consumption of products, services, ideas and experiences contribute to the broader social world, including global marketing and international business
- Develop an understanding of the positive and negative aspects of consumption and marketing practices (ethical and public policy issues in relation to consumer behavior, particularly with respect to marketing related to food security in the context of sustainability)
- Become familiar with world food problems and their relationship to agricultural production, development, and policies.

3) I SUGGEST SOME ACTIVITIES AND PROJECTS (please refer to the attached file)

NK Comments- Risk Analysis in the Food Chain- Dr. Kamel I. Sultan

Jul 22 at 3:15 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Ibrahim Tahat <tahat1972@gmail.com>
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>

Dear Dr. Tahat,

Attached are my comments to Dr. Kamel Sultan course on: Risk Analysis in the Food Chain
Press REVIEW, TRACK CHANGES, FINAL SHOW MARK-UP and then you can see the changes and comments.
Please forward my e.mail to Dr. Kamel Sultan - as his email is not on the course syllabus and I do not have it. Once a clean version is finalized, please send back to me.

My General Comments on the course are:

1- The course description / overview should be re-written to match the course objectives and learning outcomes.

2- There is clear evidence in the course description and concepts that the course is designed using a set of methodologies including: probability theory and modelling, risk analysis, and decision analysis, probability and probabilistic modelling, simulation models. Even in the suggested readings, the emphasis is rather on the mathematical side of risk analysis than on the field of risk analysis in the food chain in such a way to progress the student learning to understand types of risk in the food chain, risk perceptions, and to differentiate between risk analysis, risk management and risk communication.

3- If the course instructor has expertise on the mathematical approach to risk analysis, this would be a plus to work on this aspect. However, I suggest that the course instructor develops more critical thinking in the students to approach this topic of risk analysis in the food chain from a more holistic perspective- not only mathematical modelling What are the opportunities presented by this area? What are the possible threats? What is happening at a local level? Are there good examples from a global level of how food security can be managed? What are the main theories underpinning risk analysis, risk management and risk communication?

4- I suggest including a module on risk perceptions. There is a wide literature on this topic and I believe it should be included in this course. I also suggest another module on risk management. It would be great to see greater evidence of more in-depth and reasoned debate as part of the risk analysis process, especially that this course is designed at the Master level. There are possibilities presented throughout the modules. However, this needs to be more closely linked to the Learning Outcomes that should reflect critical thinking, problem solving and deeper learning.

5- Two of the course objectives are not addressed in the modules of the course. It is recommended to emphasize these so you address the CCSAFS themes. These are objectives (4) and (5).
Objective 4-Know the methods of risk mitigation programs and how farmers should interact towards risk and uncertainty problems in Food production.
Objective 5-Understand the effect of risk mitigation on food farming sustainability and security.

6- Module 6 on Health Risk Assessment. Why health risk? No need for this module unless the readings and activities link the health risks to food security- and this is not clear in the module. I believe the focus should be on risk in the food chain, and such a topic is preferably placed after module 1 (introduction). It includes units as below:
Unit 1. Risk Analysis in food chain- Unit 2. Food safety environment- Unit 3. Components of risk analysis
Readings that you can use should focus on: Assuring Food Safety and Quality Scientific Criteria to Ensure Safe Food

7- In a nutshell, the course aims to examine the main themes of risk analysis in the food chain. The main contents should be linked with some of the most relevant economic and environmental issues of sustainable development and climate change. This link should be addressed in a way transferable cognitive skills and attitudes (responsibility awareness, critical thinking, etc.). Also, the link could be emphasized through teaching methodology and class activities, which should be explained more in detail, considering the role of the student-centered approach and the importance of participatory learning strategies (see note 8 below for more information regarding the activities).

8- Both the course activities and the Community-Based / Service Learning Activity need to be more elaborate. Please take the following points into consideration to improve the activities in all your modules:
9- All references should follow same style. Some references are not complete.
10- Some sections in the syllabus (class policies, classroom protocol, and disability) are missing. I added suggestions above in the corresponding sections

Good luck,
Nancy

Re: Sustainability Justice and Food Security- Heliopolis University- course description, objectives and learning outcomes

Jul 23 at 7:49 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Profess Manal Hefny <manalhefny96@gmail.com>
Cc: Mohammed Anwar <mohammed.anwar@hu.edu.eg>
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis makrakis@edc.uoc.gr

Dear Dr. Hefny,

As you know Professor Makrais has already designed the modules for the Sustainability Justice and Food Security course.

When I received the course prepared by Heliopolis University, no course description, objectives and Learning outcomes were developed. When I was reviewing the course for Jordan, I have written some suggestions for these sections (course description, objectives and Learning outcomes) as they fit the modules of Prof. Makrakis. I hope these can help the course developer in Heliopolis. Of course, these are only suggestions and they might be used by the instructors as they see fit.

COURSE DESCRIPTION

Social justice is a concept that is well-discussed in curricula. Sustainability justice is a rather new concept that, in addition to social justice, integrates environmental, economic and cultural justice. Most people usually have a basic understanding of Sustainability and Sustainable Development (SD). The concept of "sustainability justice", as it has been conceptualized in this course, reflects the four pillars of sustainable development: environment, society, economy and culture. The course explores the need and importance of the concept of sustainability justice and its constituencies, and aims to bridge the gap between the academic discourse and the mainstream discourse by engaging students to reflect on the ethical and political implications of food and agricultural practices in relation to sustainability justice, with special attention to climate change.

The course addresses the development of sustainable solutions towards sustainable-just food security, using systems thinking approaches. The course explores the Community food security (CFS) as a relatively new movement that promotes food security strategies within a region or community's food system. Using case studies that examine a number of community-based sustainable farming, the course promotes sustainability justice and greater equality to reduce poverty and hunger, prepare families to assume responsibility for ethical eating and revive the cultural values of solidarity. The course will use case studies to convey ways to strengthen ties to the regional economy, support local businesses, offer new entrepreneurial opportunities, and engage residents as well as local/state governments in seeking solutions to food insecurity and healthy food choices.

COURSE LEARNING OBJECTIVES

1. To understand the need and importance of the concept of sustainability justice and its constituencies
2. To engage students to reflect on the ethical and political implications of food and agricultural practices in relation to sustainability justice, with special attention to climate change
3. To allow students to begin to visualize the complex nature and interrelations of Food Security & Sustainability Justice.
4. To address the development of sustainable solutions towards sustainable-just food security, using systems thinking approaches
5. To apply systems thinking in dealing with sustainable farming, food security and climate change through the lenses of sustainability justice.
6. To understand the complexities that face local communities and countries in terms of highly complex and interrelated systems.
7. To illustrate innovative methods of production, efficient ways of food distribution, and methods of processing or waste recycling

COURSE LEARNING OUTCOMES

- Identify the key concepts of sustainability justice in terms of social, cultural, environmental and economic aspects
- Understand the importance of sustainability justice in the context of a sustainability crisis.
- Recognize the constituencies of sustainability justice and their connection to the pillars of sustainable development.
- Identify critical issues related to sustainability justice and food security
- Describe key challenges for food justice from local and national governance perspectives
- Discuss sustainable farming and understand its connection with food security under climate change conditions through the lenses of sustainability justice
- Develop action plans to raise the awareness of farmers and other stakeholders to assure sustainable farming and food security locally.
- Understand the diversity of food production systems under climate change
- Understand the principles of system analysis and how it can be applied in sustainable farming and food production systems.
- Gain comparative and holistic knowledge of today's food systems (production, distribution, consumption, and waste).
- Analyze how the food choices we make as individuals collectively influence: 1) political, socio-economic and ecological changes taking place locally, regionally and globally and 2) both climate change and food security.
- Discuss how disadvantaged social groups are disproportionately affected by climate/food injustice policies and practices.
- Assess how sustainability justice contributes to transforming climate and food injustices.
- Identify and analyze the aims and actions of climate justice and food justice organizations and movements, locally, regionally and globally.

Regards,
Nancy

COMMUNICATIONS EXAMPLES

ASWAN: 1-small scale farming and 2- precision farming- Re: Final 20/7/2019
Jul 23 at 8:18 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Manal Hefny <manalhefny96@gmail.com>, Wagdi Saber <wagdi79@agr.aswu.edu.eg>
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>

Dear Dr. Wagdi,

Thanks for re-sending the two courses by Aswan University (1-small scale farming and 2- precision farming).
Please delete the comments and accept the changes I made and those you did - in order to have a 'clean' copy (without comments and changes) that can be sent to Dr. Kleisarchakis by Dr. Hefny

TRACK CHANGES- FINAL SHOW MARK UP- ACCEPT THE CHANGES (I suggest to do it one at a time - not to mess up the file). Also, delete comments.
Please copy me and Dr. Hefny with the final clean copies of the two syllabi.

Best regards,
Nancy

On Saturday, July 20, 2019, 4:08:36 PM GMT+3, Wagdi Saber <wagdi79@agr.aswu.edu.eg> wrote:

Dear Nancy
Aswan University team are responsible of two course attached.
I tried to follow the comments as possible I can.
Attached the final version of the courses after merging the syllabus and community based activity.
The third course was Genetics and has been deleted from the final pilot and replaced with another course which we will not be able to manage it and the person who put its syllabus in the pilot can manage it.

With my best wishes,
Wagdi Saber SOLIMAN, Associate Professor

For your information-- Fw: Environmental Governance, Esam A.Hussein
Jul 23 at 8:28 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Manal Hefny <manalhefny96@gmail.com>

Manal
I got this email from Dr Esam Hussein on july 20 without attaching the file
I am just keeping you in the loop. I have asked him to resend the file
Nancy

----- Forwarded Message -----
From: Nancy Kanbar <nancykanbar@yahoo.com>
To: Esam Hussein <husseine13@yahoo.com>
Sent: Monday, July 22, 2019, 1:25:10 AM GMT+3
Subject: Re: Environmental Governance, Esam A.Hussein

Dear Dr. Hussein,
Thanks for your message. I hope the comments I have suggested were helpful to improve the course on environmental governance.
But... it seems you forgot to attach the document.
Regards,
Nancy

On Saturday, July 20, 2019, 10:14:50 PM GMT+3, Esam Hussein <husseine13@yahoo.com> wrote:

Dear Dr. Nancy kanbar
We have never been introduced to each other before, but I heard a lot about your activity from my colleagues and it is my great honor and pleasure to write to you today.

Its me, Esam A. Hussein, professor at Bot. & Microbiol. Dept., Fac. Sci., Al-Azhar Univ. who developed the course entitled "Environmental Governance".
Let me please express my gratitude to you for your efforts in reviewing the course and making valuable comments and suggestions.

I am so sorry that I could not respond to your comments quickly because I was so tired and busy after a long scientific visit to the University of California (UF). Anyway, I want to till you that finally I could carefully read all your suggestions about the course and I agree with a lot of what you had suggested and already made some corrections on the syllabus of the course.
Please have a look and let me know if any possible further corrections are needed

Best wishes. Esam A. Hussein

From: Manal Hefny <manalhefny96@gmail.com>
Date: July 23, 2019 at 1:26:09 PM GMT+3
To: Nancy Kanbar <nancykanbar@yahoo.com>
Cc: Mohammed Anwar <mohammed.anwar@hu.edu.eg>
Subject: Re: Sustainability Justice and Food Security- Heliopolis University- course description, objectives and learning outcomes

Thank you Dr. Nancy for your great efforts. I know how much you are tired in not only reviewing but also correcting and writing complete sections in most courses.
I am sure that our colleagues at HU (managed by our friend Mohamed) will prepare the courses and include your suggestions. It is very crucial to finalize the issue of courses approval soon, for the Prof. Makrakis request and before the new coming semester .

Looking forward to receive the four corrected courses.
Kind regards

Comments- Small Scale Farming, Indigenous Knowledge and Local Food Supply- Dr. Kamel Sultan
Jul 27 at 11:09 PM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Ibrahim Tahat <tahat1972@gmail.com>

Dear colleague,
My comments in Track changes to the course: Small Scale Farming, Indigenous Knowledge and Local Food Supply- Dr. Kamel Sultan

- The course objectives and learning outcomes need more focus on critical thinking, problem-solving and decision-making skills, active and participatory tasks (e.g. case study, project-based learning tasks), etc. The objectives are focused on the achievement of concepts and skills related to small scale faming. However, the achievement of other skills (cognitive, psychological, and social skills) such as life-learning skills, transferable skills, active participation in the community, responsible citizenship- is not highlighted in the course. It is suggested to emphasize these ESD skills in the objectives and learning outcomes.
- The use of case studies and field visits are important to bring together these skills, and they should be emphasized from a sustainability perspective in order to show how disciplinary concepts can be blended meaningfully. The readings should reflect how disciplinary concepts can be blended in a pedagogical way.
- Module activities should be more structured in a way that addresses the issues of: climate change, food security, and sustainable agriculture. It is important to stress the main themes in the course title: local food supply and indigenous knowledge. The teaching methodology is centered on transmitting contents. It is recommended to incorporate well designed activities in the modules in order to enhance the active role of students and encourage critical thinking and problem-solving skills.
- Activities can be designed in a better way in order to link theory with practice, considering local community. It is significant to connect academic achievement, civic engagement, and personal growth and provide students with new knowledge and skills that they apply in real life situations. The community-based activity needs to be better designed.
- Add the following in the modules: 10Cs/6 LEARNINGGOALS, ECTS WORK LOAD, SDGs, Vision 2030
- Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc. Include the SDG table to show which SDG is addressed in the different modules.

See attached file
Good luck,
Nancy

COMMUNICATIONS EXAMPLES

Comments- Sustainable Fisheries and Food Security- Dr. Ebraheem Altahat
Jul 28 at 12:50 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Ibrahim Tahat <tahat1972@gmail.com>
Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>

Dear Dr. Altahat,

- The course overview includes reference to a range of interdisciplinary concepts: from fisheries as an important source of food, overfishing and/or habitat degradation, sustainable management, resource economics, geography, and political science..... However, when it comes to the course objectives, learning outcomes, schedule and modules, all these concepts presented in the description are not well-emphasized. There needs to be more links between the course description and the other components of the syllabus. Fisheries and food security should be emphasized in relation to climate change from the theoretical background of sustainability. Not making clear these connections will lead to unclear set of course objectives and modules!
- The instructor indicates that the course aims to help students "develop key competencies including knowledge of essential ecological, social, institutional, and economic dimensions of fisheries management; skills in fisheries systems analysis, interview and social survey techniques, resource assessment and modeling, institutional analysis, participatory planning and reflection-in-action; and a repertoire of case studies. The course also aims to foster motivation for shared problem-solving in an interdisciplinary and participatory manner, critical thinking and innovation". Also, the description indicates that "students will develop a case study on a fishery of their choice, applying what they have learned, providing concrete examples for class discussions, and eventually providing an independent review and recommendations for the further management of the fishery". This is well-written in the course description. Nonetheless, it is not clear in the other components of the syllabus. The course developer is invited to be consistent with his description in the other parts of the syllabus- starting from the course objectives to the learning outcomes throughout all modules and activities.
- The course general overview seems thorough and it integrates ESD perspectives. However, the specific activities for each module are only sketched out. It is recommended to better contextualize the activities, defining and structuring their objectives and learning tasks in more details.
- The course outcomes do not match with the course objectives. It is important that learning objectives are consistent with the outcomes and the subsequent course schedule and modules. Even the titles of the units in the modules do not match with the course description.
- CCSAFS Community-Based / Service Learning Activity

There are several modules and each module has the "Same" activity. None of the activities fit the community-based / service learning guidelines. The activities should be linked to the activity goals and learning outcomes, and of course to the modules. The activity in the last module is the community-based activity you intend to do. But, it is not well-focused. What is the main objective and what methodology you will follow to do it?
Please try to redesign the activity to show the connections between academic achievement, civic engagement, and personal growth

- ECTS Integration in Course Curriculum. Please add a summary table
- Include the SDG table to show which SDG is addressed in the different modules. Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc

See attached document with more specific comments.
Nancy

COMMUNICATIONS EXAMPLES

external revision for CCSAFS syllabi

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: Vassilios Makrakis <makrakis@edc.uoc.gr>,
Nelly Kostoulas <nkostoula@edc.uoc.gr>,
Nikos Larios <lariosn@windowslive.com>

Jul 28 at 12:56 AM
Print Raw message

Dear Vassilis and Nelly,

I am done with the external revision of all course syllabi that were sent to me by Egyptian and Jordanian colleagues.
I have copied you on the comments I have done and all the files in track changes.

I realize some colleagues did not send their courses.
I will send now another email and copy you to find out what is missing.

Can we talk via Skype sometimes soon? I have to discuss some issues with you.

Nancy

COMMUNICATIONS EXAMPLES

CCSAFS external revision- requesting updates on course lists
Jul 28 at 1:30 AM

Nancy Kanbar <nancykanbar@yahoo.com>
To: Manal Hefny <manalhefny96@gmail.com>, Ibrahim Tahat <tahat1972@gmail.com>
Cc: Omar Ramzy <omar.ramzy@hu.edu.eg>, Ahmed Al-Salaymeh <salaymeh@ju.edu.jo>, Vassilios Makrakis <makrakis@edc.uoc.gr>, Nelly Kostoulas <nkostoula@edc.uoc.gr>, Nikos Larios <lariosn@windowslive.com>

Dear colleagues,

I am done revising all course syllabi that were sent to me by Dr. Hefny and Dr. Tahat. Also, I have checked the CoP for updates ... and that's all what's in there.

I sent my comments in track changes to Dr. Hefny and Dr. Tahat (and to the course developer whenever specified) so it is easier to follow-up and make necessary changes. Some colleagues from Egypt re-sent their corrected files for another second and even third revision - before finalizing them and submit them to Dr. Kleisarchakis.

However, I realize that some syllabi are still missing. I have prepared the attached document for Egypt. Can Dr. Hefny confirm the attached? and make sure that all courses I checked have been revised? Also, it would be great to fill the last column if the final course was submitted to Dr. Kleisarchakis.

I have not a complete list of all course titles and email contacts for Jordan. I would appreciate if the local coordinator in Jordan can help prepare a similar document for Jordan? (so we are all on the same page)...

Thanks,
Nancy

COMMUNICATIONS EXAMPLES

Re: Economics Course nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com> Aug 15 at 1:37 AM
To: Mohammed Anwar <mohammed.anwar@hu.edu.eg>
Cc: Manal Hefny <manalhefny96@gmail.com>
Print Raw message

Thank you. I will go over it and get back to you in the weekend.
What about other courses?

Nancy Kanbar

On Aug 14, 2019, at 5:34 PM, Mohammed Anwar <mohammed.anwar@hu.edu.eg> wrote:

Dear Dr. Nancy,

I am attaching the other 2 courses; Consumer behavior & Social entrepreneurship.

Best Regards

Mohammed

Mohammed Anwar (MA & MSc)
Assistant Lecturer
Center of Education for Sustainable Development
(+202)265 88 930 | Fax: (+202) 265 88 260 | Mob. (+02) 0122 249 4198
Skype: mohammed.anwar174
Kilo 20, Misr – Ismailia Desert Road, P.O. Box: 2834 El-Horreya, Cairo, Egypt
جامعة هليوبوليس Heliopolis University for Sustainable Development

COMMUNICATIONS EXAMPLES

Heliopolis- Dr. Ramzi- 1. Consumer behavior, Food Security, and M arketing - 2. Social Entrepreneurship in the Organic Food Industry

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: omar.ramzy@hu.edu.eg, Mohammed Anwar <mohammed.anwar@hu.edu.eg>
Cc: Manal Hefny <manalhefny96@gmail.com>,
Vassilios Makrakis <makrakis@edc.uoc.gr>,
Nelly Kostoulas <nkostoula@edc.uoc.gr>

Aug 24 at 7:58 AM
Print Raw message

2 Files 337kB Download All

DOCX 155kB — NK comment... — Download

DOCX 182kB — NK comment... — Download

Dear Dr. Ramzy,

Attached are my reviews for the 2 courses. You can check the comments in track changes.
1) Consumer behavior, Food Security, and Marketing
2) Social Entrepreneurship in the Organic Food Industry

Best of luck,
Nancy

COMMUNICATIONS EXAMPLES

Risk Analysis in the Food Chain - Dr. Khaled El-Khawas, Al-Azhar University

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: Said Desouky <dr_saidesouky@yahoo.com>, khaledk5912@yahoo.com
Cc: Manal Hefny <manalhefny96@gmail.com>,
Vassilios Makrakis <makrakis@edc.uoc.gr>,
Nelly Kostoulas <nkostoula@edc.uoc.gr>

Aug 24 at 8:09 AM
Print Raw message

1 File 156.4kB

DOCX 156kB

NK comment...
Download

Dear Dr. Khaled El-Khawas,

I re-reviewed the version sent to me. It is better now.
However, please make sure to include the final SDG table to be consistent with other courses.
Also, please address and (then delete) my comments that are still in highlight.

Best of luck,
Nancy

Sustainable Fisheries and Food Security - Drs. Mamdouh Omar, Said E. Desouky

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: mamdohomar2003@yahoo.com, Said Desouky <dr_saidesouky@yahoo.com>
Cc: Manal Hefny <manalhefny96@gmail.com>,
Vassilios Makrakis <makrakis@edc.uoc.gr>,
Nelly Kostoulas <nkostoula@edc.uoc.gr>

Aug 24 at 8:25 PM
Print Raw message

1 File 408.3kB

DOCX 408kB

NK comment...
Download

Drs. Mamdouh Omar, Said E. Desouky

My comments are in track change for the version sent to me.
Please make sure to include the final SDG table to be consistent with other courses.

Best of luck,

Nancy

COMMUNICATIONS EXAMPLES

Environmental Governance- Prof. Dr. Esam A. Hussein- Al-Azhar University

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: husseine13@yahoo.com, Said Desouky <dr_saidesouky@yahoo.com>
Cc: Nelly Kostoulas <nkostoula@edc.uoc.gr>, Vassilios Makrakis <makrakis@edc.uoc.gr>, Manal Hefny <manalhefny96@gmail.com>

Aug 25 at 8:05 AM
Print Raw message

1 File 171.5kB

DOCX 172kB

NK comment...
Download

Prof. Dr. Esam A. Hussein,

As a second review of the environmental governance course, I believe that we have now a more coherent version with more relevant topics that the previous versions sent to me.

I have made some track changes for few more issues to be considered.

1) The course description should match the new topics as discussed in the new developed modules. (As an example, there is no environmental audit in the new modules.. so we have to change this in the course description)

2) Same comments go to the course Learning outcomes. Please refer to the course objectives as I have suggested and follow through to improve the Learning outcomes

3) The community-based activity: You may choose an environmental problem in Egypt (waste management, access to clean water, etc.) and work with the local communities to find out their needs and analyse the steps that the government has undertaken to solve this problem

4) Please include the SDGs rubric at the end of the course.

Best of luck
Nancy

COMMUNICATIONS EXAMPLES

comments- manal hefny- Research methodology

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: Manal Hefny <manalhefny96@gmail.com>
Cc: Vassilios Makrakis <makrakis@edc.uoc.gr>,
Nelly Kostoulas <nkostoula@edc.uoc.gr>

Aug 26 at 12:48 AM
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NK comment...

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My comments to the research methods syllabus (see track changes).

1) Please make sure to correct the number of assignments (you have removed some modules and the numbers have changed). Also, same comment when you refer to modules that were cut from this syllabus.
2) Provide titles for the references in the links
3) Include the SDG rubric
4) Include a short section (module) before the last to introduce the data collection process and the SPSS (you have it in the course description) and this way you can link this course to the statistics course
5) Highlight the community-based activity. It is the end result: the proposal- but you need to link it to the CCSAFS guidelines.

Nancy

Re: The University of Jordan -GIS Applications in Climate Change, Sustainable Agriculture and Food Security- Prof. Jawad Cources

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
To: tahani almalki <t.almalki@yahoo.com>, Jawad Bakri <jbakri@ju.edu.jo>
Cc: Ahmed Al-Salaymeh <salaymeh@ju.edu.jo>,
Leena Marashdeh <leena_marashdeh@yahoo.com>,
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Aug 28 at 1:48 AM
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NK comment...
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Dear Prof. Jawad Al-Bakri,

Attached you can find in track changes my comments to the course on GIS Applications in Climate Change, Sustainable Agriculture and Food Security

GENERAL COMMENTS
Overall, the course is well structured. Some improvements should be made to fir the CCASFS guidelines by addressing the following:

1) At the end of each module, you should add the SD pillars, 21st ESD, SDG goals, vision 2030, and ECTS workload

2) Please make sure to add the ECTS Student Workload summary table at the end of the syllabus (you will find more details in the file in track changes)
Be careful on the following: a) Alignment, b) Balance, c) Coverage, d) Communication, and e) Monitoring

3) Also, add the SDGs RUBRIC at the end of the syllabus: The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I have provided you with a summary table where you can do these connections. It is not clear in your modules. Please follow the same format.

4) There are different activities in the course, but you need to explain the activities in details and elaborate more on what are the tasks the students will do. Activities should be stimulating and thought provoking and should match the learning outcomes in the corresponding module. You need to elaborate on each activity by linking it to the CCSAFS project and themes (example: students will collect data on water, climate, agricultural land, etc.)

5) In the last module, you need to carefully design a community-based / service learning activity taking into consideration the following:

a) The connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.
b) The activity should meet an actual need in the community and is coordinated through collaboration with the community.
c) The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
d) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

Best regards.
Nancy

COMMUNICATIONS EXAMPLES

Jerash University- final revisions

nancykanbar@yah.../Sent

Nancy Kanbar <nancykanbar@yahoo.com>
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Michael Kleisarchakis <kleisarx@gmail.com>

Oct 2 at 4:39 PM
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Dear Dr. Tahat,

Attached are the final version for Jerash Univ. You can send to the course developers to do the final changes.
There is improvement in the courses and most comments that were suggested are addressed.
The weak points remain in the design of the community-service activities, and the SDGs (none of the courses included a final table of SDGs to show how the modules reflect the development goals).
Best,
Nancy

University of Jordan courses- my final comments

nancykanbar@yah.../Sent

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Attached are the comments on the 3 courses for Univ of Jordan that I have recieved.
The course on Climate Change Mitigation and Adaptation needs to adapt the same format and Template used by the project- including course description, objectives, Learning outcomes, resources....

Again, the same problem is seen in most courses- especially related to the design of the community-based / service Learning activity

Regards
Nancy

COMMUNICATIONS EXAMPLES

JUST courses

nancykanbar@yah.../Sent

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Cc: Leena Marashdeh <leena_marashdeh@yahoo.com>,
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Ibrahim Tahat <tahat1972@gmail.com>,
Vassilios Makrakis <makrakis@edc.uoc.gr>,
Nelly Kostoulas <nkostoula@edc.uoc.gr> more...

Oct 5 at 10:29 PM
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3 Files 1.1MB Download All

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Dear colleagues,

Attached are my comments to the three courses from JUST university (in track changes for specific comments)

Sustainable and Ethical livestock Management
Climate Change, Sustainable Agriculture, and Food Security
Sustainable Soil and Water Management

General problems in the course design:

- The course outcomes are not matching the learning objectives and the course Schedule

- Make sure to link the modules to the pillars of SDGs to map the topics as per the themes of the CCSAFS project. The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). Make sure to target the SDGs in all course modules.

- The CCSAFS Community-Based / Service Learning Activities are a critical component of the course and they should be well designed to include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved. They should be linked to the activity goals and learning outcomes. The activities should meet an actual need in the community. provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. They should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society. They should help students reflect on their learning experiences and should lead to personal and societal transformation, while providing students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.

Good luck,
Nancy

Co-funded by the Erasmus+ Programme of the European Union
CCSAFS
Climate Change, Sustainable Agriculture & Food Security
University of Crete

Thank you for reading the external evaluation report

Nancy Kanbar

nancykanbar@yahoo.com



Co-funded by the Erasmus+ Programme of the European Union

CCSAFS

Climate Change, Sustainable Agriculture & Food Security

University of Crete

CCSAFS External Evaluation

External Review of Selected CCSAFS Courses at Various Stages of the Evaluation Process

APPENDIX

Dr. Nancy KANBAR



CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

~~Course Syllabus~~

Course Number: ……

Small Scale Farming, Indigenous Knowledge and Local Food Supply
Aswan University, Faculty of Agriculture and natural Resources
Semester……., -

Instructor Information

Instructor: Dr. Wagdi Saber Soliman
Office Location: Aswan University, Sahari Campus
Telephone: office - +20 973 480 245
Office hours: Sunday-Wednesday 09.00 - 14.00
E-mail: wagdi79@agr.aswu.edu.eg
Website:

Course Identification

Course Number:
Course Name: Small Scale Farming, Indigenous Knowledge and Local Food Supply
Course Location: Aswan University
Class Times:
Prerequisites:
Faculty Web Page: http://agr.aswu.edu.eg

Course Description/Overview

This course provides an adequate understanding of the fundamentals that apply to starting and managing a small farm business. Students will examine the basics of traditional and organic farming systems and learn about resources and strategies to get started running their own farm business. The information and understanding gained from this course will prepare students to explore look at indigenous knowledge and local food supply chains from a holistic ~~and realistic~~ perspective.

Course Learning Objectives

Students will:

- ~~Students will~~ ~~g~~Gain a valuable understanding of the myriad of economic, managerial ~~l~~ and regulatory issues involved in starting and managing a small farm.

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- Aachieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community
- Engage and collaborate with local, small farms and their entire ecosystem (e.g. local supply chains, farmers' markets, farming communities, etc.)

Not clear… how to engage in the ecosystem? :Commented [NK1]

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:
- Identify the principles and practices of small-scale organic farming
- Analyze contemporary food and agricultural issues, opportunities, threats, and trends
- Demonstrate effective ~~oral and written~~ communication skills and ~~as well as the ability to~~ teamwork ~~in teams~~.
- Manage resources available to help establish a small farm business
- Describe the primary agricultural production systems for small farms
- Map the entire local, agricultural supply chain from production to retail
- Develop strategies for overcoming basic challenges in new farm business start-ups.
- Investigate local, indigenous knowledge on agricultural practices and local supply chains

- ~~Synthesize~~ between Design qualitative research methods for identifying indigenous knowledge

Course Resources
Course Website(s)
Required Course Texts and Materials

Hand-out prepared by the instructor for the class

Optional course Texts and Materials

Wolfenson~~,~~ KDM. ~~(~~2013~~)~~. Coping with the food and agriculture challenge: smallholders' agenda Preparations and outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20). Available online at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf

Quan~~,~~ J. (year) Science review: SR25. A future for small-scale farming. part of the UK Government's Foresight Project on Global Food and Farming Futures. Available online at: https://www.nri.org/images/documents/news2011/11-570-sr25-future-for-small-scale-farming.pdf

Irshad~~,~~ H. ~~(~~2010~~)~~. Local Food - A rural opportunity. Available online at: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/593337cbd907813a8725782c0058ae97/$FILE/Local-Food-A-Rural-Opp.pdf

Murphy, S~~:~~ (2012) Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition), IIED/Hivos, London/The Hague

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Ruben R., Slingerland M., Nijhoff H. (eds.). 2006. Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Assignments	20
Class attendance/participation	20
Final Exams	60
Total Points	100

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive at on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Important Dates to Remember



Course schedule

Week	Date	Topics, Reading, Assignments and Deadline (details on assignments and more bibliography are available in the course modules)
1		Course overview: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2		Introduction and ~~Concepts concepts~~ of Small-Scale Farming
3		Challenges to small-scale agricultural production
4		Basics of Farm Business Management
5		Farm Management ~~T~~tools for ~~S~~success
6		Farm Management regulations and challenges
7		Production systems overview
8-9		Action Research & Participatory Action Research in the context of local farms
10-11		Design and structure of local food supply chains
12-14		Basics of rural sociology and indigenous knowledge



~~The~~ CCSAFS Course Modules ~~Template~~

Course	Small Scale Farming, Indigenous Knowledge and Local Food Supply
Module 1	Agriculture Production and Small Farming
Key Concepts	Concepts of small farming, indigenous knowledge, and local food supply
Overview	~~It is essential for s~~Students will~~to~~ develop a fundamental understanding of small-scale farming, indigenous knowledge, and local food supply concepts. Questions to be addressed in this module include the following: What is the nature of small-scale farming? Why is small-scale farming important to food supply? What are the current applications of small-scale farming?
Aim	The overriding aim of this module is to increase student's agricultural literacy with particular attention to sustainability and local food systems
Learning Outcomes	- ~~Demonstrate an ability d~~Discuss the principles and practices of small-scale organic farming - Describe the primary agricultural production systems for small farms
Units	- Introduction and Concepts concepts of Small-Scale Farming, indigenous knowledge, and local food supply - Challenges to Agricultural Production
Readings	Quan,, J. (year). Science review: SR25. A future for small-scale farming. part of the UK Government's Foresight Project on Global Food and Farming Futures. Available online at: https://www.nri.org/images/documents/news2011/11-570-sr25-future-for-small-scale-farming.pdf Irshad H. (2010). Local Food - A rural opportunity. Available online at: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/593337cbd907813a8725782c0058ae97/$FILE/Local-Food-A-Rural-Opp.pdf Ruben, R., Slingerland, M., Nijhoff H. (eds.). (2006). Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.
Activity	- Seminars/ Lectures; a series of lectures and seminars. -Group exam task with presentation; with the acquired understanding achieved through the course. - For each unit, the students will submit an individual reflection paper of approximately 1000 words. This paper will express students reaction towards the subjects ~~addressed in needed for~~ th~~is~~ course
SDGs	SDG number 1- End poverty in all its forms everywhere SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture ~~SDG number~~ 8- Promote sustained, inclusive and sustainable economic growth,

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What is a group exam? :Commented [NK2]

	full and productive employment, and decent work for all
Module 2	Farm Management
Key Concepts	Farm management and its regulations and challenges
Overview	In this module, students will have sufficient knowledge about establishing a small farm, managing the tools and resources. Also, the students will acquire information related, awareness withto regulations and challenges as well as marketing and management techniques
Aim	The overriding aim of this module is to learn turn student's able tohow to manage ~~their own~~ small farms
Learning Outcomes	- Identify resources available to help establish a small farm business - Describe the primary agricultural production systems for small farms - Describe basic retail and wholesale marketing techniques
Units	- Basics of Farm Business Management - Farm Management Tools for Success - Farm Management Regulations and Challenges - Production systems overview
Readings	Wolfenson KDM. (2013). Coping with the food and agriculture challenge: smallholders' agenda Preparations and outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20). Available online at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf Murphy, S. (2012) Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition), IIED/Hivos, London/The Hague Ruben R., Slingerland M., Nijhoff H. (eds.). (2006). Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.
Activity	Students will be asked to: ~~prepare the following:~~ • Prepare a Ffarm plan . • Conduct aA feasibility study of a small farm . • ~~Compare the feasibility and sustainability measures.~~
SDGs	SDG number 1- End poverty in all its forms everywhere SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture SDG number 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all ~~SDG number 9- Ensure sustainable consumption and production pattern~~
~~Module 3~~	~~The context of local food supply~~
~~Key Concepts~~	~~Local food supply, action research, local farms~~
Overview	In this module, students will have sufficient knowledge and understanding about local food supply chains. They will be able to analyzezis and apply action research and particularly action research in local farms, they be able to design

The module title is management. :Commented [NK3] Any management info here?

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	and structure local food supply chains.
Aim	The overriding aim of this module is to ~~turn student's able to~~ analyzes~~is~~, design and structure local food supply chains
Learning Outcomes	- Apply a systems approach to analyzing the context of local farms - Describe strategies for designing and structuring local food supply chains
Units	- Action Research & Participatory Action Research in the context of local farms - Design and structure of local food supply chains
Readings	- IPCC Fourth Assessment Report: Climate Change (2007)~~.~~: Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability: Indigenous knowledge systems. Available online at: https://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch9s9-6-2.html - ~~T., M.~~ Velandia, T., M. , R. Holcomb, R. Dunning, and E. Bendfeldt. (2013). "Local Food Systems Markets and Supply Chains". Choices. Quarter 4. Available online at: http://choicesmagazine.org/choices-magazine/theme-articles/developing-local-food-systems-in-the-south/local-food-systems-markets-and-supply-chains - Holcomb, R.B., M.A. Palma, and M.M. Velandia. (2013). "Food Safety Policies and Implications for Local Food Systems". Choices. Quarter 4. Available online at: http://choicesmagazine.org/choices-magazine/theme-articles/developing-local-food-systems-in-the-south/food-safety-policies-and-implications-for-local-food-systems
Activity	- Seminars/ Lectures; a series of lectures and seminars. -Group exam task with presentation of~~;~~ ~~with~~ the acquired understanding achieved through the course. - Students will visit small farms. They will be asked ~~for~~ to collect~~ing~~ and analyzi~~eng~~ data as well as design~~ing~~ and structure~~ing~~ local food supply.
SDGs	SDG number 1- End poverty in all its forms everywhere SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture ~~SDG number 9- Ensure sustainable consumption and production pattern~~
~~Module 4~~	~~Rural Sociology and indigenous knowledge~~
~~Key Concepts~~	~~Rural sociology, indigenous knowledge~~
Overview	In this module, students will have sufficient knowledge and understanding about rural sociology and indigenous knowledge
Aim	Demonstrate an ability to discuss the principles and practices of rural sociology and indigenous knowledge
Learning Outcomes	- Identify basic elements for small farmers associations - Gain an understanding of indigenous knowledge
Units	- Basics of rural sociology
Readings	-Rural Sociology: Meaning, Scope, Importance and Origin. Available online at: http://www.sociologydiscussion.com/rural-sociology/rural-sociology-meaning-scope-importance-and-origin/2599

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What do you mean? :Commented [NK4]

Reference should follow APA style. :Commented [NK5]

Author, title?

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	-The Rural Sociological Society (RSS). Available online at: http://www.ruralsociology.org/ -Research in Rural Sociology and Development. Available online at: http://www.emeraldinsight.com/series/rrsd
Activity	Students will visit small farmer and indigenous knowledge associations. They will be asked for collecting data, highlighting problem, and recommending solutions. Explain more. What kinds of data? What problems? How do all this relate to the SDGs and to the three main topics of climate change, sustainable agriculture and food security?
SDGs	SDG number 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all ~~SDG number 9- Ensure sustainable consumption and production pattern~~

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Same comment :Commented [NK6]

5 ECTS Workload allocations =

Learning components	No	Time Factor	Workload	Course modules				Workload
				1	2	3	4	
Lectures (face-to-face)	14	3	42	9	12	12	9	42
Online	4	3	12	3	3	--	3	9
Lab work	2	5	10	--	5	5	--	10
Reading articles (3 pages/hr)	18	0.3	6	1	2	1	2	6
Reading book chapters (5 pages/hr)	150	0.2	30	5	10	10	5	30
Preparing course activities	4	5	20	5	--	5	10	20
Project work	1	20	20	5	5	5	5	20
Preparation for exam	1	20	20	--	--	8	12	20
Writing the exam	1	3	3	--	--	--	3	3
Total			160	28	37	46	49	160



	SDGs	CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere				1, 2, 3
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				1, 2, 3
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				1, 2, 4
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				2, 3, 4
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive in ??				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

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General Comments:

This course should include various disciplinary concepts related to economic theory, management, climate change, sustainable agriculture and food security. The course objectives are:



- Gain a valuable understanding of the myriad of economic, managerial and regulatory issues involved in starting and managing a small farm
- Achieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community
- Engage and collaborate with local, small farms and their entire ecosystem (e.g. local supply chains, farmers' markets, farming communities, etc.)

The objectives above are focused on the achievement of concepts and skills related to the main topic (small scale faming). However, the achievement of cognitive, psychological, and social skills among learners (such as life-learning skills, transferable skills, active participation in the community, responsible citizenship) is not highlighted much in the course. These skills are important in ESD and it is suggested to be reflected in the objectives and learning outcomes. Also, these are important as they support problem solving and critical thinking

The use of case studies and field visits are important to bring together several of these skills and concepts, but they need to be brought more to the forefront from a sustainability perspective to show how disciplinary concepts can be blended in a meaningful and pedagogical clever manner The readings in the field of climate and sustainability should also reflect this approach. A suggestion might be to make this more explicit in the learning outcomes of the course and this would help to anchor the modules in a more meaningful way.

I would suggest more recent bibliography and newer publications. Why IPCC 2007? The IPCC has published much recent reports. The readings assigned in the course should follow the same style in referencing. Also, the readings should reflect how disciplinary concepts can be blended in a meaningful way.

Please make sure to relate the course content to the main themes of CCSAFS (climate change, sustainable agriculture and food security). The small scale farming should be designed while addressing the issues of: climate change, food security, and sustainable agriculture. These themes are not highlighted clearly throughout the course modules.

The course objectives focus on economic, managerial and regulatory issues involved in starting and managing a farm. However, aside from 'production' and 'management', the course lacks the economic, managerial and regulatory aspects which should be reflected in the course modules to emphasize the interrelatedness of the social and economic dimensions of small scale farming with the technical dimensions to operate a small farm. Also, it is important that the course emphasizes the main themes in the course title: local food supply and indigenous knowledge.

Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc. In the designed course, only 4 SDGs (SDG numbers: 1, 2, 8 and 9) were addressed. What about the other SDGs? I believe that through the course objectives, more SDGs could be targeted (am particularly thinking of SDGs numbers 5, 6, 15).



The teaching methodology is based on a traditional approach, more centered on transmitting theoretical contents. It is recommended to integrate well designed activities that can enhance the active role of students in class and promote the achievement of critical thinking and problem-solving skills. Also, I suggest planning activities that can link theory with practice, considering local community. It is important to emphasize the connections between academic achievement, civic engagement, and personal growth and provide students with new knowledge and skills that they can apply in a real life context keeping the three main themes (climate change, sustainable agriculture and food security) well connected in the whole course.

Please make sure to include the community-based activity in the same document of the syllabus (you can insert the activity at the end of the modules).



CCSAFS COMMUNITY-BASED/SERVICE LEARNING ACTIVITY

Name of the course: Small Scale Farming, Indigenous Knowledge and Local Food Supply

Commented [NK1]: This activity is prepared for another course: precision agriculture!
CAREFUL

During the course from the 1st module ending to the 5th module, the student will be engaged together in a community- based learning activity to stimulate and evaluate the precision agriculture through field visits. The objective of the communication based learning activity is to engage students with the farmers to define their problems, recommend the suitable application of precision agriculture to solve these problems, and evaluate its negative and positive impacts.

Commented [NK2]: This is another course.

This is the same activity proposed in the precision farming course.

Please follow my comments on that file
And, it is preferable to design an activity targeting small scale farming in particular.

SEE BELOW COMMENTS- at end of document

The recommended number of students in the course is 25 students. The students will be divided into groups (each group consists of 5 students). The groups will be distributed in 5 different agricultural areas near to Aswan city, Egypt.

- All students (25 students) under supervisor of the course Staff will be engaged into group discussion in the first week of the semester to define the work plan, select each group members and the tutor for each group, and select the target areas.
- Each group responsible to collect data about the real agricultural problems facing the farmers.
- All students will be engaged again to discuss the problems and determine ONE PROBLEM to solve by all groups.
- After defining the problem, each group will collect the related data to the problem such as distance from river Nile, distance from main road, injured areas, damaged, plant growth characterizations, ….etc.
- Then, each group members together will do data analysis, group discussion to report the reasons of problem and how to solve it, …etc.

- The students will engaged in practical field activities in the target area carrying out with traditional and organic farming system and small farm management.
- Evaluate and stimulate the organic farming system and farm management.
- The staff member with assistant of student will prepare and achieve training and workshops for the target farmers to transfer knowledge and technology of organic farming and farm management
- Finally, each group will do final report. One of each group will join to present the final report and activities of the communication based learning activity in final conference inviting the staff members, tutors, farmers and all students.

For student assessment, each group will submit the collected data, data analysis repot, and field visits reports. Also, the tutor of each group will submit report about each group member about his efficiency and cooperation with team to the Staff member for final assessment.

The community-based activity goals, purpose and expected learning outcomes should be identified clearly in a way that connect between academic achievement, civic engagement, and personal growth. Also, the goals of the activity should link to the course objectives. And, this is not obvious in this activity.

Though the community-based activity, students will have the opportunities to apply new knowledge and skills in a real life context and shows a strong connection to the whole course. They should actively reflect on their learning experiences that can eventually lead to personal and societal transformation. Also, this is not well shown in this activity. Looking back to the course objectives:

- Gain a valuable understanding of the myriad of economic, managerial and regulatory issues involved in starting and managing a small farm
- Achieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community
- Engage and collaborate with local, small farms and their entire ecosystem (e.g. local supply chains, farmers' markets, farming communities, etc.)

An example of an activity: The students can, for instance, develop a questionnaire and survey small community farmers. The questionnaire can target economic, managerial and marketing issues- in terms of production (local food supply), yield, marketing agricultural products, etc. Also, information about indigenous knowledge… Through the survey, the students will analyze the data to find out the real problems- addressing the main themes:

climate change (water shortage, drought, high temperatures, etc.), sustainable agriculture, and food security--- that the farmers face in their small farms. Also, students can be involved in recommending specific solutions to the identified problems. In this way, the activity helps solve a real-life problem, meet a certain need or address an issue in the farmers' community.

Pplease include the activity in the syllabus (it is now in another word document). They should be in one document (syllabus and activity at the end of the modules.



CCSAFS COURSE SYLLABUS

Course Number: ……

Small Scale Farming, Indigenous Knowledge and Local Food Supply

Aswan University, Faculty of Agriculture and natural Resources

Semester……..

Instructor Information

Instructor: Dr. Wagdi Saber Soliman
Office Location: Aswan University, Sahari Campus
Telephone: office - +20 973 480 245
Office hours: Sunday-Wednesday 09.00 - 14.00
E-mail: wagdi79@agr.aswu.edu.eg
Website:

Course Identification

Course Number:
Course Name: Small Scale Farming, Indigenous Knowledge and Local Food Supply
Course Location: Aswan University
Class Times:
Prerequisites:
Faculty Web Page: http://agr.aswu.edu.eg

Course Description/Overview

This course provides an adequate understanding of the fundamentals that apply to starting and managing a small farm business. Students will examine the basics of traditional and organic farming systems and learn about resources and strategies to get started running their own farm business. The information and understanding gained from this course will prepare students to explore indigenous knowledge and local food supply chains from a holistic perspective.

Course Learning Objectives

Students will:

- Gain a valuable understanding of the myriad of economic, managerial and regulatory issues involved in starting and managing a small farm.

- Achieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community
- Engage and collaborate with local and, small farms and their entire ~~ecosystem~~ communities (e.g. local supply chains, farmers' markets, farming communities, etc.)

- Develop appropriate skills in scientific and community communication
- Develop cognitive, psychological, and social skills among students such as life-learning and transferable skills, promotion of students' active participation in the community, competence as responsible citizens, etc.

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:
- Identify the principles and practices of small-scale organic farming
- Analyze contemporary food and agricultural issues, opportunities, threats, and trends
- Demonstrate effective communication skills and teamwork.
- Manage resources available to help establish a small farm business
- Describe the primary agricultural production systems for small farms
- Map the entire local, agricultural supply chain from production to retail
- Develop strategies for overcoming basic challenges in new farm business start-ups.
- Investigate local, indigenous knowledge on agricultural practices and local supply chains
- Design qualitative research methods for identifying indigenous knowledge

Course Resources

Course Website(s)

Required Course Texts and Materials

Hand-out prepared by the instructor for the class

Optional course Texts and Materials

Wolfenson, KDM. (2013). Coping with the food and agriculture challenge: smallholders' agenda Preparations and outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20). Available online at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf

~~Quan, J. (year) Science review: SR25. A future for small-scale farming. part of the UK Government's Foresight Project on Global Food and Farming Futures. Available online at:~~ https://www.nri.org/images/documents/news2011/11-570-sr25-future-for-small-scale-farming.pdf

Irshad, H. (2010). Local Food - A rural opportunity. Available online at: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/593337cbd907813a8725782c0058ae97/$FILE/Local-Food-A-Rural-Opp.pdf

Murphy, S. (2012) Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition), IIED/Hivos, London/The Hague

Ruben R., Slingerland M., Nijhoff H. (eds.). 2006. Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Assignments	20
Class attendance/participation	20
Final Exam	60
Total Points	100

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive at on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Important Dates to Remember

Course schedule

Week	Date	Topics, Reading, Assignments and Deadline (details on assignments and more bibliography are available in the course modules)
1		Course overview: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2		Introduction and concepts of Small-Scale Farming
3		Challenges to small-scale agricultural production
4		Basics of Farm Business Management
5		Farm Management tools for success
6		Farm Management regulations and challenges
7		Production systems overview
8-9		Action Research & Participatory Action Research in the context of local farms
10-11		Design and structure of local food supply chains
12-14		Basics of rural sociology and indigenous knowledge



CCSAFS Course Modules

Course	Small Scale Farming, Indigenous Knowledge and Local Food Supply
Module 1	Agriculture Production and Small Farming
Key Concepts	Concepts of small farming, indigenous knowledge, and local food supply
Overview	Students will develop a fundamental understanding of small-scale farming, indigenous knowledge, and local food supply concepts. Questions to be addressed in this module include the following: What is the nature of small-scale farming? Why is small-scale farming important to food supply? What are the current applications of small-scale farming?
Aim	The overriding aim of this module is to increase student's agricultural literacy with particular attention to sustainability and local food systems
Learning Outcomes	- Discuss the principles and practices of small-scale organic farming - Describe the primary agricultural production systems for small farms
Units	- Introduction and concepts of Small-Scale Farming, indigenous knowledge, and local food supply - Challenges to Agricultural Production
Readings	~~Quan,, J. (year). Science review: SR25. A future for small-scale farming. part of the UK Government's Foresight Project on Global Food and Farming Futures. Available online at:~~ https://www.nri.org/images/documents/news2011/11-570-sr25-future-for-small-scale-farming.pdf Irshad H. (2010). Local Food - A rural opportunity. Available online at: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/593337cbd907813a8725782c0058ae97/$FILE/Local-Food-A-Rural-Opp.pdf Ruben, R., Slingerland, M., Nijhoff H. (eds.). (2006). Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.
Activity	- Seminars/ Lectures; a series of lectures and seminars. - Group ~~exam task with~~discussion and presentation; with the acquired understanding achieved through the course. - For each unit, the students will submit an individual reflection paper of approximately 1000 words. This paper will express students reaction towards the subjects addressed in the course
SDGs	SDG number 1- End poverty in all its forms everywhere SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture SDG number 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

Module 2	Farm Management
Key Concepts	Farm management and its regulations and challenges
Overview	In this module, students will have sufficient knowledge about establishing a small farm, managing the tools and resources. Also, the students will acquire information related to regulations and challenges as well as marketing and management techniques
Aim	The overriding aim of this module is to learn how to manage small farms
Learning Outcomes	- Identify resources available to help establish a small farm business and resource managment - Describe the primary agricultural production systems for small farms with economic issues - Describe basic retail and wholesale marketing techniques
Units	- Basics of Farm Business Management - Farm Management Tools for Success - Farm Management Regulations and Challenges - Production systems overview
Readings	Wolfenson KDM. (2013). Coping with the food and agriculture challenge: smallholders' agenda Preparations and outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20). Available online at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf Murphy, S. (2012) Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition), IIED/Hivos, London/The Hague Ruben R., Slingerland M., Nijhoff H. (eds.). (2006). Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.
Activity	Students will be asked to: • Prepare a farm plan . • Conduct a feasibility study of a small farm . • Compare the feasibility and sustainability measures.
SDGs	SDG number 1- End poverty in all its forms everywhere SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture SDG number 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all SDG number 9- Ensure sustainable consumption and production pattern
Module 3	**The context of local food supply**
Key Concepts	Local food supply, action research, local farms
Overview	In this module, students will have sufficient knowledge and understanding about local food supply chains. They will be able to analyze and apply action research and particularly action research in local farms, they be able to design

	and structure local food supply chains.
Aim	The overriding aim of this module is to analyze, design and structure local food supply chains
Learning Outcomes	- Apply a systems approach to analyzing the context of local farms - Describe strategies for designing and structuring local food supply chains
Units	- Action Research & Participatory Action Research in the context of local farms - Design and structure of local food supply chains
Readings	- IPCC Fourth Assessment Report: Climate Change (2007). Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability: Indigenous knowledge systems. Available online at: https://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch9s9-6-2.html - Valandia, T., M. , R. Holcomb, R. Dunning, and E. Bendfeldt. (2013). "Local Food Systems Markets and Supply Chains". Choices. Quarter 4. Available online at: http://choicesmagazine.org/choices-magazine/theme-articles/developing-local-food-systems-in-the-south/local-food-systems-markets-and-supply-chains - Holcomb, R.B., M.A. Palma, and M.M. Velandia. (2013). "Food Safety Policies and Implications for Local Food Systems". Choices. Quarter 4. Available online at: http://choicesmagazine.org/choices-magazine/theme-articles/developing-local-food-systems-in-the-south/food-safety-policies-and-implications-for-local-food-systems
Activity	- Seminars/ Lectures; a series of lectures and seminars. - Group ~~exam~~ discussion ~~task with~~and presentation of the acquired understanding achieved through the course. - Students will visit small farms. They will be asked to collect and analyze data as well as design and structure local food supply.
SDGs	SDG number 1- End poverty in all its forms everywhere SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture SDG number 9- Ensure sustainable consumption and production pattern
Module 4	Rural Sociology and indigenous knowledge
Key Concepts	Rural sociology, indigenous knowledge
Overview	In this module, students will have sufficient knowledge and understanding about rural sociology and indigenous knowledge
Aim	Demonstrate an ability to discuss the principles and practices of rural sociology and indigenous knowledge
Learning Outcomes	- Identify basic elements for small farmers associations - Gain an understanding of indigenous knowledge
Units	- Basics of rural sociology
Readings	~~- Rural Sociology: Meaning, Scope, Importance and Origin. Available online at: http://www.sociologydiscussion.com/rural-sociology/rural-sociology-meaning-scope-importance-and-origin/2599~~

	~~- The Rural Sociological Society (RSS). Available online at:~~ http://www.ruralsociology.org/ -Marsden T. (1999). Research in Rural Sociology and Development. Available online at: http://www.emeraldinsight.com/series/rrsd
Activity	Students will visit small farmer and indigenous knowledge associations. They will be asked for collecting data, highlighting problem, and recommending solutions. The student will prepare a questionnaire and survey small community farmers. The questionnaire can target the main themes CC, SA, FS in terms of economic, managerial and marketing issues- as well as indigenous knowledge and its relation with SDGs. Explain more. What kinds of data? What ~~problems? How do all this relate to the SDGs and to the three main topics of climate change, sustainable agriculture and food security?~~
SDGs	SDG number 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all SDG number 9- Ensure sustainable consumption and production pattern

ECTS Workload allocation

Learning components	No	Time Factor	Workload	Course modules				Workload
				1	2	3	4	
Lectures (face-to-face)	14	3	42	9	12	12	9	42
Online	4	3	12	3	3	--	3	9
Lab work	2	5	10	--	5	5	--	10
Reading articles (3 pages/hr)	18	0.3	6	1	2	1	2	6
Reading book chapters (5 pages/hr)	150	0.2	30	5	10	10	5	30
Preparing course activities	4	5	20	5	--	5	10	20
Project work	1	20	20	5	5	5	5	20
Preparation for exam	1	20	20	--	--	8	12	20
Writing the exam	1	3	3	--	--	--	3	3
Total			160	28	37	46	49	160

	SDGs	CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere				1, 2, 3
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				1, 2, 3
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				1, 2,3,4
6	Ensure availability and sustainable management of water and sanitation for all				1, 2, 3
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				1, 2, 4
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				2, 3, 4
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				1,2,3,4
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions on all levels ~~??~~				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

CCSAFS COMMUNITY-BASED/SERVICE LEARNING ACTIVITY

During the course from the 1st module ending to the 5th module, the student will be engaged together in a community-based learning activity to stimulate and evaluate Small Scale Farming, Indigenous Knowledge and Local Food Supply, through field visits. The objective of the communication based learning activity is to engage students with the farmers to define their problems, recommend the suitable

application of precision agriculture to solve these problems, and evaluate its negative and positive impacts.

The recommended number of students in the course is 25 students. The students will be divided into groups (each group consists of 5 students). The groups will be distributed in 5 different agricultural areas near to Aswan city, Egypt.

- All students (25 students) under supervisor of the course Staff will be engaged into group discussion in the first week of the semester to define the work plan, select each group members and the tutor for each group, and select the target areas.
- Each group will develop a questionnaire and survey small community farmers. The questionnaire can target economic, managerial and marketing issues- in terms of production (local food supply), yield, marketing agricultural products, as well as indigenous knowledge
- Each group responsible to collect data about the real agricultural problems facing the farmers.
- Students will analyze the data to find out the real problems- addressing the main themes: climate change (water shortage, drought, high temperatures, etc.), sustainable agriculture, and food security) that the farmers face in their small farms.
- All students will be engaged again to discuss the problems and determine ONE PROBLEM to solve by all groups.
- After defining the problem, each group will collect the related data to the problem such as distance from river Nile, distance from main road, injured areas, damaged, plant growth characterizations, ….etc.
- Then, each group members together will do data analysis, group discussion to report the reasons of problem and how to solve it, …etc.
- The students will engaged in practical field activities in the target area carrying out with traditional and organic farming system and small farm management.
- Evaluate and stimulate the organic farming system and farm management.
- The staff member with assistant of student will prepare and achieve training and workshops for the target farmers to transfer knowledge and technology of organic farming and farm management
- Finally, each group will do final report. One of each group will join to present the final report and activities of the communication based learning

activity in final conference inviting the staff members, tutors, farmers and all students.

For student assessment, each group will submit the collected data, data analysis repot, and field visits reports. Also, the tutor of each group will submit report about each group member about his efficiency and cooperation with team to the Staff member for final assessment.

General Comments:

This course should include various disciplinary concepts related to economic theory, management, climate change, sustainable agriculture and food security. The course objectives are:

- Gain a valuable understanding of the myriad of economic, managerial and regulatory issues involved in starting and managing a small farm
- Achieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community
- Engage and collaborate with local, small farms and their entire ecosystem (e.g. local supply chains, farmers' markets, farming communities, etc.)

The objectives above are focused on the achievement of concepts and skills related to the main topic (small scale faming). However, the achievement of cognitive, psychological, and social skills among learners (such as life-learning skills, transferable skills, active participation in the community, responsible citizenship) is not highlighted much in the course. These skills are important in ESD and it is suggested to be reflected in the objectives and learning outcomes. Also, these are important as they support problem solving and critical thinking

The use of case studies and field visits are important to bring together several of these skills and concepts, but they need to be brought more to the forefront from a sustainability perspective to show how disciplinary concepts can be blended in a meaningful and pedagogical clever manner The readings in the field of climate and sustainability should also reflect this approach. A suggestion might be to make this more explicit in the learning outcomes of the course and this would help to anchor the modules in a more meaningful way.

I would suggest more recent bibliography and newer publications. Why IPCC 2007? The IPCC has published much recent reports. The readings assigned in the course should follow the same style in referencing. Also, the readings should reflect how disciplinary concepts can be blended in a meaningful way.

Please make sure to relate the course content to the main themes of CCSAFS (climate change, sustainable agriculture and food security). The small scale farming should be designed while addressing the issues of: climate change, food security, and sustainable agriculture. These themes are not highlighted clearly throughout the course modules.

The course objectives focus on economic, managerial and regulatory issues involved in starting and managing a farm. However, aside from 'production' and 'management', the course lacks the economic, managerial and regulatory aspects which should be reflected in the course modules to emphasize the interrelatedness of the social and economic dimensions of small scale farming

with the technical dimensions to operate a small farm. Also, it is important that the course emphasizes the main themes in the course title: local food supply and indigenous knowledge.

Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc. In the designed course, only 4 SDGs (SDG numbers: 1, 2, 8 and 9) were addressed. What about the other SDGs? I believe that through the course objectives, more SDGs could be targeted (am particularly thinking of SDGs numbers 5, 6, 15).

The teaching methodology is based on a traditional approach, more centered on transmitting theoretical contents. It is recommended to integrate well designed activities that can enhance the active role of students in class and promote the achievement of critical thinking and problem-solving skills. Also, I suggest planning activities that can link theory with practice, considering local community. It is important to emphasize the connections between academic achievement, civic engagement, and personal growth and provide students with new knowledge and skills that they can apply in a real life context keeping the three main themes (climate change, sustainable agriculture and food security) well connected in the whole course.

Please make sure to include the community-based activity in the same document of the syllabus (you can insert the activity at the end of the modules).



CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

~~Course Syllabus~~

Course Number:

Small Scale Farming, Indigenous Knowledge and Local Food Supply
Aswan University, Faculty of Agriculture and natural Resources
Semester,

Formatted: French (France)

Instructor Information

Instructor:	Dr. Wagdi Saber Soliman
Office Location:	Aswan University, Sahari Campus
Telephone:	office - +20 973 480 245
Office hours:	Sunday-Wednesday 09.00 - 14.00
E-mail:	wagdi79@agr.aswu.edu.eg
Website:	

Course Identification

Course Number:	
Course Name:	Small Scale Farming, Indigenous Knowledge and Local Food Supply
Course Location:	Aswan University
Class Times:	
Prerequisites:	
Faculty Web Page:	http://agr.aswu.edu.eg

Course Description/Overview

This course provides an adequate understanding of the fundamentals that apply to starting and managing a small farm business. Students will examine the basics of traditional and organic farming systems and learn about resources and strategies to get started running their own farm business. The information and understanding gained from this course will prepare students to look at indigenous knowledge and local food supply chains from a holistic and realistic perspective.

Course Learning Objectives

- Students will gain a valuable understanding of the myriad of economic and regulatory issues involved in starting and managing a small farm.

- achieve in-depth local indigenous knowledge to solve the problems and face the challenges that reflect on sustainable development of the community

- Engage and collaborate with local, small farms and their entire ecosystem (e.g. local supply chains, farmers' markets, farming communities, etc.)

- Develop appropriate skills in scientific and community communication
- Develop cognitive, psychological, and social skills among students such as life-learning and transferable skills, promotion of students' active participation in the community, competence as responsible citizens, etc.

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

- Identify the principles and practices of small-scale organic farming
- Analyze contemporary food and agricultural issues, opportunities, threats, and trends
- Demonstrate effective oral and written communication skills as well as the ability to work in teams.
- Manage resources available to help establish a small farm business
- Describe the primary agricultural production systems for small farms
- Map the entire local, agricultural supply chain from production to retail
- Develop strategies for overcoming basic challenges in new farm business start-ups.
- Investigate local, indigenous knowledge on agricultural practices and local supply chains
- Synthesize between qualitative research methods for identifying indigenous knowledge

Course Resources

Course Website(s)

Required Course Texts and Materials

Hand-out prepared by the instructor for the class

Optional course Texts and Materials

Wolfenson KDM. 2013. Coping with the food and agriculture challenge: smallholders' agenda Preparations and outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20). http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf

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Irshad H. 2010. Local Food - A rural opportunity. http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/593337cbd907813a8725782c0058ae97/$FILE/Local-Food-A-Rural-Opp.pdf

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Murphy, S (2012) Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition), IIED/Hivos, London/The Hague

Ruben R., Slingerland M., Nijhoff H. (eds.). 2006. Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.

Commented [NK1]: Follow same APA style. Please refer to the previous version I corrected on July 20

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Assignments	20
Class attendance/participation	20
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Total Points	100

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

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Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.



Important Dates to Remember

Course schedule

Week	Date	Topics, Reading, Assignments and Deadline (details on assignments and more bibliography are available in the course modules)
1		Course overview: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2		Introduction and Concepts of Small-Scale Farming
3		Challenges to small-scale agricultural production
4		Basics of Farm Business Management
5		Farm Management Tools for Success
6		Farm Management regulations and challenges
7		Production systems overview
8-9		Action Research & Participatory Action Research in the context of local farms
10-11		Design and structure of local food supply chains
12-14		Basics of rural sociology and indigenous knowledge



The CCSAFS Course Modules Template

Course	Small Scale Farming, Indigenous Knowledge and Local Food Supply
Module 1	Agriculture Production and Small Farming
Key Concepts	Concepts of small farming, indigenous knowledge, and local food supply
Overview	It is essential for students to develop a fundamental understanding of small-scale farming, indigenous knowledge, and local food supply concepts. Questions to be addressed in this module include the following: What is the nature of small-scale farming? Why is small-scale farming important to food supply? What are the current applications of small-scale farming?
Aim	The overriding aim of this module is increase student's agricultural literacy with particular attention to sustainability and local food systems
Learning Outcomes	- Demonstrate an ability discuss the principles and practices of small-scale organic farming - Describe the primary agricultural production systems for small farms
Units	- Introduction and Concepts of Small-Scale Farming, indigenous knowledge, and local food supply - Challenges to Agricultural Production
Readings	Quan J. Science review: SR25. A future for small-scale farming. part of the UK Government's Foresight Project on Global Food and Farming Futures. https://www.nri.org/images/documents/news2011/11-570-sr25-future-for-small-scale-farming.pdf Irshad H. 2010. Local Food - A rural opportunity. http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/593337cbd907813a8725782c0058ae97/$FILE/Local-Food-A-Rural-Opp.pdf Ruben R., Slingerland M., Nijhoff H. (eds.). 2006. Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.
Activity	- Seminars/ Lectures; a series of lectures and seminars. - Group exam task with presentation; with the acquired understanding achieved through the course. - For each unit the students will submit an individual reflection paper of approximately 1000 words. This paper will express students reaction towards the subjects needed for this course
SD Pillars	
21st ESD	
ECTS workload	
SDGs	1- End poverty in all its forms everywhere

APA :Commented [NK2]



	2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all
Vision 2030	
Module 2	Farm Management
Key Concepts	Farm management and its regulations and challenges
Overview	In this module, students will have sufficient knowledge about establishing small farm, managing the tools and resources, awareness with regulations and challenges as well as marketing techniques
Aim	The overriding aim of this module is turn student's able to manage their own small farms
Learning Outcomes	- Identify resources available to help establish a small farm business and resource management - Describe the primary agricultural production systems for small farms with economic issues - Describe basic retail and wholesale marketing techniques
Units	- Basics of Farm Business Management - Farm Management Tools for Success - Farm Management Regulations and Challenges - Production systems overview
Readings	Wolfenson KDM. 2013. Coping with the food and agriculture challenge: smallholders' agenda Preparations and outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20). http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf Murphy, S (2012) Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition), IIED/Hivos, London/The Hague Ruben R., Slingerland M., Nijhoff H. (eds.). 2006. Agro-food chains and networks for development. Exclusion of small-scale farmers from coordinated supply chains. pp. 209-217. Springer. Netherlands.
Activity	Students will be asked to prepare the following: • Farm plan . • A feasibility study of a small farm . • Compare the feasibility and sustainability measures.
SD Pillars	
21st ESD	
ECTS workload	
SDGs	1- End poverty in all its forms everywhere

	2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture 8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all 9- Ensure sustainable consumption and production pattern
Vision 2030	
Module 3	The context of local food supply
Key Concepts	Local food supply, action research, local farms
Overview	In this module, students will have sufficient knowledge and understanding about local food supply chains. They will be able to analysis and apply action research and particularly action research in local farms, they be able to design and structure local food supply chains.
Aim	The overriding aim of this module is turn student's able to analysis, design and structure local food supply chains
Learning Outcomes	- Apply a systems approach to analyzing the context of local farms - Describe strategies for designing and structuring local food supply chains
Units	- Action Research & Participatory Action Research in the context of local farms - Design and structure of local food supply chains
Readings	- IPCC Fourth Assessment Report: Climate Change 2007: Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability: Indigenous knowledge systems. https://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch9s9-6-2.html - T., M. Velandia, R. Holcomb, R. Dunning, and E. Bendfeldt. 2013. "Local Food Systems Markets and Supply Chains". Choices. Quarter 4. Available online: http://choicesmagazine.org/choices-magazine/theme-articles/developing-local-food-systems-in-the-south/local-food-systems-markets-and-supply-chains - Holcomb, R.B., M.A. Palma, and M.M. Velandia. 2013. "Food Safety Policies and Implications for Local Food Systems". Choices. Quarter 4. Available online: http://choicesmagazine.org/choices-magazine/theme-articles/developing-local-food-systems-in-the-south/food-safety-policies-and-implications-for-local-food-systems
Activity	- Seminars/ Lectures; a series of lectures and seminars. - Group exam task with presentation; with the acquired understanding achieved through the course. - Students will visit small farms. They will be asked for collecting and analyzing data as well as designing and structuring local food supply.
SD Pillars	
21st ESD	
ECTS workload	
SDGs	1- End poverty in all its forms everywhere

APA :Commented [NK3]

	2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture 9- Ensure sustainable consumption and production pattern
Vision 2030	
Module 4	Rural Sociology and indigenous knowledge
Key Concepts	Rural sociology, indigenous knowledge
Overview	In this module, students will have sufficient knowledge and understanding about rural sociology and indigenous knowledge
Aim	Demonstrate an ability discuss the principles and practices of rural sociology and indigenous knowledge
Learning Outcomes	- Identify basic elements for small farmers associations - Gain an understanding of indigenous knowledge
Units	- Basics of rural sociology
Readings	- Rural Sociology: Meaning, Scope, Importance and Origin. http://www.sociologydiscussion.com/rural-sociology/rural-sociology-meaning-scope-importance-and-origin/2599 - The Rural Sociological Society (RSS). http://www.ruralsociology.org/ -Marsden T. (1999). Research in Rural Sociology and Development. Available online at: http://www.emeraldinsight.com/series/rrsd ~~Research in Rural Sociology and Development. http://www.emeraldinsight.com/series/rrsd~~
Activity	Students will visit small farmers and indigenous knowledge associations. They will be asked for collecting data, highlighting problem, and recommending solutions. The student will prepare a questionnaire and survey small community farmers. The questionnaire can target the main themes CC, SA, FS in terms of economic, managerial and marketing issues- as well as indigenous knowledge and its relation with SDGs
~~SD Pillars~~	
~~21st ESD~~	
ECTS ~~workload~~	
SDGs	8- Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all ~~9- Ensure sustainable consumption and production pattern~~
~~Vision 2030~~	

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CCSAFS COMMUNITY-BASED/SERVICE LEARNING ACTIVITY

CCSAFS COMMUNITY-BASED/SERVICE LEARNING ACTIVITY

During the course from the 1st module ending to the 5th module, the student will be engaged together in a community-based learning activity to stimulate and evaluate Small Scale Farming, Indigenous Knowledge and Local Food Supply, through field visits. The objective of the communication based learning activity is to

engage students with the farmers to define their problems, recommend the suitable application of precision agriculture to solve these problems, and evaluate its negative and positive impacts.

The recommended number of students in the course is 25 students. The students will be divided into groups (each group consists of 5 students). The groups will be distributed in 5 different agricultural areas near to Aswan city, Egypt.

- All students (25 students) under supervisor of the course Staff will be engaged into group discussion in the first week of the semester to define the work plan, select each group members and the tutor for each group, and select the target areas.
- Each group will develop a questionnaire and survey small community farmers. The questionnaire can target economic, managerial and marketing issues- in terms of production (local food supply), yield, marketing agricultural products, as well as indigenous knowledge
- Each group responsible to collect data about the real agricultural problems facing the farmers.
- Students will analyze the data to find out the real problems- addressing the main themes: climate change (water shortage, drought, high temperatures, etc.), sustainable agriculture, and food security) that the farmers face in their small farms.
- All students will be engaged again to discuss the problems and determine ONE PROBLEM to solve by all groups.
- After defining the problem, each group will collect the related data to the problem such as distance from river Nile, distance from main road, injured areas, damaged, plant growth characterizations, ….etc.
- Then, each group members together will do data analysis, group discussion to report the reasons of problem and how to solve it, …etc.
- The students will engaged in practical field activities in the target area carrying out with traditional and organic farming system and small farm management.
- Evaluate and stimulate the organic farming system and farm management.
- The staff member with assistant of student will prepare and achieve training and workshops for the target farmers to transfer knowledge and technology of organic farming and farm management

- Finally, each group will do final report. One of each group will join to present the final report and activities of the communication based learning activity in final conference inviting the staff members, tutors, farmers and all students.

For student assessment, each group will submit the collected data, data analysis repot, and field visits reports. Also, the tutor of each group will submit report about each group member about his efficiency and cooperation with team to the Staff member for final assessment.

5 ECTS Workload allocations

Learning components	No	Time Factor	Workload	Course modules				Workload
				1	2	3	4	
Lectures (face-to-face)	14	3	42	9	12	12	9	42
Online	4	3	12	3	3	--	3	9
Lab work	2	5	10	--	5	5	--	10
Reading articles (3 pages/hr)	18	0.3	6	1	2	1	2	6
Reading book chapters (5 pages/hr)	150	0.2	30	5	10	10	5	30
Preparing course activities	4	5	20	5	--	5	10	20
Project work	1	20	20	5	5	5	5	20
Preparation for exam	1	20	20	--	--	8	12	20
Writing the exam	1	3	3	--	--	--	3	3
Total			160	28	37	46	49	160



SDGs		CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere	✓		✓	1, 2, 3
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture		✓	✓	1, 2, 3
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all		✓	✓	1, 2, 4
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation		✓	✓	2, 3, 4
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive ~~institutions on all levelsin~~				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

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~~Course Syllabus~~

Course Code: *CSAF803*

Economics of Climate Change

Heliopolis University for Sustainable Development,

Faculty of Business and Economics,

2018/2019

Instructor Information

Instructor: Assoc. Prof. Karim Badr El-Din

Office Location: Heliopolis University for Sustainable Development

Telephone:

Office Hours:

E-mail: karim.badr@hu.edu.eg

Website:

Course Identification

Course Number:

Course Name:

Course Location:

Class Times:

Prerequisites:

Faculty Web Page: http://www.hu.edu.eg

Course Description/Overview

With global concerns about climate change, Ccountries plan for food security as part of their national security. This course aims to focuses onfocus on ~~the~~ countr~~y~~ies' decision-making processes and the internal and external influences on the food security ~~process~~ in the context of sustainable ~~economic~~ development. Considering that solving environmental problems ~~will~~ requires behavioral changes, it is important that economic planners as well as business entities fully understand agri-food economic requirements and ways to influence it within the concept of sustainable agriculture within the context of thein its relation with climate change challenges ~~related to climate changes~~. As such, this course intends to develop in students an in-depth understanding of climate change economics. I~~the course~~ ~~discusses~~ ~~dives into~~ the behavioral, economic, and sociological aspects of food security, sustainability, and social responsibility that ~~in turn~~ affects ~~the overall~~ economic decision- making processes.

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Understanding how governments and business entities behave is an integral part of correctly identifying their real needs. In~~Through t~~ this course, students will ~~be taught~~learn how the government and the business sector can link up effectively, and they will also to investigate ~~about countries'~~ concerns about food security and its impacts that drive and governments' ~~willingness~~ to adopt sustainable different economic plans in that address food security challenges.~~.~~

Course Learning Objectives

The overarching goals of this course are:

1) To use essential tools of environmental economics, including the assessment of trade-offs, benefits, costs, cost-effectiveness, feasibility analysis.
2) To provide a critical approach to climate change economics;
3) To assess climate change economics in the context of sustainability;

Commented [NK2]: The theme of the course climate change economics should be more emphasized in the objectives- The focus here is rather on food security and sustainable agriculture. I suggest to add these three objectives and you should follow through in the course modules.

a) Describe the relevance of food security to the entire economic process, the nature and stages of the economic decision making and the factors influencing governments' choices as related to food security and sustainable agriculture;

b) Explain and analyze the major stages which governments and businesses usually go through when making an economic~~-related~~ decision ~~as~~ related to food security and sustainable agriculture~~-~~;

c) ~~To u~~Understand the social and environmental responsibility and ethical issues associated with the behavior of economic planning process in light of the transformation economic research as related to food security and sustainable agriculture;

d) Apply the concepts and theories covered in the course to devise effective solutions in enhancing government and business performance in the context of sustainable food security within the context of the challenges related to climate change~~s~~.

Course Content Learning Outcomes

On successful completion of this course, you will be able to:

a) Analyze climate change economic issues at the microeconomic level

b) Apply the economic concepts learned to the analysis of food security, sustainable agriculture and climate change.

1. Identify and explain factors which influence both governments and the business sector's~~-~~ behavior as related to ~~the sustainability of~~ food security in ~~within~~ the context of sustainability and the challenges related to climate change~~s~~.

~~2. Identify and explain factors which influence the business sector's behavior as related to the sustainability of food security within the context of the challenges related to climate changes.~~

~~3. Display critical thinking and problem solving skills.~~

4.2.~~Gain, e~~Evaluate ~~and synthesize~~ information and existing knowledge ~~from a number~~ of sourcesrelated to climate change economics ~~and experience~~ using critical thinking and problem solving skills.

~~5. In a team, w~~Work in team to effectively to prepare a ~~professional, logical and~~ coherent project related to ~~report on~~ ffood security and climate change economics ~~issues within a specific context~~and deliver .

6.3.~~Deliver~~ an oral presentation in a professional and engaging manner.to discuss the results.

~~7.~~4. Demonstrate awareness and ability to discourse on ethical issues.

Commented [NK3]: The ethics aspect is not described in the course description above. Please make it more explicit there

~~8.~~5. Analyze the competitive advantages and risks associated with green economics.

Course Resources

Course Website(s)

- **http://www.economicsplace.com**
- https://www.elgaronline.com/view/9780857937551.xml

Required Course Texts and Materials

Power Point presentations prepared by the instructor for ~~t~~the participants.

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Optional Course Texts and Materials

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- Halvorsen, Robert & David F. Layton (2105). *Handbook on the Economics of Natural Resources*. Edward Elgar Publishing Limited. Library of Congress control Number: 2014952135.
- Parkin, M. (2015), "*Economics*", 11th ed., Addison-Wesley, USA.
- Pindyck, R.~~obert~~ S. & Rubinfeld, D.~~aniel~~ L. (2015). *MicroeconomicsICROECONOMICS*, 7th Edition, Prentice Hall
- Prasad, M.~~onica~~ (2012), *The Land of Too Much: American Abundance and the Paradox of Poverty*, Cambridge MA: Harvard University Press. ISBN-9780674066526
- North, D.~~uglass~~ (2017) *Institutions, Institutional Change and Economic Performance*, New York: Cambridge University Press. ISBN: 0521397340
- Tietenberg, T.~~om~~ & ~~Lynne~~ Lewis, L. (2016). *Environmental & Natural Resources Economics: 9th Edition*. Pearson. ISBN-13: 978-0-13-139257-1 (alk. paper) ISBN-10: 0-13-139257-3 (alk. paper).
- Varian, H.R. (2014) *Microeconomic Analysis*, 3rd edition, Norton.
- Hackett, S. C. (2006) Environmental and Natural Resource Economics: Theory, Policy, and the Sustainable Society. M.E. Sharpe, Armonk, NY (3rd ed.)

Assignments and Grading Scheme

Grading System

0 to 100 (where 60 is the least pass mark)

Grading Policy

Grades are based on the following:

Assignments	**10%**
Class attendance/participation	**10%**
Group Project	**40%**
Midterm Exam	**20%**
Final Exam	**20%**
Total Points	**100**

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come to ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by- case basis.

Important Dates to Remember

Course Schedule

Week	Topics to be covered
1	Course Overview: Discussion of syllabus and assignments, course requirements and prerequisites; Criteria for student selection
2	Microeconomics
3	Macroeconomics
4	Agriculture Economics
5	Environmental Economics
6	The Economics of Sustainable Development
7	Midterm Exam
8	The Economics of Food Security
9	The Economics of Climate change
10	The Economics of Sustainable Agriculture
11	Agrifood Economics and Policy- UNIPAD
12	Projects Presentations
13	Revision

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Course	*Economics of Climate Change, Sustainable Agriculture and Food Security (Agrifood Economics and Policy- UNIPAD)*
Module 1	*Introduction to Economics*
Key Concepts	Demand, Supply, Aggregate Demand, Aggregate Supply, Production, Economic Sectors, GDP, Trade
Overview	Students will be introduced to ~~the~~ microeconomic theoriesy and its variables. They will learn about ~~the concept of microeconomics and~~ how does this applies to markets' participants and their behavior in different ways. Moreover, they will get exposed to the nature of perception and how marketers use their knowledge of perception to enhance strategies. This will include applications on climate changes, food security, and sustainable agriculture. Questions to be addressed in this module include the following: who are the consumer? What is meant by the term demand? What is supply? Determinates of supply and demand? What is the production possibility frontier? How to arrive at aggregate demand and aggregate supply? What is GDP? What are the international trade impacts on the economic sectors?
Aim	The overriding aim of this module is to introduce students to the basics of economics. This will include applications on climate change~~s~~, food security, and sustainable agriculture.
Learning Outcomes	At the end of this module learners will be able to ~~:~~ - Identify and explain factors which influence demand, supply and the national economy. In a team, work effectively to prepare a professional, logical and coherent report on economic issues within a specific context. This will include applications on climate changes, food security, and sustainable agriculture.
Units	1. Demand and supply 2. Production 3. The national economy
Readings	1. Pindyck, Robert S. &Rubinfeld, Daniel L. (2015) *MicroeconomicsICROECONOMICS*, 7th Edition, Prentice Hall 2. Varian, H.R.(2014) *Microeconomic Analysis*, 3rd edition, Norton.

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Activity	1. Class Activity 1: 2. The development in the supply and demand forces in the labor market case study. 3. Assignment 2: Select a market that is controlled versus a free market. Justify your selection. Describe the advantages and the disadvantages of each market. 4. Project Phase 1: Project Focus This project is to apply the economic concepts and principles to the development of a real-world economy that matches with economic planning. Students should integrate all the concepts discussed in the course. This phase will require a. Selecting a country b. Macroeconomic indicators c. Stage of development This will include applications on climate changes, food security, and sustainable agriculture.

SD Pillars	environment			economy			social			culture						
21st ESD	Learning to know			Learning to be			Learning to do			Learning to live together			Learning to transform oneself and society		Learning to give and share	
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepar e exam	Writing exam	Total								
	9	6		15	15	15	10		70								
Vision 2030	This will lead to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature.															

Module 2	*The Economics of Sustainable Development*
Key Concepts	Development, Sustainable Development, Renewable Resources, and Nonrenewable Resources, Green Economics

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Overview deals	Developing more environmentally sustainable consumption and production systems depends upon consumers' willingness to engage in greener economic activities. Green economics is a form of economic activities that ~~is~~ cope with the modern actions to protect the environment and the depletion of natural resources. The change in economic activities toward green economics is a long process that depends on several variables such as, planning, awareness, and motivations. Consumers' and producers' motivations are energizing forces that activate behavior and provide purpose and direction to that behavior. There are economic models. The Hotelling rule and the Hartwick rule. The Hotelling rule with the risk of efficient resource utilisation. Hartwick rule deals with the investment of the proceeds from resource extraction. Questions to be addressed in this module include the following: What is green economics? How can planning, awareness, and motivation~~s~~ direct the economy toward green products? What are the required economic plans? What is the relationship between depletion and sustainability? How to deal with nonrenewable resources? How to deal with renewable resources? This will include applications on climate change~~s,~~ food security, and sustainable agriculture.
Aim	The aim of this module is to emphasize the concept of ~~G~~green ~~C~~consumption and production and to link consumer motivation, personality, and emotions toward buying green products. This will include applications on climate changes, food security, and sustainable agriculture.
Learning Outcomes	• Demonstrate how knowledge of green economics that can be applied to the economic development process and planning. • Demonstrate awareness and ability to discourse on ethical issues in using economic planning. • Analyze the competitive advantages and risks associated with green economics.
Units	1. Green economics 2. Sustainable economic development
Readings	1. ~~North,~~ Douglass, N. (2017) *Institutions, Institutional Change and Economic Performance,* New York: Cambridge University Press. ISBN: 0521397340 2. Halvorsen, R~~obert~~ & ~~David F.~~ Layton, D.F. (2105). *Handbook on the Economics of Natural Resources*. Edward Elgar Publishing Limited. Library of Congress control Number: 2014952135.

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Activity	Assignment 1: Develop a sustainable economic approach as related to: Nonrenewable resources Renewable resources Project Phase 2: Sustainable Economic Analysis a. Government role b. Business role c. Green economics d. Economic planning, awareness, and motivations

SD Pillars	environment		economy			social			culture							
21st ESD	Learning to know		Learning to be		Learning to do	Learning to live together			Learning to transform oneself and society		Learning to give and share					
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs workload	Lecture		Online		Lab		Reading		Course activity		Project	Prepare exam			Writing exam		Total
	6		2				10		10		7	5					40
Vision 2030	This will lead to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources															

Module 3	*The Economics of Food Security*
Key Concepts	Food production, food consumption, food processing, agroindustry.
Overview	The challenges facing food security are mainly attributed to the many problems; namely desertification, urbanization, and the increase in population. The increase in population at a rate higher than the rate of increase in food supplies cause shortages in food supply. This is a case of shortage in supply ~~or in turn deficit in supply~~ causing excess demand. This is a case of a vertical perfectly elastic aggregate supply curve. This is reflected in constant aggregate supply with increasing demand. This will lead to a rightward shift in the aggregate demand curve leading to inflation or even to hyperinflation. When all the resources are tied up the only possible way is the advancement in agricultural technology to reach abundance food production that will pull inflation downward. This requires economic planning that focuses on comparative advantage and incentives.

Questions to be addressed in this module include the following: What is food

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	security? What are the socioeconomic aspects of food security? What is meant by the term 'vertical perfectly elastic aggregate supply curve'? Why is it important for governments to understand situational influences on production and consumption behavior? Describe a process for developing a situation-based food security economic strategy as related to productivity.
Aim	The aim of this module is to explain the food security issue and the forces that affect food security in any nation. This will include applications on climate changes, food security, and sustainable agriculture.
Learning Outcomes	Identify and explain factors which influence food security. Demonstrate how knowledge of economics can be applied to the issue of food security. Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. Demonstrate awareness and ability to discourse on ethical issues.
Units	1. Food security 2. Vertical perfectly elastic aggregate supply curve
Readings	Tietenberg, T.~~om~~ & ~~Lynne~~ Lewis, L. (2016). *Environmental & Natural Resources Economics: 9th Edition*. Pearson. ISBN-13: 978-0-13-139257-1 (alk. paper) ISBN-10: 0-13-139257-3 (alk. paper).
Activity	Assignment 1: Find 2 comparative countries with one story of success in food security versus another country with shortage in food security. Discuss the approach of each in terms of its economic policies and incentives. Also discuss why the country that suffers from the shortage in food supply can overcome its problems as related to the challenges of climate changes. Project Phase 3: Recommended Economic Strategy that fits the following: a. Food security b. Vertical perfectly elastic aggregate supply curve and productivity

SD Pillars	environment	economy	social	culture
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share
SDGs	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
~~Sub goals~~	
ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6	2		10	10		5	3	36
Vision 2030	This will lead to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment.								

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Module 4	*The Economics of Sustainable Agriculture & Climatic Changes*
Key Concepts	Economics of Sustainable Agriculture , Climatic Changes, International Agreements
Overview	Economic decision making becomes more extensive and complex as development needs increase. It starts from the problem of poverty and the need to develop at the expense of the sustainable development by depleting the nonrenewable recourses to accelerate the current development process. Governments' faces the problem of recognition by the voters by decreasing environmental taxes and encouraging labor intensive projects with environmental adverse impacts to support employment. This led to the desertification with the incredible trend of urbanization and industrialization together with the pollution problems. This also, led to climatic problems such as the greenhouse effects and the problem of ozone depletion. The use of the biological fuels and the cultivation of crops that depletes the fertile soils led to unsustainability of agriculture. This will include applications on climate changes, food security, and sustainable agriculture.
Aim	The aim of this module to experience understand the different issues related to the economics of sustainable agriculture and climatic changes. This will include applications on climate changes, food security, and sustainable agriculture.
Learning Outcomes	- Identify and explain factors which influence sustainable agriculture. -Demonstrate the knowledge of the climatic changes. -Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. -In a team, work effectively to prepare a professional, logical and coherent report on the economics of sustainable agriculture and climatic changes issues within a specific context. -Deliver an oral presentation in a professional and engaging manner. -Demonstrate awareness and ability to discourse on ethical issues.
Units	The economics of sustainable agriculture and climatic changes
Readings	Prasad, Monica (2012), *The Land of Too Much: American Abundance and the Paradox of Poverty*, Cambridge MA: Harvard University Press. ISBN-9780674066526 North,Douglass (2017) *Institutions, Institutional Change and Economic Performance,* New York: Cambridge University Press. ISBN: 0521397340

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Activity	Assignment 1: Interview three students and identify five aspects that affect the sustainability of agriculture. Identify those that related to climatic changes. What reasons could be overcome in both the short run and the long run to enhance the process of sustainable agriculture? Project Phase 3: Recommended Economic Strategy that fits the following: a-The economics of sustainable agriculture and climatic changes. b- Final Submission & Presentation.
Community Based Learning Activity	The students will be engaged ~~together~~ in a Community Based-Learning Activity represented by a significant sample of the population of the agriculture entrepreneurs who are unaware of the long-term economic benefits of sustainable agricultural methods and who are involved in land reclamation projects in Egypt. The target is to provide them with their real needs of applying sustainable agricultural economic methods. The students will conduct a project in this connection. They will be responsible to collect data about relevant population to choose a significant sample. They will contact the chosen companies to designate the sustainable development methods of agriculture and to ask them to train their families accordingly. They will convince them of this transformation process through elaborating comparative long-turn cost-effective techniques calculated based on real figures. This will serve as a prototype model for Egypt and MENA region. The field work involves the direct interface with the farmers in addition to desk based studies including sampling data and required calculations and computations. The design of the whole process and all work steps are done under the full supervision of the instructors. Finally, the students will present their work~~s~~ in a written academic studyreport and will present it in ~~a presentation session~~class. Note: During the first lecture, the students will receive an assignment briefing sheet verifying all requirements, the writing instructions, the deadline of submission by the end of the course, and the exact date of the presentation which will correspond to the date of the last lecture.

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SD Pillars	environment		economy			social		culture							
21st ESD	Learning to know		Learning to be		Learning to do	Learning to live together		Learning to transform oneself and society		Learning to give and share					
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sub goals																	
ECTs Workload	Lecture 9		Online 2		Lab		Reading 10		Course activity 20		Project 20		Prepare exam 10		Writing exam 3		Total 74
Vision 2030	This will lead to a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.																

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SUMMRY OF ECTS WORKLOAD

Learning Components	No	Time Factor	Workload	Course Modules				Workload
				1	2	3	4	
Lectures (face-to-face)	10	3	30	9	6	6	9	30
Online	4	3	12	6	2	2	2	12
Lab work								
Reading articles (3 pages per hour)	200	0.4	35	15	10	5	5	35
Reading book chapters (5 per/h)	160	0.3	35	15	10	5	5	35
Preparing course activities	2	17	34	15			20	35
Project work	2	13	26		7		20	26
Preparation for exam	4	5	20	10	5	5	10	20
Writing the exam	2	3	6			3	3	6
Total			**220**	70	40	36	74	**220**

SUGGESTIONS FOR IMPROVEMENT

Unfortunately, this course is sent to me in the same format and content as sent to Padova University for the first review. I am copying below the comments made by Professor Samuele Trestinu on 09/03/2018

(Revision made by Associate Professor Samuele Trestini, Department of TESAF, University of Padova - Italy - 09/03/2018)

COURSE NAME: Economics of Climate Change, Sustainable Agriculture and Food Security

GENERAL COMMENTS
The objective of the course is quite ambitious. The provision of the contents described by the syllabus would require at least 100 hours of teaching.

COURSE OUTCOMES
The description of the outcomes is adequate. It is suggested to improve the correspondence between the objectives and the outcomes.

COURSE SCHEDULE
The description of the course schedule does not seem to be consistent with the description of the modules. The schedule associates large disciplinary macro-areas with each week (e.g. microeconomics, agricultural economics). These would represent courses alone. It is suggested to propose a brief description referring to the contents described in the modules.

MODULES
Key Concepts *(Are chosen concepts relevant? Would you suggest to delete or add something?)*
The concepts chosen are generally adequate. They should be updated with reference to following indications for Module 2.

Overview *(Is the module overview clear and appropriate?)*
The overview of the modules is generally adequate. Questions to be addressed are missed in Module 3.
It is suggested to introduce some principles of Economics Policy, discussing how a Policy can be developed and the tools that can be applied. Particular attention should be given to policy tools aiming to reduce market failure as in the case of commons (e.g. natural resources) or negative externalities (e.g. pollution, GHG emission).

Readings *(Are suggested readings up-to-date? Would you suggest more or different sources?)*
Suggested readings are up-to-date

Activity *(Are activities in agreement with the learning outcomes? Would you suggest different or additional activities?)*
Activities are adequate.

After reading again the syllabus, I pretty much agree with the first evaluator.
The course developer has not updated his syllabus to address the comments from the University of Padova.

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The main issues remain:

- The objective of the course is ambitious.
- The provision of the contents described by the syllabus would require at least 100 hours of teaching.
- It is suggested to improve the correspondence between the objectives and the outcomes.
- The description of the course schedule does not seem to be consistent with the description of the modules. The schedule associates large disciplinary macro-areas with each week (e.g. microeconomics, agricultural economics). These would represent courses alone. It is suggested to propose a brief description referring to the contents described in the modules.
- The concepts in the modules should be updated
- It is suggested to introduce some principles of Economics Policy, discussing how a Policy can be developed and the tools that can be applied. Particular attention should be given to policy tools aiming to reduce market failure as in the case of commons (e.g. natural resources) or negative externalities (e.g. pollution, GHG emission).

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The course design and structure lack:
1) A thread that contributes to the awareness-raising regarding policy-making as related to climate change,
2) A discussion of the environmental assessment principles and integration of systematic environmental and socio-economic evaluation into national policy-making;
3) The elaboration of methods and economic techniques for such socioeconomic assessments, cost benefit analysis, contingent valuation methods.

There no clear link between theoretical learning of economics and the focus on climate change economics that ensures that interrelated disciplines (environmental science, agriculture, food security, and economics). These should be examined in a holistic view, and not in separate sections. The course developer has distinct sections on microeconomics, and agriculture economics, climate change, but the contribution of the course to policy and decision making is still weak because the aspects of the interrelated disciplines have not been given a coherent prominence in the course design and are not well blended in the final assignment.

It is important to note that macroeconomic principles are not major elements in this course. All environmental economics is basically based on microeconomic principles. In the course sechedule, the third week is focused on macroeconomics and I don't see this useful in this course.

This course, as described, aims to provide an introduction to the complex world of "Economics of Climate Change, Sustainable Agriculture and Food Security (Agrifood Economics and Policy-UNIPAD)". And, this is mainly about the way human decisions affect the quality of the environment (anthropogenic greenhouse gases that contribute to climate change), how human values and institutions shape our demands for quality (consumption); and, about how to design effective economic and development policies to bring about these improvements. The relatedness of environmental issues to ethical, political, economic, social and technical dimensions is not identified clearly.

Modules (3) and (4) that I am suggesting below can help towards an in-depth understanding of climate change economics and sustainability policy. I invite the course developer to integrate those in the syllabus. The other modules (5) through (7) in my suggestions below are also necessary for this course. I am not seeing these modules in isolation but would like to see them linked to other modules and concepts discussed by the course developer in the course designed above.

- I SUGGEST MORE MODULES TO BE ADDED or COMBINED with your course design above to improve the course- as the scope of the course needs a wider perspective.
- Please check my recommendations regarding course outline and detailed modules below.
- Your course title is: Economics of Climate Change, Sustainable Agriculture and Food Security (Agrifood Economics and Policy- UNIPAD). But, I don't see much of the policy aspect.
- In the modules below, I have suggested other relevant readings and activities.
- You can use this below in combination of the modules you believe are important in your course design (the original syllabus you sent me) and come up with a more comprehensive syllabus.
- Once you have a final version of the syllabus, you should rearrange the SD pillars, 21st ESD, SDGs, ECTS, and vision 2030 as you see fit your final course syllabus.
- Please provide a clean version of the syllabus- without comments and with changes addressed.

If more clarifications are needed, please ask!
Good luck.

Course Outline

	TOPICS for discussion
01	Syllabus / Introduction to the course
02	Scarcity, opportunity cost, and economic rationality
03	Pareto efficiency and the Kaldor/Hicks criteria Positive and normative economics
04	~~Economics and Sustainability~~
05	~~Theory of consumer choice and the demand curve~~
06	~~Profit maximization and the supply curve~~
07	~~The economics of market allocation~~
08	~~Positive and Negative Externalities~~
09	~~Public Goods and Sustainability~~
10	Human transformation of the Earth: drivers of change: *Demographic drivers (population size, age and gender structure, and spatial distribution) *Economic drivers (national and per capita income, macroeconomic policies, international trade) *Sociopolitical (democratization, roles of women and local communities, role of private sector) *Scientific and technological (research and development, adoption of new technologies) *Cultural and religious (choices individuals make about what and how to ~~consume and what they value~~).
11	~~Climate change and the Kyoto Protocol~~
12	~~The Sustainable Development Goals of the United Nations~~

13	Decision-making: Individual vs. collective action The Rational Actor Paradigm Self-interest vs. social goals
14	Non-Market Valuation
15	Benefit Cost Analysis
16	Students' presentations

Course Modules

Course	Economics of Climate Change, Sustainable Agriculture and Food Security (Agrifood Economics and Policy- UNIPAD)
Module 1	Climate change economics and sustainability policy
Key Concepts	climate change economics, sustainability policy
Overview	Anthropogenic climate change represents the most challenging global problem confronting policymakers. This course begins with a module that explains anthropogenic greenhouse gas emissions as a function of a number of economic variables.
Aim	The aim of this module is for students to learn to discourse on climate change economics and sustainability policy.
Learning Outcomes	At the end of this module learners will be able to: 1. Understand economic rationality and the concept of climate change 2. understand the complex factors influencing changes in carbon dioxide emissions
Units	Unit 1. Fundamental economic Concepts Unit 2. The relationship between environment and economics Unit 3. Ecosystems and their services
Readings	Assigned readings from various websites (see in the activity section below and choose relevant readings to agriculture and food security)
Activity	Ask students to browse the sites below: □ World Meteorological Organization (WMO) □ United Nations Environment Programme (UNEP) □ United Nations Framework Convention on Climate Change (UNFCCC) □ Global Environment Facility (GEF) □ Linkages by International Institute for Sustainable Development (IISD) □ IPCC Data Distribution Centre □ United Nations Convention to Combat Desertification
21st ESD SDGs ECTS workload Vision 2030	

Module 2	Sustainability and Climate Change
Key Concepts	Pillars of sustainability, climate change, mitigation, adaptation, The Sustainable Development Goals
Overview	In this module, we examine the nature and scope of sustainability in relation to climate change. We begin with a definition of sustainability and a discussion of its relationship to other fields, including agriculture and food security. We emphasize strategies to ensure sustainability of both natural ecosystems and human well-being by integrating economic, environmental, social and cultural aspirations. The Sustainable Development Goals and the Millennium Ecosystem Assessment reports will be used to illustrate the integration of information from natural and social sciences and to harmonize the use of ecosystem services with human needs (food security and sustainable agriculture)
Aim	The aims of this module are to: 1) distinguish between the different dimensions of sustainability, 2) introduce the Sustainable Development Goals, 3) explore decision-making options that can harmonize the use of ecosystem goods and service with human needs (such a food provision and other ecosystem services)
Learning Outcomes	At the end of this module, learners will be able to: • Distinguish between sustainability dimensions • Assess the status of the Sustainable Development Goals in Egypt and in the region • Examine decision-making to mitigate and adapt to climate change
Units	Unit 1. Sustainability Unit 2. The relationship between sustainability and economics Unit 3. the Sustainable Development Goals Unit 4. The Millennium Ecosystem Assessment Unit 5. Making policy decisions to mitigate and adapt to climate change
Readings	Millennium Ecosystem Assessment for the Arab region http://gis.cedare.int/arabma/docs/MA_final%20full%20Report_Low.pdf
Activity	Discussion related to the application of economic principles to e issues, such as climate change and sustainable agriculture
SD pillars	
21st ESD	
SDGs ECTS workload Vision 2030	
Module 3	Human transformation of the Earth: drivers of change
Key Concepts	Drivers of change: Demographic, economic, sociopolitical, scientific and technological, cultural and religious. Benefits and Costs of Climate Change Mitigation, Threats caused by climate change, Policy Initiatives.
Overview	In this module, we discuss- in a holistic view-the different drivers of change for the transformation of the earth (including climate change) * Demographic drivers (population size, age and gender structure, and spatial distribution)

	* Economic drivers (national and per capita income, macroeconomic policies, international trade) * Sociopolitical (democratization, roles of women and local communities, role of private sector) * Scientific and technological (research and development, adoption of new technologies) *Cultural and religious (choices individuals make about what and how to consume and what they value).
Aim	The aims are: 1) to discuss the drivers of climate change; 2) to understand the threats caused by climate change on humans and other living things through impacts on ecosystems, agriculture and food security; 3) to analyze economically estimates of mitigation benefits and costs in the case of various market distortions; 4) to discuss making policy choices under uncertainty in climate change models
Learning Outcomes	At the end of this module, learners will be able to: 1. Identify drivers of change; 2. Understand the threats caused by global climate change through impacts on agriculture and food security; 3. Analyze economically estimates of mitigation benefits, improved understanding of costs in the presence of various market distortions, 4. Design tools for making policy choices under uncertainty
Units	Unit 1: Drivers of change Unit 2: Assessing the Benefits and Costs of Climate Change Mitigation Unit 3: Dealing with Uncertainty of climate policy Unit 4: International Policy Coordination
Readings	Millennium Ecosystem Assessment Reports http://maweb.org Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity (www.eia.doe.gov/oiaf/kyoto/kyotorpt.html): Comprehensive economic analysis of the costs of complying with the Kyoto Protocol, sponsored by the U.S. Energy Information Administration
Activity	Write a five-page essay in which you summarize what is known about global climate change. Discuss how the complexity, the long-term nature of the problem, the uncertainty regarding climate change effects, and the challenging policy problems related to sustainable agriculture and food security.
SD pillars	
21st ESD SDGs	
ECTS workload Vision 2030	
Module 4	Climate Change: Science, Policy, and Economics
Key Concepts	Greenhouse Gas Emissions and Global Climate Change, trends in greenhouse gas emissions, climate change predictions, international

	action on Climate Change: The Earth Summit , The Kyoto Protocol
Overview	According to the Intergovernmental Panel on Climate Change (IPCC), the present carbon dioxide concentration has not been exceeded during the past 650,000 years, and likely not during the past 20 million years. The current rate of increase is unprecedented during at least the past 20,000 years. Climate models are extremely complex, and so as our understanding of the world's climate improves, so too will our ability to model climate change caused by greenhouse gas emissions.
Aim	The aims of this module are to: 1) understand that deterioration of ecosystems due to climate change could have negative consequences for the world's economy, 2) introduce climate change models and predictions, 3) discuss international action on climate change.
Learning Outcomes	At the end of this module, learners will be able to: • Understand that major alterations to ecosystems due to climate change could possibly have negative consequences for the world's economy • Explore assumptions of climate change scenarios • Discuss the Earth Summit and The Kyoto Protocol that includes three incentive-based economic instruments.
Units	Unit 1: The scientific aspect of climate change Unit 2: Assessing the Benefits and Costs of Climate Change Unit 3: Policy Initiatives
Readings	Hackett, S. C. (2006) Environmental and Natural Resource Economics: Theory, Policy, and the Sustainable Society. M.E. Sharpe, Armonk, NY (3rd ed.) - chapter 11
Activity	An Inconvenient Truth (movie)
SD pillars	
21st ESD	
SDGs	
ECTS workload	
Vision 2030	
Module 5	Climate Change and Economic Development
Key Concepts	Gas emissions and impacts of climate change on developing nations
Overview	This module examines climate change impacts on developing nations, particularly on poor people, and identifies the most vulnerable zones across the world. The cost of these direct and indirect climate change impacts are primarily borne by the poor as they directly depend on environmental resources for their livelihood. Strategies to slow down the progress of climate change and policy adaptations to help the "poor" are discussed.
Aim	The overriding aims of this module are: 1) to examine the topic of climate change and its impact on developing nations, particularly the poor; and 2) to discuss the strategies that need to be pursued to impede the pace of climate change.

Learning Outcomes	At the end of this module, learners will be able to: • Analyze the development challenges caused by climate change • Examine strategies to slow down climate change and adapt policies to help the poor, mostly affected by this problem
Units	Unit 1: Estimating the human and environmental impacts of global environmental problems, such as climate change Unit 2: The impacts of climate change on developing nations, particularly the poor Unit 3: Policies to impede the progress of climate change
Readings	• http://www.ipcc.ch/ • http://climatechange.worldbank.org/ • Adaptation to a changing climate in the Arab countries: a case for adaptation governance and leadership in building climate resilience http://www.preventionweb.net/english/professional/publications/v.php?id=29948
Activity	Write a report to discuss the responsibilities of developing and developed countries with respect to climate change and its impacts on the economy and the lives of people.
SD pillars	
21st ESD	
SDGs	
ECTS workload	
Vision 2030	
Module 6	Decision-making: Individual vs. collective action
Key Concepts	The Rational Actor Paradigm, Self-interest vs. social goals
Overview	This module provides an overview on how individuals make decisions in collective action situation
Aim	The aim of this module is to explain individual behavior in the case of a collective action
Learning Outcomes	At the end of this module learners will be able to: 1. Understand the social dimension of environmental problems 2. Analyze decision-making from an economic perspective (RAP) 3. Understand cooperation in collective action situations
Units	Unit 1. Environmental problems and their social dimensions Unit 2. The Rational Actor Paradigm Unit 3. Collective action cooperation
Readings	Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press, New York Ostrom, E. (2000). Collective Action and the Evolution of Social Norms. Journal of Economic Perspectives 13 (4): 137-158. Titenberg, T. (2002). The tradable Permits Approach to Protecting the Commons: What Have We Learned? Pages 197-232 in E. Ostrom, T. Dietz, and N. Dolsak, eds. The Drama of the Commons. National Academy Press, Washington, DC. http://www.ipcc.ch/publications_and_data/publications_and_data_reports.

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Activity	Discuss the climate change problem in terms of individual vs. collective decisions to reduce its impact on the economy and the lives of people
SD pillars 21st ESD SDGs ECTS workload Vision 2030	
Module 7	Economic Valuation Methods
Key Concepts	Present value, future value, social discount rate, cost benefit analysis, willingness to pay, contingent valuation method (CVM), ecosystem assessment
Overview	This module overviews basic microeconomics as it applies to climate change economics. Also, it presents the methodologies available for quantifying benefits and costs. • Tradeoffs between current and future consumption. • Using an appropriate social discount rate. • How to correctly value the environment as a resource whose depletion represents a cost to future generations. • How to internalize negative externalities and correct for market failures.
Aim	The overall aims of this module are: 1) to run a cost-benefit analysis, 2) to define types of economic values and total willingness to pay, 3) to understand the various nonmarket valuation methods , 4) to provide an overview of cost estimation methods, 5) to illustrate complexities including benefits transfers, the monetization of intangibles, the treatment of risk and the choice of the discount rate.
Learning Outcomes	At the end of this module, learners will be able to: • Outline the complexities of cost-benefit analysis • Define types of values: use value, option value, existence value and willingness to pay • Classify the available non-market valuation methods • Examine the potential complexities associated with the contingent valuation method and other cost estimation methods
Units	Unit 1: Current conditions of ecosystems and the effect of climate change agriculture and food security Unit 2: Essential tools of environmental analysis and economic valuation, including the assessment of trade-offs, benefits, costs, cost-effectiveness, contingent valuation. Unit 3: Ecological and social systems interactions, trade-offs involved in decisions concerning climate change Unit 4: Economic policy to better achieve human development
Readings	• The Millennium Ecosystem Assessment (http://www.maweb.org/en/index.aspx)

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	• Environmental valuation http://cmsdata.iucn.org/downloads/09_compendium_of_case_studies_introduction.pdf • Environmental Valuation: Challenges and Practices http://www.rff.org/Documents/08_Tropics_Conference/Tropics_Conference_Papers/Tropics_Conference_Dixon_Environmenal_Valuation.pdf • The Economic Valuation of Environmental Amenities and Disamenities: Methods and Applications: http://environment.yale.edu/files/biblio/YaleFES-00000201.pdf
Activity	• An in-class example or problem set related to discounting will let the students learn with a hands-on example and will likely ease their minds about the difficulty of the concept of environmental valuation. Example: A spreadsheet problem is a hypothetical example of two proposed uses for an area (development project vs. agricultural area). A set of costs and benefits is given for a 5-year period. The problem is set up so that the net present value changes from positive to negative with a change in the discount rate. This is a nice illustration of the effect of the discount rate. The example is also set up so that a different project would be pursued at a different rate. • Case study (in the field). You can the Community Based Learning Activity you have designed

CCSAFS COURSE SYLLABUS

Course Code: *CSAF803*

Economics of Climate Change

Heliopolis University for Sustainable Development, Faculty of Business and Economics,

2018/2019

Instructor Information

Instructor: Assoc. Prof. Karim Badr El-Din

Office Location: Heliopolis University for Sustainable Development

Telephone:

Office Hours:

E-mail: karim.badr@hu.edu.eg

Website:

Course Identification

Course Number:

Course Name:

Course Location:

Class Times:

Prerequisites:

Faculty Web Page: http://www.hu.edu.eg

Course Description/Overview

With global concerns about climate change, countries plan for food security as part of their national security. This course aims to focus on the countries' decision-making processes and the internal and external influences on the food security in the context of sustainable development. Considering that solving environmental problems will require behavioral changes, it is important that economic planners as well as business entities fully understand agrifood economic requirements and ways to influence it within the concept of sustainable agriculture in its relation with climate change challenges. As such, this course intends to develop in students an in-depth understanding of climate change economics, and discuss behavioral, economic, and sociological aspects of food security, sustainability, and social responsibility that affects the overall economic decision making processes. Understanding how governments and business entities behave is an integral part of correctly identifying their real needs. In this course, students will learn how the government and the business sector can link up effectively, and they will investigate concerns about food security and its impacts that drive governments' to adopt sustainable economic plans that address food security challenges. More emphasis will be demonstrated in the course module as crosscutting related to the

ethical issues which is considered as a main part of the economics of climate in general.

Course Learning Objectives

The overarching goals of this course are:

1) To use essential tools of environmental economics, including the assessment of trade-offs, benefits, costs, cost-effectiveness, feasibility analysis.
2) To provide a critical approach to climate change economics;
3) To assess climate change economics in the context of sustainability;

Accordingly, on successful completion of this course, you will be able to:

a) Describe the relevance of food security to the entire economic process, the nature and stages of the economic decision making and the factors influencing governments' choices as related to food security and sustainable agriculture; b) Explain and analyze the major stages which governments and businesses usually go through when making an economic decision related to food security and sustainable agriculture ; c) Understand the social and environmental responsibility and ethical issues associated with the behavior of economic planning process in light of the transformation economic research as related to food security and sustainable agriculture; d) Apply the concepts and theories covered in the course to devise effective solutions in enhancing government and business performance in the context of sustainable food security within the context of the challenges related to climate change~~s.~~

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Course Content Learning Outcomes

~~a)~~1. Analyze climate change economic issues at the microeconomic level

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~~b)~~2. Apply the economic concepts learned to the analysis of food security, sustainable agriculture and climate change.

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~~1.~~3. Identify both the governments', and business sector behavior as related to the food security in the context of sustainability and the challenges related to climate changes.

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~~2.~~4. Evaluate information related to climate change economics knowledge using critical thinking and problem solving skills.

~~3.~~5. Work in team to prepare a project related food and climate change economics.

~~4.~~6. Demonstrate awareness and ability to discourse on ethical issues.

~~5.~~7. Analyze the competitive advantages and risks associated with green economics.

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Course Resources

Course Website(s)

- http://www.economicsplace.com
- https://www.elgaronline.com/view/9780857937551.xml

Required Course Texts and Materials

PowerPoint presentations prepared by the instructor for the participants.

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Optional Course Texts and Materials

- Hackett, S. C. (2006) Environmental and Natural Resource Economics: Theory, Policy, and the Sustainable Society. M.E. Sharpe, Armonk, NY (3rd ed.)
- Halvorsen, R~~obert~~ & D~~avid~~ F. Layton (2105). *Handbook on the Economics of Natural Resources*. Edward Elgar Publishing Limited. Library of Congress control Number: 2014952135.
- North, D. (2017) *Institutions, Institutional Change and Economic Performance,* New York: Cambridge University Press. ISBN: 0521397340
- Parkin, M. (2015), "*Economics*", 11th ed., Addison-Wesley, USA.
- Pindyck, R. S. & Rubinfeld, D. L. (2015). *Microeconomics*, 7th Edition, Prentice Hall
- Prasad, M. (2012), *The Land of Too Much: American Abundance and the Paradox of Poverty*, Cambridge MA: Harvard University Press. ISBN-9780674066526
- Tietenberg, T. & Lewis, L. (2016). *Environmental & Natural Resources Economics: 9th Edition*. Pearson. ISBN-13: 978-0-13-139257-1 (alk. paper) ISBN-10: 0-13-139257-3 (alk. paper).
- Varian, H.R. (2014) *Microeconomic Analysis*, 3rd edition, Norton.

Assignments and Grading Scheme

Grading System

0 to 100 (where 60 is the least pass mark)

Grading Policy

Grades are based on the following:

Assignments	10%
Class attendance/participation	10%
Group Project	40%
Midterm Exam	20%
Final Exam	20%
Total Points	100

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come to ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability
Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by- case basis.

Important Dates to Remember

Course Schedule

Week	Topics to be covered
1	Course Overview: Discussion of syllabus and assignments, course requirements and prerequisites; Criteria for student selection 2
	Microeconomics
3	Human transformation of the Earth: drivers of change: *Demographic drivers (population size, age and gender structure, and spatial distribution) *Economic drivers (national and per capita income, macroeconomic policies, international trade)
4	Economics and Sustainability
~~5~~	~~Environmental Economics~~
6	The Economics of Sustainable Development
7	Midterm Exam
8	The Economics of Food Security
9	The Economics of Climate change
10	The Economics of Sustainable Agriculture
11	Agrifood Economics and Policy- UNIPAD
12	Climate change and policies
13	Projects Presentations
14	Revision

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Course	*Economics of Climate Change, Sustainable Agriculture and Food Security (Agrifood Economics and Policy- UNIPAD*
Module 1	Introduction to Economics
Key Concepts	Demand, Supply, Aggregate Demand, Aggregate Supply, Production, Economic Sectors, GDP, Trade
Overview	Students who will join this program are mostly not coming from economics background; therefore they will be introduced to microeconomic theory in this module. They will learn how this applies to markets' participants and their behavior in different ways. Moreover, they will get exposed to the nature of perception and how marketers use their knowledge of perception to enhance strategies. This will include applications on climate changes, food security, and sustainable agriculture. Questions to be addressed in this module include the following: who are the consumer? What is meant by the term demand? What is supply? Determinates of supply and demand? What is the production possibility frontier? How to arrive at aggregate demand and aggregate supply? What is GDP? What are the international trade impacts on the economic sectors?
Aim	The overriding aim of this module is to introduce students to the basics of economics. This will include applications on climate changes, food security, and sustainable agriculture.
Learning Outcomes	At the end of this module learners will be able to: • Identify and explain factors which influence demand, supply and the national economy. In a team, work effectively to prepare a professional, logical and coherent report on economic issues within a specific context. This will include applications on climate changes, food security, and sustainable agriculture.
Units	1. Demand and supply 2. Production 3. The national economy
Readings	1. Pindyck, Robert S. &Rubinfeld, Daniel L. (2015) *Microeconomics*, 7th Edition, Prentice Hall 2. Varian, H.R.(2014) *Microeconomic Analysis*, 3rd edition, Norton.

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Activity	1. Class Activity 1: 2. The development in the supply and demand forces in the labor market case study. 3. Assignment 2: Select a market that is controlled versus a free market. Justify your selection. Describe the advantages and the disadvantages of each market. 4. Project Phase 1: Project Focus This project is to apply the economic concepts and principles to the development of a real-world economy that matches with economic planning. Students should integrate all the concepts discussed in the course. This phase will require a. Selecting a country b. Macroeconomic indicators c. Stage of development This will include applications on climate changes, food security, and sustainable agriculture.

SD Pillars	environment			economy				social			culture					
21st ESD	Learning to know			Learning to be			Learning to do			Learning to live together			Learning to transform oneself and society			Learning to give and share
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	9		6				5		5		5		10				40
Vision 2030	This will lead to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature. It is obvious here that the ethical consideration has to be emphasized in this module in accordance with Egypt vision for 2030															

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Module 2	Human transformation of the Earth: drivers of change
Key Concepts	Drivers of change: Demographic, economic, sociopolitical, scientific and technological, cultural and religious. Benefits and Costs of Climate Change Mitigation, Threats caused by climate change, Policy Initiatives.
Overview	In this module, we discuss- in a holistic view-the different drivers of change for the transformation of the earth (including climate change) * Demographic drivers (population size, age and gender structure, and spatial distribution) * Economic drivers (national and per capita income, macroeconomic policies, international trade) * Sociopolitical (democratization, roles of women and local communities, role of private sector) * Scientific and technological (research and development, adoption of new technologies) *Cultural and religious (choices individuals make about what and how to consume and what they value).
Aim	The aims are: 1) to discuss the drivers of climate change; 2) to understand the threats caused by climate change on humans and other living things through impacts on ecosystems, agriculture and food security; 3) to analyze economically estimates of mitigation benefits and costs in the case of various market distortions; 4) to discuss making policy choices under uncertainty in climate change models
Learning Outcomes	At the end of this module, learners will be able to: 1. Identify drivers of change; 2. Understand the threats caused by global climate change through impacts on agriculture and food security; 3. Analyze economically estimates of mitigation benefits, improved understanding of costs in the presence of various market distortions, 4. Design tools for making policy choices under uncertainty
Units	Unit 1: Drivers of change Unit 2: Assessing the Benefits and Costs of Climate Change Mitigation Unit 3: Dealing with Uncertainty of climate policy Unit 4: International Policy Coordination
Readings	Millennium Ecosystem Assessment Reports http://maweb.org Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity (www.eia.doe.gov/oiaf/kyoto/kyotorpt.html): Comprehensive economic analysis of the costs of complying with the Kyoto Protocol, sponsored by the U.S. Energy Information Administration
Activity	Write a five-page essay in which you summarize what is known about global climate change. Discuss how the complexity, the long-term nature of the problem, the uncertainty regarding climate change effects, and the challenging policy problems related to sustainable agriculture and food security. The essay to be uploaded on Moodle and each student write 5 questions that the answers are embedded into his essay. These questions to be answered by one of his colleagues (each one select one essay to answer its questions). All answers to be shared in the forum discussion.

SD Pillars	environment		economy			social			culture								
21st ESD	Learning to know		Learning to be		Learning to do	Learning to live together			Learning to transform oneself and society			Learning to give and share					
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total								
Vision 2030	6	9		15	10				40								
	The main factor in Egypt vision that address sustainable consumption and production is obviously embedded in this course																

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Module 3	The Economics of Sustainable Development
Key Concepts	Development, Sustainable Development, Renewable Resources, and Nonrenewable Resources, Green Economics, climate change, mitigation, adaptation
Overview	Developing more environmentally sustainable consumption and production systems depends upon consumers' willingness to engage in greener economic activities. Green economics is a form of economic activities that ~~is~~ cope with the modern actions to protect the environment and the depletion of natural resources. The change in economic activities toward green economics is a long process that depends on several variables such as, planning, awareness, and motivations. Consumers' and producers' motivations are energizing forces that activate behavior and provide purpose and direction to that behavior. There are economic models. The Hotelling rule and the Hartwick rule. The Hotelling rule deals with the risk of efficient resource utilisation. Hartwick rule deals with the investment of the proceeds from resource extraction. Questions to be addressed in this module include the following: What is green economics? How can planning, awareness, and motivations direct the economy toward green products? What are the required economic plans? What is the relationship between depletion and sustainability? How to deal with nonrenewable resources? How to deal with renewable resources? This will include applications on climate changes, food security, and sustainable agriculture. Climate change mitigation and adaptation ant its relation to macroeconomics policies embedded in Egypt vision 2030?
Aim	1) The aim of this module is to emphasize the concept of consumption and production and to link consumer motivation, personality, and emotions toward buying green products. This will include applications on climate changes, food security, producing green products, and sustainable agriculture. 2) Explore decision-making options that can harmonize the use of ecosystem goods and service with human needs (such a food provision and other ecosystem services)
Learning Outcomes	□ Demonstrate how knowledge of green economics that can be applied to the economic development process and planning. □ Demonstrate awareness and ability to discourse on ethical issues in using economic planning. □ Analyze the competitive advantages and risks associated with green economics.
Units	1. Green economics 2. Sustainable economic development 3. Examine decision-making to mitigate and adapt to climate change 4. The Millennium Ecosystem Assessment

Readings	1. Douglass, N. (2017) *Institutions, Institutional Change and Economic Performance*, New York: Cambridge University Press. ISBN: 0521397340 2. Halvorsen, R. & Layton D. F. (2105). *Handbook on the Economics of Natural Resources*. Edward Elgar Publishing Limited. Library of Congress control Number: 2014952135. 3. Millennium Ecosystem Assessment for the Arab region http://gis.cedare.int/arabma/docs/MA_final%20full%20Report_Low.pdf http://sdsegypt2030.com/?lang=en
Activity	Activity 1. In the forum discussion students Discussion related to the application of economic principles to environmental issues, such as climate change and sustainable agriculture Project Phase 1: Develop a sustainable economic approach as related to: □ Nonrenewable resources □ Renewable resources Project Phase 2: Sustainable Economic Analysis a. Government role b. Business role c. Green economics d. Economic planning, awareness, and motivations

SD Pillars	environment				economy				social			culture				
21st ESD	Learning to know □				Learning to be □				Learning to do □			Learning to live together □			Learning to transform oneself and society □	Learning to give and share □
SDGs Sub goals	1	2	3	4	5	6	7 □	8 □	9	10	11 □	12	13	14	15	16	17
ECTs workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total							
	6	2		10	10	7	5		40							
Vision 2030	This will lead to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources															

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Module 4	The Economics of Food Security
Key Concepts	Food production, food consumption, food processing, agroindustry.
Overview	The challenges facing food security are mainly attributed to many problems, namely: desertification, urbanization, and the increase in population. The increase in population at a rate higher than the rate of increase in food supplies cause shortages in food supply. This is a case of shortage in supply causing excess demand. This is a case of a vertical perfectly elastic aggregate supply curve. This is reflected in constant aggregate supply with increasing demand. This will lead to a rightward shift in the aggregate demand curve leading to inflation or even to hyperinflation. When all the resources are tied up the only possible way is the advancement in agricultural technology to reach abundance food production that will pull inflation downward. This requires economic planning that focuses on comparative advantage and incentives. Questions to be addressed in this module include the following: What is food security? What are the socioeconomic aspects of food security? What is meant by the term 'vertical perfectly elastic aggregate supply curve'? Why is it important for governments to understand situational influences on production and consumption behavior? What are the policies tools that the government has to emphasize on in order to ensure food sovereignty? Describe a process for developing a situation-based food security economic strategy as related to productivity.
Aim	The aim of this module is to explain the food security issue and the forces that affect food security in any nation. This will include applications on climate changes, food security, and sustainable agriculture.
Learning Outcomes	Identify and explain factors which influence food security. Demonstrate how knowledge of economics can be applied to the issue of food security. Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. Demonstrate awareness and ability to discourse on ethical issues.
Units	1. Food security 2. Vertical perfectly elastic aggregate supply curve
Readings	Tietenberg, T. & Lewis L. (2016). *Environmental & Natural Resources Economics: 9th Edition*. Pearson. ISBN-13: 978-0-13-139257-1 (alk. paper) ISBN-10: 0-13-139257-3 (alk. paper).

	Assignment 1: (Group Assignment) Find 2 comparative countries with one story of success in food security versus another country with shortage in food security. Discuss the approach of each in terms of its economic policies and incentives. Also discuss why the country that suffers from the shortage in food supply can overcome its problems as related to the challenges of climate changes. Activity 2. Students are going to make glossary related to the food security and food sovereignty A glossary can also be a collaborative activity, where students will add key terms related the 2 concepts to build their knowledge Project Phase 3: Recommended Activity Economic Strategy that fits the following: a. Food security b. Vertical perfectly elastic aggregate supply curve and productivity

SD Pillars	environment		economy			social			culture								
21st ESD	Learning to know		Learning to be		Learning to do	Learning to live together			Learning to transform oneself and society			Learning to give and share					
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total								
	6	2		10	10		5	3	36								
Vision 2030	This will lead to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment.																

Module 5	Climate Change: Science, Policy, and Economics
Key Concepts	Greenhouse Gas Emissions and Global Climate Change, trends in greenhouse gas emissions, climate change predictions, international action on Climate Change: The Earth Summit , The Kyoto Protocol
Overview	According to the Intergovernmental Panel on Climate Change (IPCC), the present carbon dioxide concentration has not been exceeded during the past 650,000 years, and likely not during the past 20 million years. The current rate of increase is unprecedented during at least the past 20,000 years. Climate models are extremely complex, and so as our understanding of the world's climate improves, so too will our ability to model climate change caused by greenhouse gas emissions.
Aim	The aims of this module are to: 1) understand that deterioration of ecosystems due to climate change could have negative consequences for the world's economy, 2) introduce climate change models and predictions, 3) discuss international action on climate change.
Learning Outcomes	At the end of this module, learners will be able to: □ Understand that major alterations to ecosystems due to climate change could possibly have negative consequences for the world's economy □ Explore assumptions of climate change scenarios □ Discuss the Earth Summit and The Kyoto Protocol that includes three incentive-based economic instruments.
Units	Unit 1: The scientific aspect of climate change Unit 2: Assessing the Benefits and Costs of Climate Change Unit 3: Policy Initiatives
Readings	Hackett, S. C. (2006) Environmental and Natural Resource Economics: Theory, Policy, and the Sustainable Society. M.E. Sharpe, Armonk, NY (3rd ed.) - chapter 11
Activity	An Inconvenient Truth (movie)

SD Pillars	environment		economy			social			culture								
21st ESD	Learning to know □		Learning to be □		Learning to do □	Learning to live together □			Learning to transform oneself and society □			Learning to give and share □					
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13 □	14	15 □	16	17 □
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	6		2				5		5		10		2				30
Vision 2030	This will lead to a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.																

Module 6	The Economics of Sustainable Agriculture & Climatic Changes
Key Concepts	Economics of Sustainable Agriculture , Climatic Changes, International Agreements
Overview	Economic decision making becomes more extensive and complex as development needs increase. It starts from the problem of poverty and the need to develop at the expense of the sustainable development by depleting the nonrenewable recourses to accelerate the current development process. Governments' faces the problem of recognition by the voters by decreasing environmental taxes and encouraging labor intensive projects with environmental adverse impacts to support employment. This led to the desertification with the incredible trend of urbanization and industrialization together with the pollution problems. This also, led to climatic problems such as the greenhouse effects and the problem of ozone depletion. The use of the biological fuels and the cultivation of crops that depletes the fertile soils led to unsustainability of agriculture. This will include applications on climate changes, food security, and sustainable agriculture.
Aim	The aim of this module to understand the different issues related to the economics of sustainable agriculture and climatic changes. This will include applications on climate changes, food security, and sustainable agriculture.
Learning Outcomes	- Identify and explain factors which influence sustainable agriculture. -Demonstrate the knowledge of the climatic changes. -Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. -In a team, work effectively to prepare a professional, logical and coherent report on the economics of sustainable agriculture and climatic changes issues within a specific context. -Deliver an oral presentation in a professional and engaging manner. -Demonstrate awareness and ability to discourse on ethical issues.
Units	The economics of sustainable agriculture and climatic changes
Readings	Prasad, Monica (2012), *The Land of Too Much: American Abundance and the Paradox of Poverty*, Cambridge MA: Harvard University Press. ISBN-9780674066526 http://www.ipcc.ch/ http://climatechange.worldbank.org/ Adaptation to a changing climate in the Arab countries: a case for adaptation governance and leadership in building climate resilience http://www.preventionweb.net/english/professional/publications/v.php?id=29948

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Activity	Assignment 1: Interview three students and identify five aspects that affect the sustainability of agriculture. Identify those that related to climatic changes. What reasons could be overcome in both the short run and the long run to enhance the process of sustainable agriculture? Project Phase 3: Recommended Economic Strategy that fits the following: a-The economics of sustainable agriculture and climatic changes. b- Final Submission & Presentation.
Community Based Learning Activity	~~The~~ The students will be engage~~s~~d in a Community Based-Learning Activity represented by a significant sample of the population of the agriculture entrepreneurs who are unaware of the long-term economic benefits of sustainable agricultural methods and who are involved in land reclamation projects in Egypt. The target is to provide them with their real needs of applying sustainable agricultural economic methods. The students will conduct a project in this connection. They will be responsible to collect data about relevant population to choose a significant sample. They will contact the chosen companies to designate the sustainable development methods of agriculture and to ask them to train their families accordingly. They will convince them of this transformation process through elaborating comparative long-turn cost-effective techniques calculated based on real figures. This will serve as a prototype model for Egypt and MENA region. The field work involves the direct interface with the farmers in addition to desk based studies including sampling data and required calculations and computations. The design of the whole process and all work steps are done under the full supervision of the instructors. Finally, the students will present their work~~s~~ in a written report and will present it in class. Note: During the first lecture, the students will receive an assignment briefing sheet verifying all requirements, the writing instructions, the deadline of submission by the end of the course, and the exact date of the presentation which will correspond to the date of the last lecture.

SD Pillars	environment		economy				social				culture					
21st ESD	Learning to know		Learning to be			Learning to do	Learning to live together				Learning to transform oneself and society			Learning to give and share		
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sub goals																	
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project	Prepare exam			Writing exam		Total
	6		2				10		5		5	5			3		36
Vision 2030	This will lead to a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.																

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SUMMARY OF ECTS WORKLOAD

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	9	3	30	6	6	3	6	6	6	27
Online	6	2	12	2	2	2	2	2	2	12
Lab work										
Reading articles (3 pages per hour)	120	0.3	40	5	10	10	5	5	10	40
Reading book chapters (5 per/h)	100	0.3	35	5	5	10	5			35
Preparing course activities	2	17	35	5	10			5	5	35
Project work	2	13	26			7		10	5	26
Preparation for exam	4	5	20	10		5	5	2	5	20
Writing the exam	2	3	6				3			6
Total			219	40	40	40	36	30	36	219



Suez Canal University

Course Syllabus

Course Number (----------)

Course Title

Sustainable and Ethical Livestock Management

Semester (--------)

Instructor Information

Instructor: Prof. Atef Mohamed Kamel Ahmed

Office Location: Faculty of Veterinary Medicine, Suez Canal University, new campus

Telephone: +20 1004135504

Hours: (Times & Days) ……

E-mail: atefkamel1955@hotmail.com

Website:

Course Identification

Course Number:

Course Name: Sustainable and Ethical Livestock Management

Course Location: University New Campus

Class Times: Not Now

Prerequisites:

Faculty Web Page: http://www.agri.scuegypt.edu.eg

Course modules (6):

1. Sustainable and ethical livestock production

2. Ethics of Animal Use in Food Production
3. Modern livestock production and food security
4. Livestock health, disease management and production
5. Climate Change and Sustainable Livestock Production
6. The Application of Animal Welfare Ethics

Course Description/Overview

Livestock are central to achieving many of the Sustainable Development Goals (SDGs) and directly relevant to most of them. The growing demand for livestock products in developing countries, driven by population growth, higher incomes and urbanization, represents a huge opportunity for hundreds of millions of poor smallholder livestock farmers, processors and marketers, to meet that market demand and rise out of poverty. Livestock products (meat, milk, eggs) provide essential nutrients that contribute to food and nutritional security. Improving the efficiency of livestock production in adverse environmental impacts, including climate change mitigation and adaptation measures and reducing emissions of greenhouse gases. In this course we will explore the impact of climate change on livestock production system and the effect of infectious disease on sustainable and ethical animal health - based food production. The course aims to help students develop key competencies including knowledge of essential ecological, environmental, social, institutional, and economic dimensions as part of a an ethical sustainable farming system. Topics included are animal welfare, health monitoring and management and animal use ethics concept, animal welfare inputs, climate change impacts, modern livestock production systems and resources, animal welfare to improve production and impact assessment of livestock production systems using welfare concept. Upon completion, students should demonstrate an understanding of the role of livestock production in a sustainable production system under the umbrella of animal welfare. Field trips are an essential part of this course; students are expected to pay attention to where class meetings will be held based on the syllabus structure.

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Course Learning Objectives:

1. Livestock production and SDGs
2. Define terminology and concepts related to sustainable farming practices.
3. Define the concept of welfare and ethical livestock production.
4. Apply best welfare practices in livestock management to maximize livestock productivity.

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5. Identify key factors relating to interaction between sustainable livestock production and the Climate change

6. Livestock health care, disease management and production

7. Analyze and discuss the importance of livestock production in sustainable production systems.

8. Summarize climate change adaptation and mitigation strategies

9. Understand the Environmental Impact Assessment of sustainable and ethical livestock production systems .

10. Strengthen group work, communication, facilitation and reporting skills

Course Content Learning Outcomes:

Global demand for livestock products is increasing due to the enormous increase in global population. Such demand on animal product result in direct or indirect influence towered animal's quality of life and environment. This can either be utilizing production resources or livestock production plan and management. The overall aim with the course is to give the students the necessary basic information about sustainable livestock production and the effect of diseases and good practises of welfare on its productivity. This should be set in overall view so the students are able to critically evaluate the factors which are important for a sustainable growth in the ethical livestock production systems.

Upon completion of this course, students should demonstrate competency in:

- Selectingon of appropriate livestock production system to einsure sustainable and ethical production strategy.
- Selecting appropriate environment for livestock production to maintain best animal health, disease control and welfare.
- Monitoring animal health and evaluating animal welfare to maintain ethical livestock use and increase its productivity.
- Identifying key factors relating to interaction between sustainable livestock production and the Climate change

Teaching and learning approach

The course is designed to foster multi-disciplinary and integrative problem-solving skills in ethical livestock production management. It starts off with structured lectures, homework, assignments and field visits, but progresses towards are more open-ended, student-driven and often group-based learning.

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From you as a student, the course requires enthusiasm for grappling with complex and poorly defined ethical livestock production management issues ("messes"). From graduate students, it further requires initiative and a willingness and ability work in groups (you will receive a substantial share of your grade based on group work). Many students enjoy these challenges but some don't.

If you want to be told what to do at all times, are uncomfortable engaging with problems that don't have a right or wrong answer, or dislike group work then this course may not be for you. The course is taught in mixed mode for both on-campus and distance students. On-campus and distance students will interact directly through a variety of electronic means and work collaboratively throughout the course. In addition, as a student you should be able to evaluate, analyze and improve livestock production systems.

CCSAFS SDGs and its Gaps

Learning Outcomes	Competencies	Content Knowledge
Students will be able to: 1. Apply the concept of the ethical, welfare in sustainable livestock production system 2. Use new technologies in adaptation and mitigation practices and policy for sustainable livestock production system	1. Identify the use of modern technology to analyze and interpret the data collected for developing future strategy for enhance the sustainable livestock production system	1. The role of sustainable livestock production system in food security to end poverty and hunger 2. The new technology applied in climate change mitigation and adaptation measures to protect livestock production system from environmental changes 3. Good management practices in livestock welfare and ethical farm standards

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Gaps covered for the course from SDgs

Increase investment, including enhanced livestock production system (establish animal farms, applied ethics and animal welfare concept, fish and poultry farms, new technology to be applied, gene banks and encourage animal research in order to enhance sustainable and ethical livestock production

Course Resources:

There is no single text for this course. Readings will come from a variety of articles, books and reports including reports on Climate Change and livestock production. The following may be helpful.

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1. Animal Rights: Current Debates and New Directions, edited by Cass R. Sunstein and Martha C. Nussbaum (Oxford University Press, 2004).

2. Barnes, A.P., 2013. Heterogeneity in climate change risk perception amongst dairy farmers: a latent class clustering analysis. Appl. Geogr. 41, 105-115.

3. FAO (Food and Agriculture Organization of the United Nations), 1986. Farm structures in tropical climates: Animal environmental requirements. <http:// www.fao.org/docrep/s1250e/s1250e10.htm> (acessed 12.02.13).

4. FAO (Food and Agriculture Organization of the United Nations), 2013. Climate-smart agriculture: Sourcebook. FAO, Rome. <http://www.fao.org/3/a-i3325e.pdf>.

5. Fraser, A.F. & Broom, D.M. Farm Animal Behaviour and Welfare. London, Boiler Tindall 3rd Ed. 1990

6. IFAD (International Fund for Agricultural Development), 2010. Livestock and climate change. <http://www.ifad.org/lrkm/events/cops/papers/climate.pdf>.Iglesias, A., Avis, K., Benzie, M., Fisher, P., Harley, M., Hodgson, N., Horrocks, L., Moneo, M., Webb, J., 2007. Adaptation to climate change in the agricultural sector. AEA Energy & Environment and Universidad de Politécnica de Madrid.

7. IPCC (Intergovermental Panel on Climate Change), 2007. Climate Change 2007: Synthesis Report. In: Pachauri, R.K., Reisinger, A. (Eds.), Contribution of Working Groups I, II and III to the Fourth assessment report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland, p. 104.

8. Kurukulasuriya, P., Rosenthal, S., 2003. Climate change and agriculture: a review of impacts and adaptations. Climate Change Series Paper No. 91, World Bank, Washington DC.

9. Monteny, G.J., Groenestein, C.M., Hilhorst, M.A., 2001. Interactions and coupling between emissions of methane and nitrous oxide from animal husbandry.Nutr. Cycl. Agroecosyst. 60, 123-132.

10. Nardone, A., 2000. Weather conditions and genetics of breeding systems in the Mediterranean area, in: XXXX International Sysmposium of Societa Italiana

11. per il Progresso della Zootecnia, Ragusa, Italy, pp. 67-92.

12. Olivier, J.G., Janssens-Maenhout, G., 2012. Part III: Greenhouse gas emissions, in: International Energy Agency (IEA), CO2 Emissions from Fuel Combustion,

13. 2012 Ed, Paris, France, pp. III.1-III.51.

14. Sustainable Livestock Management for Poverty Alleviation and Food Security by Katrien van t'Hooft; Terry S. Wollen; Dilip P. Bhandari .Call Number: SF55.D44H66 2012, Publication Date: 2012

15. The Royal Society, 2001. The role of land carbon sinks in mitigating global climate change. Policy document 10/01. The Royal Society, London.

16. Thornton, P.K., Boone, R.B., Ramirez-Villegas J., 2015. Climate change impacts on livestock. CGIAR Resrach program on Climate Change, Agriculture and Food Security (CCAFS), Working Paper No. 120.

17. Thornton, P.K., Herrero, M., 2010. The Inter-linkages between rapid growth in livestock production, climate change, and the impacts on water resources, land use, and deforestation. World Bank Policy Research Working Paper, WPS 5178. World Bank, Washington, DC.

18. Thornton P.K., Herrero M., Freeman A., Mwai O., Rege E., Jones P., McDermott J., 2008. Vulnerability, climate change and livestock: Research opportunities and challenges for poverty alleviation. International Livestock Research Institute (ILRI), Kenya

Course Website(s)

Required Course Texts and Materials

Optional Course Texts and Materials

1. Sustainable Livestock Management for Poverty Alleviation and Food Security by Katrien van t'Hooft; Terry S. Wollen; Dilip P. Bhandari .Call Number: SF55.D44H66 2012, Publication Date: 2012

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading Policy

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Component	Grade
Assignments	20%
Exams	60%
Class Attendance/ Participation	10%
Field trip and practical class	10%
Total Points	100%

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to all classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me early before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and / or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assignment materials before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Important Dates to Remember

Course Syllabus

Week	SUBJECT	Date
1	General Introduction. - Introduction to the course. - Course overview includes 6 modules both (presentation and practical work at College of	

	Veterinary & Agriculture livestock farms). Module. 1: Sustainable and ethical livestock production and Animal Welfare - Unit 1.1: The role of livestock in achieving the SDGs (?) - Unit 1.2: The 3 dimensions of livestock and SDGs (people, planet and processes) - Unit 1.3: Animal welfare , the five freedom and ethics the concept (inputs and outputs) - Unit 1.4: The importance of animal welfare and Welfare validation how and why? - Unit 1.5: Introduction to Environmental Ethics - Unit 1.6: Welfare Assessment: (Livestock production systems and problem solving) - Unit 1.7: Good Management Practices in Animal Welfare and Ethical farm standards. - Unit 1.8: Animal Welfare Impact on Productivity and Economics	
2	?????	
3	Field Visit to livestock production plan	
4	Module.2: Ethics of Animal Use in Food Production - Unit.2.1: Participatory Approach - Unit. 2.2: The New era of Animal Ethics - Unit. 2.3: Unit Our duties to Animal - Unit 2.4: Community Organization - Unit.2.5: Advisory Committees - Unit 2.6: Use of Traditional Knowledge - Unit.2.7: Case Studies: Examples of Community Small Livestock Holding Management - Unit.2.8: Exercise: Develop Plan for Winning	

	Argument for Using Animal in Food Production.	
5	Module.3: Modern livestock production and food security - Unit 3.1: Whole Farm Planning: with Livestock (Meat & Milk Production) - Unit 3.2: Principles of Animal Nutrition (quality and quality of feeds). - Unit. 3.3 Livestock plan management skillsUnit 4.4: Unit 4.1: Principles of Animal Nutrition (quality and quality of feeds). - Unit. 3.2: Livestock production and the livestock industry - Unit 3.3: Animal production systems and requisites - Unit 3.4: Animal production environment and production factors - Unit 3.5: Livestock Breeds and Rare Breeds - Unit 3.6: Poultry & Ostrich Farms	
6	Module.4: Livestock health, disease management and production Unit 4.1: Livestock health, disease management and production Unit 4.2: Livestock High impact diseases. Unit 4.3: Primary Animal Health Care ('PAHC') and good management practices Unit.4.4: Risk Assessment for emergency animal diseases Unit.4.5: Risk Assessment for emergency animal diseases. Unit 4.6: The Concept of One Health	
7	Minor Exam: Midterm	
8	Module.5: Sustainable Livestock Production and Climate Change - Unit 5.1: Understanding livestock productions and	

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	management systems - Unit 5.2: Impacts of climate change on livestock production - Unit.5.3: The impact of livestock on climate change - Unit 5.4: Adaptation and mitigation measures	
9	Communication strategies for working with stakeholders & Farmers	
11	Case study	
13	Module 6: The Application of Animal Welfare Ethics Unit.6.1: Ethical Animal Breeding Unit.6.2: Farming and Animal Nutrition Unit.6.3: Animal Housing & Husbandry Unit 6.4: Animal Welfare Impact on Productivity and Economics Unit 6.5: Utilitarianism Unit 6.6: Introduction to Environmental Ethics	
14	Sustainability certification of animal products managing small-scale livestock production systems in developing countries	
14	Case study	
15	Student Presentations	
16	Final exam	

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Course Name	Sustainable and Ethical Livestock Management
Module 1	Sustainable and Ethical Livestock Production and Animal Welfare
Key Concepts	Animal welfare, ethics, livestock Sustainability, Ethical animal farming and five freedom
Overview	- Livestock are central to achieving many of the Sustainable Development Goals (SDGs) and directly relevant to most of them. Topics included are

	livestock and sustainable development, animal welfare and animal use ethics concept, animal welfare inputs, livestock production systems and resources, animal welfare to improve production and assessment of livestock production systems using welfare concept.
Aim	1. Introduction to Sustainable Livestock Production 2. Livestock and the Sustainable Development Goals 3. Know the Concept of Animal welfare 4. Define terminology and concepts related to sustainable farming practices. 5. Ways to develop basic animal Health care and disease control and control 6. Describe the ecological, economical, and social implications of agricultural practices. 7. Define the concept of welfare and ethical livestock production. - 8. Apply best welfare practices in livestock management to maximize animal productivity.
Learning Outcomes	~~After completion of the module the student will Know that:~~ ~~•~~ At the end of this module learners will be able to: • you need a verb The role of livestock in achieving the SDGs • verb…..The 3 dimension of livestock and SDGs (people, planet and processes) • ~~To u~~Understand the terminology of animal ethics and welfare • Animal welfare and ethics the concept • Good Management Practices in Animal Welfare • Ethical farms prioritize animal welfare
Units	- Unit 1.1: The role of livestock in achieving the SDGs - Unit 1.2: The 3 dimensions of livestock and SDGs (people, planet and processes) - Unit 1.3: Animal welfare , the five freedom and ethics the concept (inputs and outputs) - Unit 1.4: The importance of animal welfare and Welfare validation how and why? - Unit 1.5: Introduction to Environmental Ethics - Unit 1.6: Welfare Assessment: (Livestock production systems and problem solving) - Unit 1.7: Good Management Practices in Animal Welfare and Ethical farm standards. Unit 1.8: Animal Welfare Impact on Productivity and Economics Unit 1.1: Livestock management and sustainable economic growth Unit 1. 2: Animal welfare and ethics the concept Unit 1.3: Animal Welfare Assessment I: Livestock production systems Unit 1.4: Animal Welfare Assessment II: solving problems Unit 1.5: Good Management Practices in Animal Welfare and Ethical farm standards.
Readings	□ Course Notes. □ Compulsory Reading: Farm Animal Welfare. http://www.fao.org/ag/againfo/themes/animal-welfare/aw-abthegat/aw-

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	whaistgate/en/. • See http://www.oie.int/animal-welfare/animal-welfare-key-themes/. • OIE (2014). - Introduction to the Recommendations for Animal Welfare. In: Terrestrial Animal Health Code. OIE, Paris, Article 7.1.1. Available at: http://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/2010/chapitre_aw_introduction.pdf. • 11http://conventions.coe.int/Treaty/en/Treaties/Html/087.htm • Optional readings: Bawden, R.J. 1991: System thinking and practi~~Comm~~ agriculture. J. Dairy Sci., 74, 2362-2373; Fromm, J. 2004: The emergence of complexity. Kassel University Press, Kassel, Germany; Sundrum, A. 2008: System approach in organic livestock production (in preparation)
Activity	~~Overview~~ Assignment 1a In light of the global trends, needs and priorities of CCSAFS research that can be identified through the links listed in the readings: 1) develop a catalogue of trends, needs and priorities; 2) assess the extent to which they are related to your country/region; 3) what other research needs and priorities can be considered in your local/national area; 4) develop an inventory of CCSAFS research topics on Animal welfare, ethics, livestock Sustainability, Ethical animal farming and five freedom in line with the local/national circumstances. Assignment 1b: Use the class discussion forum available in the Blended Learning Environment and livestock and share your topic list with your instructor and classmates. Select one or two topics from the list that you would like to learn more about and return to your instructor or supervisor to discuss further.

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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	4h	2h	6h	5h	2h	2h	-	-	21h

Key Concepts	At the end of this module students will be able to: Understand~~ing~~ the integrity and ethics of using animals for food production

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Overview	- Consumer awareness and demand is increasing for products from animals that have been treated appropriately and with consideration for their needs. - Animal welfare impacts the growth, reproduction and health care and survival of animals. It also has an impact on the quality of animal products.
Aim	Based on a scientific and practical up-to-date level, students should learn:~~know~~ 1. Goals of Primary Animal Health Care ('PAHC'). 2. The develop modern and effective livestock hygiene practices , disease isolation , control and eradication, health monitoring programs, 3. The difference between healthy and unhealthy animals , Disease epidemiology, 4. Types of infectious diseases of livestock, Causes of Diseases, transmission and Prevention, Emerging diseases, vaccination and Quarantine measures.
Learning Outcomes	At the end of this module learners will be able to ??? you need a verb: 1. Role of high impact diseases on livestock health, management and production. 2. The Goal of PAHC system. 1. To establish the knowledge, skills and tools needed at the first line of defense against livestock disease and production loss. 2. To ensure livestock handlers undertake a structured observation of their animals on an ongoing daily basis. 3. To improve disease recording and reporting, so that veterinary services can develop seasonal disease prevention and treatment strategies.
Units	- Unit.2.1: Participatory Approach - Unit. 2.2: The New era of Animal Ethics - Unit. 2.3: Unit Our duties to Animal - Unit 2.4: Community Organization - Unit.2.5: Advisory Committees - Unit 2.6: Use of Traditional Knowledge - Unit.2.7: Case Studies: Examples of Community Small Livestock Holding Management - Unit.2.8: Exercise: Develop Plan for Winning Argument for Using Anim~~Form~~ atted: English (United States) Food Production Unit.2.1: Ethics of using animals in food production Unit 2.2 : Ethical Animal Breeding Unit.2.3: Animal Housing Unit.2.4: Animal Welfare Impact on Productivity and Economics Unit 2.5: Utilitarianism

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	Unit 2.6: Introduction to Environmental Ethics
Readings	Compulsory readings: Rollin, B. (2006). An introduction to veterinary medical ethics: Theory and cases (2nd ed., pp. 1-41). Oxford: Blackwell. Anthony, R. (2003). The ethical implications of the human□animal bond on the farm. Animal Welfare, 12, 505-512. Sandøe, P., & Christiansen, S. B. (2008). Ethics of animal use (pp. 15-31). Chichester, UK: Wiley-Blackwell. Optional readings: Cohen, C. (2003). Reply to Tom Regan. In S. Armstrong & R. Botzler (Eds.), The animal ethics reader (pp. 25-29). London: Routledge. Douglas-Hamilton, I., Bhalla, S., Wittemyer, G., & Vollrath, F. (2006). Behavioural reactions of elephants towards a dying and deceased matriarch. Applied Animal Behaviour, 100, 87-102. Heleski, C. R., & Anthony, R. (2012). Science alone is not always enough: The importance of ethical assessment for a more comprehensive view of equine welfare. Journal of Veterinary Behaviour, 7, 169-178. Langford, D., Crager, S., Shehzad, Z., Smith, S., Sotocinal, S., Levenstadt, J., Chanda, M. L., Letivin, D. J., & Mogil, J. S. (2006). Social modulation of pain as evidence for empathy in mice. Science, 312, 1967-1970. Regan, T. (1984). The case for animal rights. London: Routledge. Schneider, B. (2001). A study in animal ethics in New Brunswick. Canadian Veterinary Journal, 42, 540-547. Taylor, A. (1999). Magpies, monkeys and morals. What philosophers say about animal liberation (pp. 25-66). Peterborough, UK: Broadview.
Activity/ Self Study	1. Seminars / presentations; a series of seminars and student presentations. 2. Work in group (Group exam task with presentation; with the acquired understanding achieved through the course). Practical work: Farm visit (Veterinary & Agriculture College Farm)+ practical work: to Faculty Animal Farm 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. 5. Self study: Student Assignments on :

	1. Animal Production Practices 2. Livestock Systems (Dairy & Milk productions) 3. Produce for Purpose 4. Farm Management 5. Risk analysis for Livestock farms 6. Economic of Livestock Systems 7. Market Supply and Demand 8. Case Studies: Risk Analysis of a Dairy & Meat Farm Commented [NK16]: Give a brief description of the case studies
	Assignment 2a: 1. Animal Production Practices 2. Livestock Systems (Dairy & Milk productions) 3. Produce for Purpose Assignment 2b: 4. Farm Management 5. Risk analysis for Livestock farms 6. Economic of Livestock Systems . Assignment 2c 7. Market Supply and Demand and ???. 8. Case Studies: Risk Analysis of a Dairy & Meat Farm

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course	Project	Prepare	Writing	Total
	4h	2h	6h	7h	activity 2h	5h	exam -	exam -	26h

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Module 2	
Key Concepts Overview	Livestock production, breeding management, reproduction and food security Modern animal production deals with the caring, feeding, breeding and management of all classes of domesticated and aquatic animals, as well as wildlife. Animal production is often studied in terms of the various biological functions of animals,

	emphasizing those of economic importance.
Aim	Students are able to know : 1. Livestock production and the livestock industry 2. Animal production systems practices and requisites 3. Animal production environment and production factors 4. Production cycles and commodities derived from animals. 5. Animal products 6. Farm management and risk analysis 7. Economic of Livestock Systems 8. Market Supply and Demand
Learning Outcomes	At the end of this module learners will be able to: 1. Deals with the caring, feeding, breeding and management of all classes of domesticated and aquatic animals, as well as wildlife 2. ?? you need a verb Livestock Systems 3. Produce for Purpose 4. Economic of Livestock Systems 5. Market Supply and Demand 6. Case Studies: Risk Analysis of a Dairy Farm Exercise: Designing an Economically Efficient and Environmentally sustainable Dairy Farm
Units	Modern livestock production and food security - Unit 3.1: Whole Farm Planning: with Livestock (Meat & Milk Production) - Unit 3.2: Principles of Animal Nutrition (quality and quality of feeds). - Unit. 3.3 Livestock plan management skillsUnit Unit 4.4: Unit 4.1: Principles of Animal Nutrition (quality and quality of feeds). - Unit. 3.2: Livestock production and the livestock industry - Unit 3.3: Animal production systems and requisites - Unit 3.4: Animal production environment and production factors - Unit 3.5: Livestock Breeds and Rare Breeds Unit 3.6: Poultry & Ostrich Farms Unit 3.1: Principles of Animal Nutrition (quality and quality of feeds).

	Unit. 3.2: Livestock production and the livestock industry Unit 3.3: Animal production systems, (hygiene, quality and requisites) Unit 3.4: Animal production environment and production factors Unit 3.5: Production cycles and commodities derived from animals.
Readings	Compulsory reading: https://www.angelo.edu/dept/agriculture/courses_animal_science.php B., Hafez, E.S.E. 2000: Reproduction in Farm Animals 7th ed. Lippincott Williams & Wilkins Publishing; Bearden, H.J., Fuquay, J.W., Willard, S.T. 2004: Applied Animal Reproduction, 6th ed. Optional reading: Pearson Prentice Hall Publishing; Squires, E.J. 2003: Applied Animal Endocrinology 1st ed. CABI Publishing; Pineda, M.H., Dooley, M.P. 2003: Mc Donald's Veterinary Endocrinology and Reproduction 5th ed. Blackwell Publishing.
	1. Seminars / presentations; a series of seminars and student presentations. 2. Work in group student group to problem -based learning in (Production cycles and commodities derived from animals) Visit to (Veterinary & Agriculture College Farm)+ Practical work 3. Group exam task with presentation; with the acquired understanding achieved through the course. 4. The students will also be asked to write critical summaries on the lectures content. 5. For each unit the students will submit an individual reflection paper of approximately 1000 words. Self study: Student Assignments on : Principles of Animal Nutrition Animal ration formulation and evaluation Nutrient digestion and metabolism Reproductive Techniques (pregnancy diagnosis and Artificial insemination) Applied Animal Nutrition (food analysis procedures)

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LEARNING GOALS	√	√	√	√	√	√	√	√	√	√		√	√		√	√	√
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√											√				

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6h	2h	6h	9h	3h	5h	-	-	31h

Module 4	
Learning Outcomes Overview	At the end of this module students will be able to learn: Livestock Health management, High impact diseases, epidemiology and emerging diseases Diseases are a major constraint for animal production and therefore constitute a threat to livelihoods and food security, and sometimes to the survival of a species. While any disease has negative effects and causes suffering, some diseases have higher impacts than others and are major targets for management and control.
Aim	Based on a scientific and practical up-to-date level, students know 1. Goals of Primary Animal Health Care ('PAHC'). 2. The develop modern and effective livestock hygiene practices , disease isolation , control and eradication, health monitoring programs, 3. The difference between healthy and unhealthy animals , Disease epidemiology, 4. Types of infectious diseases of livestock, Causes of Diseases, transmission and Prevention, Emerging diseases, vaccination and Quarantine measures.
	At the end of this module learners will be able to: 1. Role of high impact diseases on livestock health, management and production. 2. The Goal of PAHC system. 1. To establish the knowledge, skills and tools needed at the first line of defense against livestock disease and production loss. 2. To ensure livestock handlers undertake a structured observation of their animals on an ongoing daily basis. 3. To improve disease recording and reporting, so that veterinary services can develop seasonal disease prevention and treatment strategies.
Units	Unit 4.1: Livestock health, management and production Unit 4.2: Livestock diseases epidemiology Unit 4.3: Livestock High impact diseases & control measures. Unit 4.4: Primary Animal Health Care ('PAHC') and good management practices Unit.4.5: Risk Assessment for emergency animal diseases Unit 4.6: The concept of One Health
Readings	Compulsory reading: Manual on Livestock Disease Surveillance and Informati

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Unit 4.1: Livestock health, disease management and production
Unit 4.2: Livestock High impact diseases.
Unit 4.3: Primary Animal Health Care ('PAHC') and good management practices
Unit.4.4: Risk Assessment for emergency animal diseases
Unit.4.5: Risk Assessment for emergency animal diseases.
t 4.6: The Concept of One Health

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	Systems FAO, www.fao.org/docrep/004/x3331e/X3331E01.htm OIE-Listed diseases, infections and infestations in force in 2018 - World Organization for Animal Health www.oie.int/animal-health-in-the-world/oie-listed-diseases-2018/ and www.fao.org/docrep/004/X2096E/X2096E05.htm Optional readings: Secretariat of the Convention on Biological Diversity (2008). Synthesis and Review of the Best Available Scientific Studies on Priority Areas for Biodiversity Conservation in Marine Areas beyond the Limits of National Jurisdiction. Montreal, Technical Series No. 37, 63 pages available from http://www.cbd.int/doc/publications/cbd-ts-37-en.pdf
Activity/ Self Study	Farm visit (Veterinary College Farm)+ practical work: to Faculty Animal Farm 1. Seminars / presentations; a series of seminars and student presentations. 2. Work in group student group to problem -based learning in (Caring of farm animals) 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. 5. Farm visit (Veterinary & Agriculture College Farm) + Practical work: Faculty of Vet Medicine Farm 6. Community-based service learning to contact with local communities and identify their needs and problems to achieve and help them. The community/service-based learning activity Includes the communication with the community service learning through sharing with livestock production problems (Caring of animal farms) through the following points: 1.Design the strategy plan with students in order to: a. Increase community Public awareness to know and overcome the problem b. Prepareation of questionnaires about the problems, current or seasonal occurrence, recurrent or new. c. Set up strategy to improve (Aanimal welfare, ethics, animal husbandry and health, animal environment, farming management and risk analysis , economic of livestock systems, welfare assessment (inputs and outputs), farming and animal nutrition, ethical animal breeding. Annual vaccination programs, animal treatment, Livestock production system. d. Define tools for better communication with local communities (direct contact) e. Evaluate the result of the strategy (effectiveness) (good or redefining or change the strategy) f. Establishment of a permanent community--based service g. Students learn the communication process and system to apply their knowledge in a future community service . 7. Student Problem-based learning on Car of farm animals: depend on communi based learning to define and solve farm animals health problems. This activity needs student basic skills, team work, data collection, response, reflection, define the problem and suggested solution in the form of group presentation and technical report. Self study: Student Assignments on : Assignment: Reflecting Upon Curriculum • Early disease identification and treatment

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	• preventive measure and veterinary services • Ongoing disease management (Vaccination, Parasite Management and Udder Health) • Evaluating disease dynamics and livestock adaptation.

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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project/P reparatio n	Prepare exam	Writing exam	Total
	6h	5h	10h	14h	25h	20h	-	-	80h

Module 5	
Key Concepts	~~Climate change, sustainable livestock production systems, mitigation and adaptation~~ strategies
Overview	- Improving the efficiency of livestock production and its sustainability in developing countries, especially the productivity per animal, can double ~~livestock productivity while halving its adverse environmental impacts,~~ including reducing emissions of greenhouse gases, in those countries.
Aim	Students are able to know : This module assesses: - The overall aim with the module is to give the students the necessary basic information about sustainable livestock production and the effect of climate change on its productivity. - The key issues linking climate change and development practices in livestock and farming systems. - Livestock are central to achieving many of the Sustainable Development Goals (SDGs) and directly relevant to most of them.
Learning Outcomes	- Climate change mitigation and adaptation measures After completion of the module the student will Know that: • The roles of livestock in achieving the sustainable development goals • Responses to climate change includes the followings: (i) Farm adaptation measures (Livestock production and management systems, breeding strategies, farmer's perception and adaptive capacity) and (ii) mitigation measures (carbon sequestration, ~~enteric fermentation, manure management, fertilizer management, and shifting~~ human dietary trends),

Units	Unit 5.1: Livestock production and management system Unit 5.2: SDGs and Livestock production Unit 5.3: Livestock Systems, Produce for Purpose and Farm Management Unit.5:4: Economic of Livestock Systems and Market Supply and Demand Unit.5.5: The impact of livestock on climate change Unit 5.6: Climate change adaptation and mitigation measures.
Readings	Course Notes. Compulsory readings: https://www.ifad.org/documents/ https://www.uncclearn.org/sites/default/files/inventory/fao3.pdf FAO. 2010a. Climate-smart agriculture: policies, practices and financing for food security, adaptation and mitigation. Report prepared for The Hague Conference on Agriculture, Food Security, and Climate Change. Rome. - Optional readings: Bentley, D. & Hegarty, R. 2008. Managing livestock enterprises in Australia's extensive rangelands for greenhouse gas and environmental outcomes: a pastoral company perspective. Australian journal of experimental agriculture, 48: 60-64.
Activity/ Self Study	Visit to (Veterinary & Agriculture College Farm)+ Practical work 1. Seminars / presentations; a series of seminars and student group presentations. 2. Work in group student group to problem -based learning in (How can you meet the growing global demand for animal products while minimizing climate impacts?) 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. Self study: Student Assignments on : • The roles of livestock in achieving the sustainable development goals (SDGs). • Livestock's production and management systems • Farm Management and Risk analysis • Potential types of adaptation and mitigation practices in the livestock sector. • Livestock and soil carbon sequestration. •How to improv~~eing~~ animal environment to reduce impacts of livestock on climate change

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project/Preparation	Prepare exam	Writing exam	Total
	6h	2h	6h	9h	5h	5h	-	-	33h

Module 6	The Application of Animal Welfare Ethics
Key Concepts	At the end of this module students will be able to: Understanding of the advantages of practicing animal welfare ethics
Overview	- Livestock production, however, has a major impact on the environment. It is responsible for about 41% of the global emission of greenhouse gases from livestock, and one of the drivers of land degradation and deforestation. The demand for livestock products is expected to increase significantly. Without major changes, therefore, the above described environmental concerns about the livestock sector will increase only further. So we are facing an urgent question: how to reduce the environmental impact of production of animal-source food?
Aim	Students are able - To gain insight into future options and limitations of reducing the environmental impact of livestock production, we need sound environmental impact assessment tools. - to provide participants with advanced knowledge, both theoretical and practical the environmental impact assessment of livestock systems - discuss the latest insights of environmental impact assessment tools - How to assess the impact of livestock production on biodiversity?
Learning Outcomes	At the end of this module learners will be able to: 1. Understanding of the advantages of practicing animal welfare ethics 2. Ethics application as recommended good farming practices and general farm management 3. Animal housing and husbandry measures of farm animals. 4. Introduction to Environmental Ethics
Units	Module 6: The Application of Animal Welfare Ethics Unit.6.1: Ethical Animal Breeding Unit.6.2: Farming and Animal Nutrition Unit.6.3: Animal Housing & Husbandry Unit 6.4. Animal Welfare Impact on Productivity and Economics

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	Unit 6.5: Utilitarianism Unit 6.6: Introduction to Environmental Ethics
Readings	Compulsory readings: Rollin, B. (2006). An Introduction to Veterinary Medical Ethics. Theory and Cases. Second edition, pp.34-37. Oxford: Blackwell. Sandøe, P., & Christiansen, S. B. (2008). Ethics of Animal Use, pp.67-153. Chichester: Blackwell Desjardins, J. R. (2012). Environmental Ethics: An Introduction to Environmental Philosophy. 5th edition. Kentucky: Wadsworth Publishing Optional readings: Dawkins, M. S., & Layton, R. (2012). Breeding for better welfare: genetic goals for broiler chickens and their parents. Animal Welfare , 21: 147-155. D'Silva, J., & Webster, J. (eds) (2010). The Meat Crisis. Developing more sustainable production and consumption. London: Earthscan. Helelski, C. R., & Anthony, R. (2012). Science alone is not always enough: The importance of ethical assessment for a more comprehensive view of equine welfare. Journal of Veterinary Behaviour, 7: 169-178. Mepham, B. (1996). Food Ethics. London: Routledge Mullan, S., & Main, D. (2001). Principles of ethical decision-making in veterinary practice. In Practice, 23: 394-401. Palmer, C. (2012). Does breeding a bulldog harm it? Breeding, ethics and harm to animals. Animal Welfare, 21: 157-166.
Activity and Self Study	Visit to (Veterinary & Agriculture College Farm)+ Practical work 1. Seminars / presentations; a series of seminars and student group presentations. 2. Work in group student group to problem -based learning in What are Environmental Ethics and What's Your Role in Saving Nature and Animal rights? 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. Self study: Student Assignments on : Environmental Ethics Ethical Animal Breeding Feed Requirements of Animals Whole Farm Planning: with Livestock Livestock Breeds and Rare Breeds
	Assignment 6 This assignment is to get you to practice qualitative data analysis and theory generation using Grounded Theory. You will complete this assignment in three parts.

	In the first part, you will carry out 2-3 interviews with key experts in the CCSAFS research topic you have chosen, following-up the instructions provided in the Toolkit Part 1, listed in the readings. Then, you are going to use inductive coding to analyze the collected data from the interviews and develop a narrative that answers your research question, following-up the instructions provided in the Toolkit Part 2. More specifically, using the inductive analysis method to code and analyze your data: A) Read through the entire transcript of the data set derived from your interviews a few times. B) Carry out your initial coding, generating 20-30 categories. C) Go through your codes and data again, reducing overlap and redundancy, combining related codes, etc. until you have generated 10-15 codes. D) Continue the iterating process on the data until you have roughly 5-8 high-level and meaningful "themes". In the second part, find a partner from your student group and ask him/her to do the same process as you independently. You also do the same for his/her own data set. Then, compare your codes/themes with your partner's codes/themes. They will mostly likely be different. In the third part, organize an online discussion to discuss the differences and work together to reach a consensus between the two sets of codes/themes. Discuss which are the most meaningful to keep and which can be dropped, changed, or consolidated. You may need to rework your codes/themes based on each other's findings. Finally, develop a narrative that explains your data.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√											√				

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project/P reparatio n	Prepare exam	Writing exam	Total
	4h	2h	6h	6h	3h	3h	32h	3h	59h

~~SUMMRY OF ECTS WORKLOAD~~

~~Learning Components~~	~~No~~	~~Time~~	~~Work load~~	~~Course Modules~~								~~Work load~~
				~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~	~~7~~	~~8~~	
~~Lectures (face-to-face)~~												
~~Online~~												
~~Lab work~~												

~~Reading articles (3 pages per hour)~~												
~~Reading book chapters (5 per/h)~~												
~~Preparing course activities~~												
~~Project work~~												
~~Preparation for exam~~												
~~Writing the exam~~												
~~Total~~												

Course Title:
Sustainable and Ethical Livestock Management

Prof. Dr. Atef Mohamed Kamel

Table 1: ECTS Workload Allocation √

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	10	3	30	4	4	6	6	6	4	30
Online	5	3	15	2	2	2	5	2	2	15
Lab work	10	4	40	6	6	6	10	6	6	40
Reading articles (3 pages per hour)	100	0,2	20	2	2	4	5	4	3	20
Reading book chapters (5 per/h)	150	0.2	30	3	5	5	9	5	3	30
Preparing course activities	4	10 (M)	40	2	2	3	25	5	3	40
Project work	1	40	40	2	5	5	20	5	3	40
Preparation for exam	1	32	32	-	-	-	-	-	32	32
Writing the exam	1	3	3	-	-	-	-	-	3	3
Total			250	21	2 6	31	80	33	59	250

Course modules (6):

7. 1. Sustainable and ethical livestock production
8. 7. Ethics of Animal Use in Food Production
9. 8. Modern livestock production and food security

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~~10.~~9. Livestock health, disease management and production
~~11.~~10. Climate Change and Sustainable Livestock Production
~~12.~~11. The Application of Animal Welfare Ethics

Sustainable Development Goals (SDGs 17)

Vision 2030

1. The interrelation of poverty, natural hazards, climate change and other economic, social and environmental shocks and stresses.
2. Conduct a Life Cycle Analysis (LCA) of food and animal farms.
3. Integrate climate change mitigation and adaptation measures into national policies, strategies and planning.
4. Improve educations, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
5. Biodiversity of seeds, plants and animals, particularly in relation to wild species.



Commented [NK21]: What's this vision? How it relates to the course?



Comments on the overall course:

- This course as described seems to involve disciplinary oncepts related to a number of areas including animal welfare, health monitoring and management and animal use ethics concept, animal welfare inputs, climate change impacts, modern livestock production systems and resources, animal welfare to improve production and impact assessment of livestock production systems using welfare concept.
- Suggested readings are good
- While this is clearly stated in the course description, some of these aspects are only touched on in the actual modules. I would advise returning to the Learning Outcomes and grounding the modules in these outcomes. More work on the methodologies used and the assessment procedures would support such learning.
- The course objectives are not well-written. You need to use action verbs and be consistent in your course objectives and learning outcomes throughout all modules.
- The course outcomes are not fully described in the learning objectives. It is important that learning objectives are consistent with the outcomes and the subsequent course schedule
- The titles of the units in the modules are not matching with the above descriptions in the course syllabus.

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- The course shows evidence of integration of disciplinary insights but these are at a basic level and need to be developed to show a well- focused intent in relation to the sustainable and ethical livestock management. Go back to the Pillars of SDGs to map these insights.

- ECTS Integration in Course Curriculum

It is very critical to weight each component in line with the learning objectives and outcomes, in total and separately for each course module. It is not clear how you allocate the workload.

- CCSAFS Community-Based / Service Learning Activity

There are several activities, but none show the community-based / service learning perspective. The activities should be linked to the activity goals and learning outcomes. The activity in module 4 seems to me to be the community-based activity you intend to do. But, it is very broad and not well-focused. What is the main objective and what methodology you will follow to do it?

Please keep in mind the following:

a) The activity should meet an actual need in the community.
b) The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
c) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society.
d) The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The activity should provide students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

Please try to redesign the activities to show the connections between academic achievement, civic engagement, and personal growth

- SDG Rubric

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I provided a summary table where you can do these connections. It is not clear in your modules. You have checked most SDGs in all 6 modules. It is preferable to target specific ones in the different modules.

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CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

Course Syllabus

Course Number: UNI-RESM 870

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Course Title: Research Methodology

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Instructor Information

Instructors:
Office Location: ********
Telephone:
Office Hours: Sunday-Wednesday: 9.30 AM - 3.00 PM
E-mail:

Course Identification

Course Number:
Course Name: Research Methodology
Course Location: SCU, Faculty of Agriculture, Centre of excellence on Climate Change, Sustainable Agriculture and Food Security
Class Times: Sunday: 10.00 Am- 1.00 PM
Prerequisites: none
Faculty Web Page: http://scuegypt.edu.eg

Course Description/Overview

The course aims to introduce students to fundamentals of doing basic and meaningful research. Through the course, students will gain an overview of research intent and design, methodology and technique, ethics, format and reports presentation. The course will provide an overview of the important concepts of research design, explore the trends, needs and priorities of CCSAFS research, and identify research areas, topics of CCSAFS research. Topics include techniques for ~~I~~dentifying and defining~~justify the~~ research problems, steps of designing a good and ethical research, writing, presenting and discussing the research proposal. The course will develop a range of skills involved in formulating a research proposal; including framing research questions, reviewing the literature and choosing appropriate methodologies for different types of study. The course is structured in a logical order of four modules. The first module addresses CCSAFS research trends, areas, needs

and priorities. The second module covers research problem identifications, justification and setting up. The third module~~s~~ addresses~~ evaluating~~ the strengths and weaknesses of the different research designs of CCSAFS research~~., review and synthesize previously published literature associated with the research problem~~. The fourth module builds the students capacity for presentations and discussions of research results~~., report the findings of study based upon the methodology applied~~.

The course will be delivered through a combination of face-to-face lectures, computer lab practice, individual assignments and seminars. Lectures will explain theories underlying techniques, with demonstrations using real applications from varied disciplines. The course material is designed to offer students a balance between theory and applied examples. In addition the lab practices will provide students opportunities to perform and apply proper statistical analyses for different modules using SPSS package.

Course Learning Objectives

The principle goals of this course are: i) develop student's ability to use available resources, acquired knowledge and skills to design an effective multidisciplinary research proposal ii) ability to synthes~~i~~sze, present and discuss reports, build interpretative analysis, for emerging environmental problems locally and globally, iii) search for, select and critically analyse research articles and papers, iv) g~~G~~ain experience with ethics in writing research proposals

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

- Develop a research proposal or project plan
- Prepare an interdisciplinary research proposal/ project~~s~~ relevant with CCSAFS subject matter areas,
- Interpret and discuss the results to communicate and make decisions relevant ~~with~~ to environmental issues
- Work cooperatively in collecting and analyzing data

write and present reports

- Present complex data or situations clearly
- Review and critique research findings ~~that affect their agency~~
- Demonstrate ~~awareness and~~ ability to address ~~on~~ ethical issues ~~when preparing~~ in research~~es~~
- Provide technical guidance for inclusion in contract documents related to research projects CCSAFS.

Course Resources

Course Website(s)

Required Course Texts and Materials

Hands-out prepared by the instructor for the class. Online and printed teaching resources are also available.

Optional Course Texts and Materials

- Nicholas, W. (2011). Research methods, the basics. 1st edition, Routledge, *Taylor & Francis Group. Available at:* https://edisciplinas.usp.br/.../BLOCO%202_Research%20Methods%20The%20Basics.

- Montgomery, D. C. (2012). *Design and Analysis of Experiments*, 8th Edition, John Wiley & Sons.

- Cooper H, Hedges LV, Valentine JC, editors (2009). The Handbook of Research Synthesis and Meta-Analysis. 2nd edition. New York: Russell Sage Foundation.

- Oliver, P. (2003) *The Student's Guide to Research Ethics*. Maidenhead: Open University Press.

- https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

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Assignments and Grading Scheme

Grading System

Grading Policy

Grades can be based on the following criteria:

Course Assignments	10%
Written Exam	60%
Oral exam	10%
Practical	20%
Total Points	100

Course Policies

Late Assignments

It is essential that reports and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

The course is mixture lectures, presentations, assignments, which means that students are expected to come to all classes. You cannot pass the class under any circumstances if you miss more than 25% of classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal

expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class.

Dissability

Important Dates to Remember

Course Schedule

Week		
1		Course Overview Discussion of syllabus and assignments, course requirements and prerequisites; assessment criteria and due dates _____
2		CCSAFS research trends, needs and priorities CCSAFS Research Areas and Themes
3		Exemplary Cases of CCSAFS Research
4		The research problem and its constituencies
5		Criteria for judging the quality of the research problem
6		An overview of research designs
7		Choosing and justifying a research design
8		Quality standards for designing research methodology
9		Substantiating research findings through previous research
10		Results presentation, interpretation and conclusion
11		Overall revision

The CCSAFS Course Modules Template

Course	Research Methodology & Advanced Statistical Analysis Developed by Prof.Dr. Vassilios Makrakis, University of Crete
Module 1	The CCSAFS Research Context: Trends, Needs & Priorities
Key Concepts	Climate change, sustainable agriculture, food security
Overview	Climate projections for the Middle East and North African (MENA) region indicate warmer and drier conditions with increased frequency of natural disasters. Food insecurity and climate change are the two major challenges in the region. Agriculture is one of the most vulnerable economic sectors to climate change, mainly due to the limited availability of water and land resources in the two target MENA countries (Egypt and Jordan). Together with increasing urbanization (Egypt will be doubled by 2030) and forced migration in Jordan, puts additional challenges, not only for supporting the livelihood of rural populations, but also to maintain a tolerable level of food security. Given the rapidly changing marketplace that confronts agri-food industries, there is an urgent need to integrating agro-food entrepreneurship and trnasversal skills in teaching, learning and outrech activities. In light of these challenges, this modile will focus on~~what are~~ the research trends, needs and priorities ~~to tackle them~~ both globally and locally?
Aim	The overriding aim of this module is to: 1) explore the trends, needs and priorities of CCSAFS research; 2) identify research areas, topics and themes of CCSAFS research and 3) relate these to the local and regional contexts.
Learning Outcomes	At the end of this module students will be able to: - Identify and discuss various CCSAFS research areas - Discuss how these research areas can be related to local circumstances - Develop an inventory of potential CCSAFS research topics
Units	Unit 1.1 CCSAFS research trends, needs and priorities Unit 1.2: CCSAFS Research Areas and Themes Unit 1.3: Exemplary Cases of CCSAFS Research
Readings	American Journal of Climate Change http://www.scirp.org/journal/ajcc Identifying research priorities to advance climate services Catherine Vaughan a,d,⇑ , Lawrence Buja b , Andrew Kruczkiewicz c , Lisa Goddard cClimate Services 4 (2016) 65-74 Journal of Sustainable Agriculture https://www.tandfonline.com/toc/wjsa20/current Journal of Environment & Sustainable Agriculture http://www.todayscience.org/JESA/jesa.html International Journal of Sustainable Agricultural Management and Informatics http://www.inderscience.com/jhome.php?jcode=IJSAMI Journal of Sustainable Agricultural Sciences (JSAS) http://jsas.journals.ekb.eg/

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	Sustainable Agriculture, Food and Wildlife http://www.mdpi.com/journal/sustainability/sections/agriculture_food_and_wildlife Agricultural Sciences http://www.scirp.org/journal/as Journal of Agriculture and Sustainability *http://infinitypress.info/index.php/jas* *Food Security https://link.springer.com/journal/12571* *Journal of Food Security http://www.sciepub.com/journal/JFS* Agriculture & Food Security https://agricultureandfoodsecurity.biomedcentral.com/ Global Food Security https://www.journals.elsevier.com/global-food-security
Activity	Overview
	Assignment 1a In light of the global trends, needs and priorities of CCSAFS research that can be identified through the links listed in the readings: 1) develop a catalogue of trends, needs and priorities; 2) assess the extent to which they are related to your country/region; 3) identify ~~what~~ other research needs and priorities can be considered in your local/national area; 4) develop an inventory of CCSAFS research topics in line with the local/national circumstances. Assignment 1b Use the class discussion forum available in the Blended Learning Environment and share your topic list with your instructor and classmates. Select one or two topics from the list that you would like to learn more about and return to your instructor or supervisor to discuss further. The deadline of both activities is one week after the end of the module.

10Cs/6 LEARNINGGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	

Key Concepts Overview	Research problem, researchable issue, deductive reasoning, inductive reasoning Defining a researchable problem is crucial in assuring the quality of the research design, including the theoretical constructs and the suitable research method. A researchable problem is the one that can be handled and make sense. The terms *research question* and *research problem* are used interchangeably to reference the problem or issue you intend to investigate and/or solve. A quantitative research problem uses deductive reasoning to ~~arrive in a testable~~formulate a hypothesis, while

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	the qualitative one uses inductive reasoning. Defining your research problem implies that you are justifying the need to study a researchable issue or problem by asking a number of questions. Before doing that, it is important that you pay consideration of the following: The rationale of the research problem The aims and objectives The context of the research problem The basic principles that underlie any kind of research include a systematic process of identifying a question or problem, setting forth a plan of action to answer the question or resolve the problem and rigorously collecting and analyzing data. In conducting any research, it is critical to choose the right method and design for a specific researchable problem. In module 1, you have learned to identify and document the trends and priorities in CCSAFS research and in module 2, you have learned the arguments concerning the quantitative and qualitative research. Now, it is time to understand the basic principles in formulating a research statement by identifying, justifying and documenting a researchable problem that can be applicable to both research paradigms.
Aim	The overriding aim of this module is to explore the rationale for choosing a researchable issue or problem and define the constituencies of the research problem in the context of CCSAFS research.
Learning Outcomes	At the end of this module learners will be able to: □ Identifying and justifying a research problem □ Recognising and discussing the constituencies of the research problem □ Setting the research problem in its context
Units	Unit 3.1: The research problem and its constituencies Unit 3.2: Criteria for judging the quality of the research problem
Readings	Identifying and Defining a Research Problem ppt Presentation (file:///D:/Downloads/identifyinganddefiningaresearchproblem-111106143750-phpapp02.pdf) What are the techniques involved in defining a Research Problem? Research Methodology Tutorial https://www.wisdomjobs.com/e-university/research-methodology-tutorial-355/technique-involved-in-defining-a-problem-11458.html
Activity	Overview Assignment ~~3~~2: Define your research problem through reflecting on: What? So what? Now what? In order to facilitate your task, please ~~you~~ visit https://lib.dr.iastate.edu/gpsa_etd/index.2.html and choose from the Sustainable Agriculture examples of research problems. Find out what these examples include and how they are formulated~~Theses examples of research problems to find out what they include and how they are formulated~~.

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What?

Based on the short-list of research topics selected, choose one and write a problem statement. Post it to your group's Blended Learning Environment discussion group by [set date and time]. You are answering the following four questions in your problem statement:

- What issue of CCSAFS are you considering for your research?
- What are some of the pressing needs/issues in the community?
- How does this issue address the local needs and priorities?
- What ~~is~~ are the main research questions and the sub-questions?

So What?

In defining your problem, look into the examples of the dissertations listed in the readings. In answering the "so what?" question, you are answering the following 7 questions:

- Why this problem and research questions are important and challenging to you, to others and locally?
- Are your research questions leading to a researchable problem?
- Do the research questions require data that can be accessible?
- Can the research questions explain variability, different outcomes under different conditions?
- Are the units of analysis clearly identified?
- Are the questions posed in a way that more than one result is possible?
- Does the research lead to better understanding of the CCSAFS issue under consideration
- Does it fill in gaps in our present knowledge about the CCSAFS issue?
- Can the investigation of these questions generate solutions?

Now What?

- What seem to be the root causes of the CCSAFS research issue chosen?
- What other work is currently happening to address the issue?
- Did you learn anything by answering the above questions?
- If yes, what and how such ~~a~~ learning can be applied?
- What would you like to learn more about this research issue?
- What steps are needed to address any challenges or difficulties?
- What information can you share and how with your peers?

The deadline of this activity is one week after the end of this module.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17

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ECTS WORK LOAD	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		
	3h		2h				5h		4h								14

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Key Concepts Overview	Research design, problem statement, quantitative research design, qualitative research design, mixed-methods research design, philosophical assumptions A research design or methodology refers to the overall strategy that you choose to address the research problem and constitutes the blueprint for the collection, measurement, and analysis of data. Since your research problem determines the type of design you should use, before you create a research design, you first need to formulate a problem statement that you have done in the previous module. Now, it is time to think first the theoretical basis of your research problem and second to critically think about what information is required to address the research problem you have defined in the previous assignment. You should describe where and when you will conduct your research, who is going to participate, and what approach and methods you will employ. There are different types of research designs depending on the research methodology adopted. Some of them can be: 1) quantitative research design (cause and effect, empirical-analytic, experimental); 2) qualitative research design (action research, case study) and 3) mixed-method research design (combining quantitative and qualitative methodologies). For each of them, despite some similarities, there are also differences as you can see in the examples of the dissertations listed in the readings. Thus, in developing your research design, it is crucial that you examine your philosophical assumptions and those underpinning the research problem and questions, before answering where, when, who and what. Philosophical assumptions relate to ontology, or the nature of reality, the epistemology, the nature of knowledge and axiology, the values guiding your research decisions. Alignment of the researcher's worldview (e.g. ontology, epistemology and axiology) with methodology (research approach/design). Summing-up, the research design (or methodological approach) refers to: • The rationale and theoretical source for your choice of research approach • The rationale behind the selection of participants, methods of data collection and analysis, and the steps to be taken to ensure that ethical practices are followed • The limits, restrictions or boundaries of the research • An action plan which explains each of the tasks to be carried out and the anticipated times for completion
Aim	The overriding aim of this module is to help you become familiar with the characteristics, language and logic of qualitative/quantitative and mixed-methods research designs.
Learning Outcomes	At the end of this module students will be able to: • Classify and evaluate the strengths and weaknesses of the different research

	designs of CCSAFS research - Discuss and use key concepts in research ethics as they apply to research design - Choose appropriately, and describe in detail, a research design for a specific CCSAFS research project - Identify the research problem clearly and justify its selection, particularly in relation to any valid alternative designs that could have been used - Review and synthesize previously published literature associated with the research problem - Clearly and explicitly specify hypotheses [i.e., research questions] central to the problem - Recognise the principles for constructing a research instrument - Explain how such data will be obtained - Describe the methods of analysis to be applied to the data in determining whether or not the hypotheses are true or false
Units	Unit 3.1: An overview of research designs Unit 3.2: Choosing and justifying a research design Unit 3.3: Quality standards for designing research methodology
Readings	Sustainable Agriculture Theses IOWA STATE UNIVERSITY DIGITAL REPOSITORY https://lib.dr.iastate.edu/gpsa_etd/index.2.html More information about research design, see http://tll.mit.edu/help/develop-research-design
Activity	Overview
	Assignment ~~4~~3: The purpose of this assignment is for you to explore quantitative, qualitative and mixed-methods research designs. Visit https://lib.dr.iastate.edu/gpsa_etd/index.2.html and choose from the Sustainable Agriculture Theses one example from each of the three research approaches. Read the sections referring to the research methodology. Having these as examples, ~~as~~ continue from the problem statement you formulated in the previous assignment and complete the following: - Background of the research problem - Aims and objectives - Design of a conceptual framework that shows how the intervention is expected to achieve the objectives - Description of the intervention intended to achieve the objectives - Describe who will be involved in the study, what means will be used to collect the data and what methods will be used to analyse them Upload the assignment and arrange peer-review with another student of your own choice using the Blended Learning Environment. The deadline of this activity is one week after the end of this module.

10Cs/6 LEARNINGGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Formatted Table
	4h	2h		6h	3h				15

Key Concepts	~~Research results, research discussion, research conclusion, interpretation~~
Overview	The presentation and discussion of research results are the most important parts of a research process. It is the part of a research paper or thesis where you report the findings of your study based upon the methodology [or methodologies] you applied. The results section should state the findings of the research arranged in a logical sequence. Just as the literature review is arranged under conceptual categories reflecting the key concepts of your research problem. In the results section, you just present the results without connecting them with previous results (interpretation), unless the results section includes the discussion section. In the discussion section, the strategy is different. Here, there is an opportunity to explore further or interpret the results, making connections between the results of your analysis and existing theory and research. This means that in the discussion there is need to explain what messages the results obtained convey. Usually, there is confusion of what the discussion is and what it should contain. Sometimes, researchers wrongly interpret the results in the results section or summarize their results without interpretation. The interpretations in the quantitative studies are organized in line with the research questions or hypotheses while for qualitative studies, the interpretations are organized in line with the themes derived. For each question or theme, there is need to go back to the literature and look at the major findings of previous studies as well as to provide possible explanations as to why the findings corroborated or contradicted the findings of previous studies. Additionally, other key issues to be included in the discussion of the findings are the implications, both in theory and methodology as well as recommendations for policy and further research. Finally, a conclusion is not merely a summary of the main topics covered or a re-statement of the research problem, but a synthesis of key points raised in the research results.
Aim	The overriding aim of the module is make explicit and understandable the meaning function for the presentation of the research findings, the discussion of the findings and their conclusions.
Learning Outcomes	At the end of this module students will be able to: 1. Understand the principles for presenting, discussing and concluding research results 2. Recognise and discuss what should be avoided in writing the research results and their interpretation 3. Know how to synthesise research results and explore their possible implications in theory and practice

Commented [NK4]: You may need to add a module or section on Sampling Data Collection
Introduction to SPSS (you have this in the course description above)
Fundamentals of data manipulation, analysis and interpretation
This is needed before interpreting and discussing results. Also, it will link the students to the statistics course.

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Units	Unit 7.1: Substantiating research findings through previous research Unit 7.2: Results presentation, interpretation and conclusion
Readings	Sustainable Agriculture Theses IOWA STATE UNIVERSITY DIGITAL REPOSITORY https://lib.dr.iastate.edu/gpsa_etd/index.2.html Grading Rubric for Research Proposal Assignment available at file:///D:/Downloads/Rubric%20(1).pdf Common Rubric for Evaluating Undergraduate Research Proposals Student Study and Research Committee file:///D:/Downloads/DRI-Student-Research-Proposal-Rubric_151112%20(2).pdf https://www.ship.edu/globalassets/student-research/scoring-rubric-1.pdf
Activity	Overview Assignment ~~7.14~~: Look into the results section of the project assignment in mod and 6. fulfills the following: - Evidence that helps to understand the context of the results by restating the research problem underpinning the study. - Inclusion of non-textual elements, such as, tables, figures, charts, etc. that further illustrate key findings, if needed. - Highlighting the most meaningful results. - A balance of the length of the results section in relation to its importance and the amount and types of data. - A short paragraph that summarises the key findings of the study. Examine if in the presentation of the results, the authors avoid doing the following: - Discussing or interpreting their results. - Attempting to explain findings in relation to previous research, unless the results section includes also the discussion of the results. - Ignoring possible negative results. Look at the discussion section and examine if the content includes the following: 1. Substantiates the findings with previous studies and indicate where findings align or do not align. 2. Provides possible explanations of not alignment with previous research findings. 3. Organizes the discussion from the general to the specific, linking the findings to the literature, then to theory, then to practice. 4. States how the findings from the study fill in and/or reveal new gaps in the research area. 5. Includes the implications of the research findings and provides

Commented [NK5]: Title…

Comm ented [NK6]: Why 7.1?

Examine if the content of the results section

Commented [NK7]: No modules 5 and 6 here

	recommendations for policy and further research. 6. Explores possible improvements in theory, the methodology and future research. Look at the conclusion section and examine if the content includes the following: 1. Summarizes the key findings that make sense and convey the significance of your study. 2. States possible new avenues about the research problem in its context and beyond that. The deadline for this assignment goes together with the assignment 5 and 6. Assignment ~~7.2~~5. Preparing a research proposal This assignment will be carried out in cooperation with the students' research supervisors and has three parts. In the first part, you work alone to put all the previous pieces of the assignments you have done and develop a research proposal. While developing your proposal consult the rubrics listed in the readings for self-assessment. In the second part, exchange your research proposal with another student and start to evaluate each one's research proposal following-up the rubrics. Write down an assessment report of 4-5 pages, justifying your evaluation, paying attention to the issues raised in the rubrics. In the third part, using the Blended Learning Environment, set-up an online session to discuss your evaluations. The deadline for this assignment will be discussed with the students' supervisors.

Commented [NK8]: This is supposed to be the community-based activity.
link it to the CCSAFS guidelines

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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare / Writing exam	Formatted Table
	4h	2h		4h	4h		2	16

Summary of ECTS Workload

Learning Components	No	Time	Workload	Course Modules				
				1	2	3	4	Sum
Lectures (face-to-face)	7	2	14	3	3	4	4	14

Online	4	2	8	2	2	2	2	8
Lab work								
Reading articles/books	100	0.2	20	5	5	6	4	20
Preparing course activities	8	2	16	5	4	3	4	16
Preparation/ Writing exam	1	2	2				2	2
Total				15	14	15	16	60

SDGs RUBRIC

Commented [NK9]: It is suggested to add this rubric and mark in the table the corresponding info- to be consistent with all other syllabi submitted

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build				

	effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



Course Syllabus

Course Code: CSAF830

Sustainability Justice of Food Security and Climate Change

Developed by Prof. Dr. Vassilios Makrakis, University of Crete

2018/2019

This is not a complete syllabus. Professor Makrakis did the modules, but the syllabus is missing the following:

Course Description/Overview

Course Learning Objectives

Course Content Learning Outcomes

Course Resources

Course Website(s)

Required Course Texts and Materials

Optional Course Texts and Materials

Assignments and Grading Scheme

Grading System

Grading Policy

Course Policies

Course Schedule

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Sustainability Justice of Food Security and Climate

Module 1	The Constituencies of Sustainability Justice
Key Concepts	Sustainability justice; environmental sustainability, social sustainability; economic sustainability; cultural sustainability
Overview	While social justice is a frequently employed concept in the deconstruction and reconstruction of the school curriculum and discussion of instructional practice in schools, sustainability-justice that, in addition to social justice, integrates environmental, economic and cultural justice, has not been discussed. Most people usually have only a basic or cursory understanding of Sustainability and Sustainable Development (SD). The concept of Sustainability Justice (SJ) has been recently advanced by Prof. Dr. Makrakis. The concept of "sustainability justice" as it has been conceptualised by Makrakis reflects the four pillars of sustainable development: environment, society, economy and culture. It is thus a concept that when students could be asked about it, they will mostly talk in terms of environmental issues and ignore the other dimensions or constituencies of sustainability justice.
Aim	The overriding aim of this module is for students to be able to understand the need and importance of the concept of sustainability justice and its constituencies
Learning Outcomes	At the end of this module learners will be able to: • Identify the key concepts of sustainability justice in terms of social, cultural, environmental and economic aspects. • Realize the rationale and critical importance of sustainability justice in the context of sustainability crisis. • Recognize the constituencies of sustainability justice and their connection to sustainable development pillars.
Units	Unit 1.1: The environmental dimension of sustainability justice Unit 1.2: The social dimension of sustainability justice Unit 1.3: The economic dimension of sustainability justice Unit 1.4: The culture dimension of sustainability justice
Readings	Makrakis, V. (2017). Unlocking the potentiality and actuality of ICTs in developing sustainable-justice curricula and society. Knowledge Cultures, 5(2), 103-122. doi: 0.22381/KC5220177 http://petarjandric.com/images/pdf/Knowledge-Cultures522017.pdf Makrakis, V. (2017). Developing and validating a sustainability justice instrument to transform curriculum, learning and teaching. 9th International Conference in Open & Distance Learning - November 2017, Athens, Greece-PROCEEDINGS https://eproceedings.epublishing.ekt.gr/index.php/openedu/article/viewFile/1368/1303 Vouzaksakis, G. & Makrakis, V. (2017). Embedding sustainability justice in secondary education economic courses enabled by ICTs (with G.). 9th International Conference in Open & Distance Learning - November 2017, Athens, Greece-PROCEEDINGS file:///D:/Downloads/1371-3200-1-PB%20(1).pdf https://eproceedings.epublishing.ekt.gr/index.php/openedu/article/viewFile/1368/1303
Activity	Assignment 1a:

<table>
<tr><td></td><td colspan="17">The main activity for this module will mainly focus on engaging students on the different dimensions or pillars of sustainability justice. As such, students will be organized in groups of 4. Each student will represent one of the pillars of Sustainability Justice and will be required to prepare one page report which will be discussed during an online session among the group members.

Assignment 1b:
Each group of students will exchange their reports for peer reviewing. After peer reviewing, students will collaboratively develop a Wiki providing a comprehensive overview of the pillars of Sustainability Justice and their connection to corresponding sustainable development pillars. The wikis developed will be presented and discussed in class during the second week.

Assignment 1c (Community-based learning project):
In this activity, the students have to disseminate their Wikis through the social media, especially through the development of a Facebook page, aiming to give and share knowledge and information as well as raising awareness on issues of sustainability justice, in relation to climate and food injustices.

The deadline for both assignments will be two weeks after the end of the module.</td></tr>
<tr><td rowspan="2">10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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<tr><td rowspan="2">ECTS WORK LOAD</td><td colspan="2">Lecture</td><td colspan="2">Online</td><td colspan="2">Lab</td><td colspan="2">Reading</td><td colspan="2">Course activity</td><td colspan="2">Project</td><td colspan="2">Prepare exam</td><td colspan="2">Writing exam</td><td>Total</td></tr>
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<tr><td>Module 2</td><td colspan="17">Climate Change, Food Security and Sustainability Justice in Context</td></tr>
<tr><td>Key Concepts</td><td colspan="17">Climate justice, food justice, sustainability justice</td></tr>
<tr><td>Overview</td><td colspan="17">In recent years, due to climate change humanity has witnessed wild weather and unpredictable seasons that have affected what farmers can grow and the prices and quality of the food. Besides that, millions of people, including children face inhumane working conditions to produce the food we all eat, while they do not have enough to eat themselves. Recent evidence (https://www.weadapt.org/knowledge-base/vulnerability/food-in-an-uncertain-future) shows that the MENA region is the only region outside of Sub-Saharan Africa where the number of undernourished people has increased since the early 1990s,

Although, climate change and food security are two critical issues threatening</td></tr>
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	humanity, the way these two interact in relation to justice has started to receive attention in recent years. Indeed, there is considerable discussion of climate justice and food justice and their interrelationship with climate change. Both climate justice and food justice are two emerging movements that can be seen in the context of sustainability justice, a concept that bridges together the four pillars of sustainable development. Sustainability justice reveals the critical intersection of climate change and food security issues in relation to the environmental, social, economic and cultural injustices emanating from climate change and food insecurity. In this sense, climate justice is food justice and sustainability justice offers a framework for addressing food and nutritional insecurity at levels from local to international in light of climate change. It is particularly effective in highlighting the injustices caused by climate change impacts on food security and the effects they have for the poorest and most vulnerable.
Aim	The overriding aim of this module is to bridge the gap between the academic discourse and the mainstream discourse by engaging students to reflect on the ethical and political implications of food and agricultural practices in relation to sustainability justice, with special attention to climate change.
Learning Outcomes	At the end of this module students will be able to: • Discuss the concepts of climate change and food security through the lenses of sustainability justice. • Realize the complex relationships between climate change, food security and sustainability justice. • Discuss how food justice and climate justice intersect with sustainability justice, and with inequities involving race, class, gender and governance. • Analyze how the food choices we make as individuals collectively influence: 1) political, socio-economic and ecological changes taking place locally, regionally and globally and 2) both climate change and food security. • Discuss how disadvantaged social groups are disproportionately affected by climate/food injustice policies and practices. • Assess how sustainability justice contributes to transforming climate and food injustices. • Identify and analyze the aims and actions of climate justice and food justice organizations and movements, locally, regionally and globally.
Units	Unit 2.1: Clarifying the Concepts of Climate Justice and Food Justice. Unit 2.2: Climate/Food Justice Policy Considerations and Actions in the Egyptian/Jordanian context.
Readings	Human rights: their role in achieving climate justice and food and nutrition security: A New Dialogue : Putting People at the Heart of Global Development https://www.mrfcj.org/media/pdf/Human-Rights-FNS-Climate-Justice.pdf Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf Schmidhuber, J., &Tubiello, F. N. (2007). Global food security under climate change. Proceedings of the National Academy of Sciences, 104(50), 19703-19708. file:///D:/Downloads/Global_Food_Security_under_Climate_Change.pdf

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<tr><td></td><td>Agriculture, Food Security and Climate change: Outlook for knowledge, tools and action. CCAFS Report No. 3 file:///D:/Downloads/ccafs_report_3-low-res_final.pdf

Purifou, D. Food policy councils: Integrating food justice and environmental justice. https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1302&context=delpf

Jobbins, G. & Henley, G. (2015). Food in an uncertain future: the impacts of climate change on food security and nutrition in the Middle East and North Africa. Overseas Development Institute, London / World Food Programme, Rome. Available at file:///D:/Downloads/wfp283866.pdf</td></tr>
<tr><td>Activity</td><td></td></tr>
<tr><td></td><td>Assignment 2
Visit the site http://www.icarda.cgiar.org/arab-food-security entitled “Enhancing Food Security in Arab Countries”, led by ICARDA. Read carefully the cases of Egypt or Jordan and based on the list of readings, write a 4 pages (1.5 Times New Roman) essay, identifying critical aspects of food insecurity facing the country of choice in light of potential climate change effects.

Each student will post his/her essay. Then, students will be required to engage in an online forum to identify and discuss the root causes of food insecurity in these specific circumstances. Students will be required to write a 3 page summary reflective report, including in an annex the forum post and replies.

The deadline for this assignment is two weeks after the end of the module</td></tr>
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6h	2h		8	8				24

Module 3	Sustainable Farming and Food Justice/Security under Climate Change
Key Concepts	Sustainable agriculture, food security, climate change, food system
Overview	The current agriculture and food system practices and climate threatening seem to damage sustainable farming and food security. Increasing agricultural and food production through intensive and pesticide means, and over-grazed lands, heavily pollutes air, water, and farmworkers health. As a whole, the food system, especially

	meat production is responsible for a significant portion of greenhouse gas emissions. In this module, particular attention will be given to the assumption that if our food and farming methods are to be sustainable over time, we must shift from unsustainable to sustainable farming. In doing so, maintain the health and productivity of land and must conserve water, energy, and the other natural resources upon which agricultural productivity ultimately depends. Any system of food and farming that fails to meet the needs of a sustainable society will fail in the long term. Climate change raises complex issues of science, economics, and politics; it also raises difficult issues of sustainable farming and food justice.
Aim	The aim of this module is to allow students to begin to visualize the complex nature and interrelations of Food Security & Sustainability Justice.
Learning Outcomes	At the end of this module students will be able to: • Discuss food and agriculture systems and how these are changing to impact on sustainable farming • Identify and understand the connection of sustainable farming with food justice • Get information about sustainable farming, food security and justice under climate change effects using online searching machines • Work with other students to define sustainable farming practices under climate change conditions through the lenses of sustainability justice • Analyse the current situation of food security/justice and think over what can be done • Develop action plans to raise the awareness of farmers and other stakeholders to assure sustainable farming and food security locally.
Units	Unit 3.1: Climate Friendly Farming Unit 3.2: Sustainable Farming and Food Security Unit 3.3: Empowering Community Farmers Unit 3.4: Sustainability Justice and Sustainable Climate/Food Justice
Readings	Wreford, A.A., Ignaciuk, A. & Guere, G. (2017). Overcoming barriers to the adoption of climate-friendly practices in agriculture. Papers 101. Paris: OECD DOI:http://dx.doi.org/10.1787/97767de8-en https://read.oecd-ilibrary.org/agriculture-and-food/overcoming-barriers-to-the-adoption-of-climate-friendly-practices-in-agriculture_97767de8-en#page1 European Commission (2012). Sustainable agriculture for the future we want. https://ec.europa.eu/agriculture/sites/agriculture/files/events/2012/rio-side-event/brochure_en.pdf
Activity	
	Assignment 3a Each student should construct three digital concept maps, using any type of software (e.g. Cmap, Inspiration): one for sustainable farming, the other for climate justice and the last for food justice. Then, they will critically reflect on the association and links of the three concept maps to produce a new one that merges the three. Each student should post his/her merged concept map in the blended learning

<table>
<tr><td></td><td colspan="16">environment and invite another student to comment on the concept map, highlighting similarities and differences using the discussion forum. The idea of this reflective assignment is to examine the need of revising the concept maps. Write down a comprehensive 1 page report on the conceptual changes in students' thinking for revising the initial concepts maps.

The deadline for this assignment is within the period of the module that lasts for two weeks.</td></tr>
<tr><td rowspan="2">10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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<tr><td>Module 4</td><td colspan="16">Sustainable Just Climate & Food Security: The Value of Systems Thinking</td></tr>
<tr><td>Key Concepts</td><td colspan="16">Systems thinking, climate change, food security, values</td></tr>
<tr><td>Overview</td><td colspan="16">Systems thinking, in general, is the ability to think about a system as a whole, rather than in its parts. It also helps to see the world as a complex system and better understand its interconnectedness and interrelationships. In other words, systems thinking is a way of approaching complicated issues through connecting the dots and understanding them as inter-related parts of a greater whole that constitutes the system. Understanding and working with the complexity of sustainable food production systems requires the values of systems thinking. In this module, students will apply systems thinking in line with sustainability justice to tackle the sustainability of food production systems. In a way, this module synthesizes knowledge and skills from the previous modules, addressing the development of sustainable solutions towards sustainable-just food security, using systems thinking approaches. Thus, students will begin to understand how to apply systems thinking in dealing with sustainable farming, food security and climate change through the lenses of sustainability justice. Moreover, they will also begin to understand the complexities that face their local communities and countries in terms of highly complex and interrelated systems that this module deals with.</td></tr>
<tr><td>Aim</td><td colspan="16">The overriding aim of this module is: 1) to provide students with an understanding of the "big ideas" regarding systems thinking, complexity, and resilience as well as with an understanding of some of the methods and tools of analysis in the context of sustainable farming, food security and climate change. 2) To allow students to apply the principles of a systems thinking approach for a sustainable-just climate and food security.</td></tr>
</table>

Learning Outcomes	At the end of this module students will be able to: • Understand the complexity and diversity of food production systems under climate change through the lenses of sustainability justice. • Understand the principles of system analysis and how it can be applied in sustainable farming and food production systems. • Evaluate strong and weak points of different food production in terms of sustainability justice. • Gain comparative and holistic knowledge of today's food systems (production, distribution, consumption, and waste). • Explore the idea of food justice and alternative food systems in the local context.
Units	Unit 4.1: Systems Thinking: What, Why, When, Where and How? Unit 4.2: The Climate and Food System Concept Unit 4.3: The Values of Systems Thinking Unit 4.4: Climate Change and Food Security Systems in Action
Readings	Arnold, R.D. & Wade, J.P. (2015). A Definition of Systems Thinking: A Systems Approach Procedia Computer Science 44 (2015) 669 - 678 Behla, D. & Ferreiraa, S. (2014). Systems Thinking: An Analysis of Key Factors and Relationships Procedia Computer Science 36 (2014) 104 - 109 Keegan, M. (n.d.).Systems thinking, rural Development and food security. Migration Institute of Australia. https://core.ac.uk/download/pdf/15125474.pdf Kwamina E. Banson, K. et. al. A systems thinking approach to address the complexity of agribusiness for sustainable development in Africa. http://journals.isss.org/index.php/proceedings57th/article/viewFile/2119/697 Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf
Activity	Overview
	Assignment 3 Students will write a 3 pages paper that analyses a given aspect of food security in light of climate change and its impacts and effects on environment, society, economy and culture. It will examine this as a social-ecological system and incorporate the knowledge acquired so far from previous readings and assignments. The report may cover the perspective of specific groups of people, at the local, national or regional level. An online discussion forum will be arranged to discuss the key points of the papers written. A power point presentation will be prepared by each student for class presentation and discussion during the third week of the module. This deadline of this assignment will be carried out during the three weeks of the

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<table>
<tr><td></td><td colspan="17">module.</td></tr>
<tr><td>10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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<tr><td>SDGs</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>5</td><td>16</td><td>17</td></tr>
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<tr><td>Module 5</td><td colspan="17">Community Food Security and Sustainability Justice</td></tr>
<tr><td>Key Concepts</td><td colspan="17">Community food security (CFS), hunger, sustainability justice, democratic decision-making</td></tr>
<tr><td>Overview</td><td colspan="17">Community food security (CFS) is a relatively a new movement that promotes food security strategies within a region or community's food system. In this sense, CFS is concerned with the full range of food chain events including agriculture, the availability of supermarkets and other affordable outlets for quality and accessible food. It is also concerned with the involvement of the wider citizenry and local/state governments in seeking solutions to food insecurity and healthy food choices.
While officially a movement since only 1994, CFS is now practiced by hundreds of organizations and communities worldwide, engaging thousands of groups, volunteers, government and non-government representatives in projects and activities that have improved their communities' capacity to meet their own food needs. Looking into past experiences, one can see projects and activities that include farmers' markets, food assistance program outreach, community gardens, youth food and agriculture programs, farmland preservation and farm viability projects, food system planning and food policy councils, nutrition education and health promotion strategies, farm-to-school projects and a range of public education and awareness campaigns. In general, CFS encourages progressive planning that addresses the underlying causes of hunger and food insecurity facing the current global food system. Although such a system has witnessed highly efficient food production, it has created many undesirable environmental, social, economic and cultural impacts. Small farmers' mostly profit margins that have significantly led to the abandonment of their agricultural activities. In general, the economic viability of small and medium-sized farms has reduced the number of farm-related local business and made farming less attractive to younger generations. Many studies show that food production has been less community-based, diminishing farmers' collective knowledge and sustainable agrarian practices. At the same time, the unprecedented demand for local and regionally identified foods has created many opportunities for agricultural producers and communities.</td></tr>
</table>

	In this module, we will bring a number of community-based sustainable farming and food case studies aiming to the promotion of sustainability justice and greater equality. Such case studies show how to reduce poverty and hunger, prepare families to assume responsibility for ethical eating and revive the cultural values of solidarity among families and social responsibility. Some case studies illustrate innovative methods of production, others demonstrate more efficient ways to distribute food, and some are exemplary methods of processing or waste recycling. The majority of case studies convey ways to strengthen ties to the regional economy, support local businesses, offer new entrepreneurial opportunities, and engage residents.
Aim	It is promoting greater compassion for the food insecure, expanding awareness of local food systems and the range of options available to build local food security, and engaging the talents, resources, and wisdom of more participants than ever before to end food insecurity and hunger .
Learning Outcomes	At the end of this module students will be able to: • Identify critical issues and problems related to SJ and FS • Understand the problems & obstacles faced by minority and disadvantaged groups in achieving food justice • Discuss how low-income communities are disproportionately impacted by food injustice • Explore the idea of food justice and alternative food systems in the local context • Describe key challenges for food justice from local and national governance perspectives
Units	Unit 5.1: What is a Community-Based Sustainable Food System? Unit 5.2: Indicators of Community-Based Sustainable Food System Unit 5.3: Community Food Security in Action: Case Studies
Readings	Building a Community-Based Sustainable Food System. University of Michigan Urban & Regional Planning Capstone Project April 2009. http://closup.umich.edu/publications/misc/Community-Based-Sustainable-Food-Systems.pdf Bendfeldt, E. et.al. (2011), A Community-based food system: Building health, wealth, connection, and capacity. Virginia Tech. https://pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/3306/3306-9029/3306-9029-PDF.pdf Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf Ismail, S. et.al. (2003). Community-based food and nutrition programmes: What makes them successful -A review and analysis of experience. FAO Food and Nutrition Division 1. BRAZIL CASE STUDY 2. KENYA CASE STUDY 3. BANGLADESH CASE STUDY

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<tr><td></td><td colspan="17">http://www.fao.org/docrep/006/y5030e/y5030e00.htm</td></tr>
<tr><td>Activity:
Community-based learning</td><td colspan="17">

Assignment 4a

Choose one out of the three case studies and 1) discover the strengths and weaknesses; 2) discuss how such a case study can be contextualized in your own community. Based on it, organise an online discussion forum to share best practices in community-based, sustainable food systems for application in your own local communities.

Write-up an action plan to show how changes to the current local food system could enhance the presence of healthy, affordable food and serve as an economic development tool in your local community.

Assignment 4b: Community-based learning project “Sustainable-Just Dining”

Create a number of Sustainable-Just Food Working Groups, preferably 2-3 students in each group. Each group will focus on a community sector that has services for dining and/or selling food, such as university, supermarkets, hotels, etc. Each group will have to examine ways to increase sustainable food policies that can be turned into concrete actions. The aim will be to reduce landfill food waste and promote the idea of ethical eating and to ensure that unsold leftovers are suitable for donating to vulnerable groups in the community. Each group should write a reflective essay about their experience and develop a .ppt presentation to share them. For “Writing a Good Reflective Essay: from Introduction to Conclusion” visit the https://writemyessay4me.org/blog/reflective-essay

Organise an off-line (in class) and an online conference session to present and discuss your results.

The deadline of the last assignment will be at the end of the examination period.</td></tr>
<tr><td rowspan="2">10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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SUMMARY OF ECTS WORKLOAD

Learning Components	No	Time Factor	Work load	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)	11	3	33	3	6	6	9	9	33
Online	5	2	10	2	2	2	2	2	10
Lab work									
Reading articles (3 pages per hour)	100	0.3	22	5	4	4	5	4	22
Reading book chapters (5 per/h)	120	0.2	22	5	4	4	5	4	22
Preparing course activities	4	9	37	6	8	7	8	8	37
Project work	2	6	12	4				8	12
Preparation for exam	1	12					6	6	12
Writing the exam	1	3	3					3	3
Total			151	25	24	23	35	44	151



Course Syllabus

Course Name: Climate Change Mitigation and Adaptation

Suez Canal University, -

Faculty of Agriculture, -

Fall Semester, 2018

Instructor Information

Instructor: Khalid El-Sayed Abd El-Hamed Ibraheim, Mohammed Wasfi Elwan, Marwa Samir Kamel.

Office Location: Faculty of Agriculture, SCU, New Campus

Telephone:

Office Hours:

E-mail:

Website:

Course Identification

Course Name: Climate Change Mitigation and Adaptation

Course Location: Center of Excellence in Climate Change, Sustainable and Food Security

Class Times: Lecturer:

Practical Session:

Prerequisites: None

Faculty Web Page: ????

Course Description/Overview

The impacts of climate change on agriculture could be devastating in many areas. Adaptation and mitigation measures are urgently needed ~~urgently~~ to reduce the adverse impacts of climate change.

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Mitigation - reducing climate change - involves reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing sources of these gases or enhancing the "sinks" that accumulate and store these gases. The goal of mitigation is to avoid significant human interference with the climate system, and "stabilize greenhouse gas levels in a timeframe sufficient to allow ecosystems to adapt naturally to climate change and ensure that food production is not threatened .

Adaptation - adapting to life in a changing climate - involves adjusting to actual or expected future climate. The goal is to reduce ~~our~~the vulnerability to the harmful effects of climate change (e.g.~~like~~ sea-level rising, more intense extreme weather events or food insecurity).

Course Learning Objectives

This course is designed to provide students with comprehensive knowledge and skills concerning climate change adaptation and mitigation approaches. This course examines issues related to the impacts of climate change on agriculture and adaptation responses and to the mitigation of greenhouse gases. In particular, the course analyses achieving reductions in greenhouse gas emissions through the implementation of different actions in the agricultural sector. The overall goal of the course is to help guide policy makers in the design of policies to address climate change issues in agriculture.

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Course Content Learning Outcomes

At the end of this course participants will be able to:

- ~~Show understanding~~Analyze ~~of~~ the impacts of climate change on the agricultural sector.
- Explain the main factors that affect agricultural productivity.
- ~~Show understanding of~~Examine adaptation and mitigation measures needed to reduce the adverse impacts of climate change on agriculture.
- Explain the major sources of greenhouse gas emissions, and how agriculture can help in reducing emissions through specific agricultural practices.
- Show ability of grafting technique ~~and they could do that by themselves~~.
- Identify the factors that affect the yield and quality under unsuitable climate conditions.

- ~~Show understanding of~~Understand the role of safety chemicals and fertilizers for production high yield and quality of field and horticultural crops under varying climate conditions ~~to meet the circumstances of CCSAFS~~.
- ~~Appreciate~~ Assess the advantages of modern irrigation systems for decreasing water amount and increase the soil fertility.
- Evaluate new genotypes and strains to overcome ~~a~~ biotic stresses.
- Identify the advantageous of *in vitro* culture technique for producing strain lines tolerate heat stress with high fruit yield and quality to meet the circumstances of CCSAFS.
- Evaluate and compare crop pests and climate change and risk.
- Recognize ~~insects~~insects' adaptation and mitigation.
- Apply ~~that knowledge as they~~ practice control pests in the field.
- Explain the evolution Arthropod diversity and extinction.
- ~~Recognize of some meaning like~~Apply Integrated Pest Management techniques.

Course Resources

Required Course Texts and Materials:

- Course Notes (Class note will be prepared and distributed at the beginning of the lectures).
- Reddy P.P. (2015) Impacts of Climate Change on Agriculture. In: Climate Resilient Agriculture for Ensuring Food Security. Springer, New Delhi.
- Tubiello, F. (2012). Climate change adaptation and mitigation: challenges and opportunities in the food sector. Natural Resources Management and Environment Department, FAO, Rome. High-level conference on world food security: the challenges of climate change and bioenergy, Rome, 3-5 June 2008.
- Altieri, M. A., and Nicholls, C. I. (2017). The adaptation and mitigation potential of traditional agriculture in a changing climate. Climatic Change, 140(1), 33-45.
- Howden, M., Soussana, J.F. & Tubiello, F.N. 2007. Adaptation strategies for climate change. Proc. Nat. Ac. Sciences 104:19691-19698.

Commented [NK3]: Is this 2008? Or 2012??

- IPCC. 2007. *Mitigation of Climate Change*. Assessment Report 4, Working Group III, Inter- Governmental Panel on Climate Change.
- Bakkegaard, R.K; L.R. Moller and F. Bakhtiari.(year missing) Adaptation and mitigation in agriculture and forestry. For more on the Climate Resilient Development (CRD) programme, see http://www.unepdtu.org/What-We-Do/Thematic-Programmes/Climate-Resilient
- Petzoldt, C. and A. Seaman. (2007). Climate Change Effects on Insects and Pathogens. Fact Sheet.
- http://www.climateandfarming.org/clr-cc.php.
- Petzoldt, C. and A. Seaman. (2007). Climate Change Effects on Insects and Pathogens. Powerpoint file. http://www.climateandfarming.org/clr-cc.php
- Wolfe DW, L Ziska, C Petzoldt, A Seaman, L Chase, K Hayhoe. 2008. Projected change in climate thresholds in the Northeastern U.S.: implications for crops, pests, livestock, and farmers. Mitigation and Adaptation Strategies for Global Change. 13:555-575, eds., New York: CAB International,2000

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Optional Course Texts and Materials

- Mendelsohn, R. (2008). The impact of climate change on agriculture in developing countries. *Journal of Natural Resources Policy Research*, *1*(1), 5-19.
- Climate change adaptation and mitigation: challenges and opportunities in the food sector. Food and Agriculture Organization of the United Nations (FAO) Natural Resources Management and Environment Department Rome, September 2012
- Pathak H, Aggarwal PK and Singh SD (Editors). 2012. Climate Change Impact, Adaptation and Mitigation in Agriculture: Methodology for Assessment and Applications. Indian Agricultural Research Institute, New Delhi. pp xix + 302.
- Rosenzweig, Cynthia and Tubiello, Francesco Nicola, "Adaptation and mitigation strategies in agriculture: an analysis of potential synergies" (2007). *NASA Publications*. 25. http://digitalcommons.unl.edu/nasapub/25
- Whitney, S, J. Whalen, M. VanGessel, B. Mulrooney. 2000. Crop Profile for Corn (sweet) in Delaware. http://www.ipmcenters.org/CropProfiles/docs/DEcorn-sweet.html
- Shelton, A.M., W.R. Wilsey, and D.M. Soderlund. 2001. Classification of insecticides and acaricides for resistance management. Dept. of Entomology, NYSAES, Geneva, NY14456.315-787-2352. http://www.nysaes.cornell.edu/ent/faculty/shelton/pdf/res_mgmt.pdf

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Assignments and Grading Scheme

Grading Policy

Assignments	10%
Practical Exam	20%
Oral Exam	10%
Final Exam	60%
Total Points	100

Course Schedule

~~Lecturers,~~

Week	Date	Topics
1		Unit 1: Impacts of climate change on agriculture.
2		Unit 2: Climate change adaptation. I
3		Unit 2: Climate change adaptation. II
4		Unit 3: Climate change mitigation. I Unit 3.1.a (refer to module 3) Unit 3.1.b. (module 3)
5		Unit 3: Climate change mitigation. II
6		Unit 4: Production of grafted plant materials to overcome bioti and abiotic stresses. 4,1 see modules below 4.2
7		Unit 4: Greenhouse Gas Emission and Carbon sequestration.
8		Unit 5: Water management using modern irrigation systems.

9		Unit 6 a: Altering the timing or location of cropping activities. Unit 6 b: Application of safe materials to overcome biotic and abiotic stresses.
10		Unit 7 a: Use genetic diversity within local germplasm and introduce new imported varieties and genotypes to find more tolerate genotypes for hot as well as other a biotic stresses. Unit 7 b: Use *in vitro* culture technique to produce new lines carrying biotic and abiotic stresses.
11		Unit 8: Effect of climate change on insect migration Unit 8: Impact of climate change on pests adaptation and mitigation
12		Unit 9: Change geographic distribution and population dynamics of insect pests.
13		Unit 10: Adaptation of integrated pest management to future pest risks.
14		General Revision
15		Final Exam



Course	Climate Change Adaptation and Mitigation
Module 1	Impacts of climate change on agriculture
Key Concepts	Rising global temperatures, less precipitation, intense droughts and floods, salinization.
Overview	The impacts of climate change on agriculture could be devastating in many areas. Many regions already feel these impacts, which will get progressively more severe as mean temperatures rise and the climate becomes more variable. Scientific evidence about the seriousness of the climate threat to agriculture is now unambiguous, but the exact magnitude is uncertain because of the complex interactions and feedback processes in the ecosystem and the economy. Five main factors will affect agricultural productivity: changes in temperature, precipitation, carbon dioxide fertilization, climate variability, and surface water runoff.
Aim	This module is designed to provide students with comprehensive knowledge and skills concerning the impacts of climate change on agriculture and adaptation responses and to the mitigation of greenhouse gases.
Learning Outcomes	At the end of this module participants will be able to: - Show understanding ofAnalyze the impacts of climate change on agricultural sector - Explain the main factors that affect agricultural productivity.
Units	Unit 1: Impacts of climate change on agriculture
Readings	- Course Notes. - Reddy P.P. (2015). Impacts of Climate Change on Agriculture. In: Climate Resilient Agriculture for Ensuring Food Security. Springer, New Delhi. - Mendelsohn, R. (2008). The impact of climate change on agriculture in developing countries. *Journal of Natural Resources Policy Research*, 1(1), 5-19.
Activity	

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	Storytelling activity: Climate change impacts and adaptation: Story from my Nepalese village: Madan Poudel, a youth agriculture activist and student from Nepal, personal story on how climate change is affecting his community, and how farmers are trying to adapt to an increasingly variable climate. (https://ccafs.cgiar.org/blog/climate-change-impacts-and-adaptation-story-my-nepalese-village#.WjLl-fVrxdg) The story won the Climate Change, Agriculture and Food Security (CCAFS) open blog competition for the South Asia region. Video viewing: Climate Change and Agriculture: Impacts, Adaptation, and Mitigation(https://www.youtube.com/watch?v=QAg-g5VhxGs) Assignment 1: Design Prepare a power point presentation that addresses the impacts of climate change on agriculture. Y ~~y~~ou should use resources from both suggested readings and alternative resources. Assignment 2: Using the internet, search for video clips addressing the impacts of climate change on agriculture (using your ~~solid~~ knowledge, decide which of these clips were more robust to you as agricultural specialist)

SD Pillars	environment	economy	social	culture

21st ESD	Learning to know (√)	Learning to be (√)	Learning to do (√)	Learning to live together (√)	Learning to transform oneself and society	Learning to give and share (√)

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sub goals	(√)	(√)			(√)			(√)		(√)					(√)		

Vision 2030	
Key Concepts	Adaptation, mitigation, deforestation, ecosystem

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Overview	Climate change will have far-reaching consequences for agriculture that will affect the poor. Greater risks of crop failures and livestock deaths are already imposing economic losses and undermining food security and they are likely to get far more severe as global warming continues. Adaptation and mitigation measures are needed urgently to reduce the adverse impacts of climate change, facilitated by concerted international action and strategic country planning. As a major source of greenhouse gas emissions, agriculture also has much untapped potential to reduce emissions through reduced deforestation and changes in land use and agricultural practices.
Aim	This module is designed to provide students with comprehensive knowledge and skills concerning climate change adaptation and mitigation approaches. This module examines issues related to adaptation responses and to the mitigation of greenhouse gases.
Learning Outcomes	At the end of this module participants will be able to: - Show understanding ofExamine adaptation and mitigation measures needed to reduce the adverse impacts of climate change on agriculture. - Explain the major source of greenhouse gas emissions, and how agriculture can help in reducing emissions through specific agricultural practices.
Units	Unit 2: Climate change adaptation Unit 3: Climate change mitigation
Readings	- Course Notes. - Tubiello, F. (2012). Climate change adaptation and mitigation: challenges and opportunities in the food sector. Natural Resources Management and Environment Department, FAO, Rome. High-level conference on world food security: the challenges of climate change and bioenergy, Rome, 3-5 June 2008. - Altieri, M. A., and Nicholls, C. I. (2017). The adaptation and mitigation potential of traditional agriculture in a changing climate. Climatic Change, 140(1), 33-45.
Activity	
	Brainstorming activity: This activity is designed to generate creative ideas about adaptation to and mitigation of climate change in agriculture through group discussions. Every participant will be encouraged to ~~think aloud and~~ suggest as many ideas as possible. Assignment 1: Similar to the ones introduced to you in the lectures; prepare a poster representing a mind map about several adaptation to and mitigation of climate change in agriculture techniques.

	-Video viewing: Linking Climate Change Adaptation And Mitigation In Agriculture And Forestry (https://www.youtube.com/watch?v=Y6UF9i7yllM)																	
SD Pillars	environment			economy			social			culture								
21st ESD	Learning to know (√)			Learning to be (√)			Learning to do (√)			Learning to live together (√)			Learning to transform oneself and society			Learning to give and share (√)		
SDGs Sub goals	1 (√)	2 (√)	3	4	5 (√)	6	7	8 (√)	9	10 (√)	11	12	13	14	15 (√)	16	17	
Vision 2030																		
Module 3	Sustainable agriculture and food security by production of crops under protected conditions																	
Key Concepts	Greenhouses, food scarce, sustainability and adaptation ,																	
Overview	Egypt has ~~is an~~ arid and semi-arid lands country, ~~which~~ coverings ~~an~~ area of about one million square kilometres in the north-east corner of Africa and Sinai Peninsula of south-west Asia. More than 100 million inhabitants now occupy only 5% of this area, which is mainly concentrated in the Nile Valley, the Delta and the coastal zone along the Mediterranean Sea. ~~Thus,~~ Egypt has one of the highest population densities in the world with an average of 2000 inhabitants per km^2. More importantly, Egypt is one of the countries that suffer severe salinity problems. For example, 33% of the total cultivated land, in Egypt (approximately 8-9 million feddans) is already salinized. This salinization is mainly due to low precipitation (<25 mm annual rainfall), high temperature, high surface evaporation (1500-2400 mm/year), poor drainage system with 98% of the cultivated land under irrigated, rising water table (less than one meter below the soil surface), and irrigating with low quality water (up to salinity of 4.5 dS/m). The reduction in production capacity of soils affected by salinity is about 30%, threatening the livelihoods of the poor farmers and having a significant negative impact on the food production of Egypt as a whole. Each year about 40000 ha of land becomes unavailable for agricultural production worldwide due to salinisation, and approximately 50% of irrigated lands are currently affected by salinity.																	

Commented [NK9]: Unclear where these are met from the learning outcomes in this module

Commented [NK10]: How? Gender equlity?

	Projected population and socio-economic growth will double current food demand by 2050. To meet this challenge in developing countries, cereal yields need to increase by 40 %, net irrigation water requirements by 40-50 percent, and 100-200 million ha of additional land may be needed. Food insecurity will continue to be a serious issue in coming decades. Despite significant projected overall reductions in hunger projected by the end of the century - from the current 850 million to about 200-300 million - many developing countries will continue to experience serious poverty and food insecurity, due to localized high population growth rates, poor socio-economic capacity and continued natural resource degradation. By the end of the century, 40 to 50 % of all undernourished are expected to live in sub-Saharan Africa. Projections indicate that MDGs SDGs for undernourishment will not be met, despite robust projected economic growth. Indeed, prevalence of hunger may indeed be halved, but not before 2030, unless additional policy measures are implemented. For limited cultivated land in Egypt, the Egyptian governorate established a huge project to cultivate 100,000 greenhouses to cover local and export demand
Aim	The overriding aim of this module is to turn students able to discuss the nature factors affecting production under greenhouses conditions. In addition to agriculture treatments use to increase the production yield.
Learning Outcomes	At the end of this module learners will be able to: - Identify ~~and discuss~~ the different factors affecting crops cultivated under greenhouses conditions. - Discuss how the some agriculture treatments can affect the yield production. - Discuss hHow the greenhouse gas can change the temperature - Show ability of grafting technique ~~and they could do that by themselves.~~
Units	Unit 3.1a: Production of warm and cool crops under greenhouses conditions to overcome food scarce Unit 3.1b: Production of grafted plant materials under greenhouses conditions to overcome biotic and a biotic stresses and to maintain~~s the~~ sustainability Unit 3.2: Greenhouse Gas Emission and Carbon sequestration: case study by increas number of greenhouses (National Project for establishing 100000 greenhouses in Eg
Readings	- Course Notes. - Easterling, W.E., Aggarwal, P.K. ,Batima, P.,Brander, K.M., Erda, L., Howden, S.M., Kirilenko, A., Morton, J., Soussana, J.-F., Schmidhuber, J. & Tubiello, F.N. (2007). Food, fibre and forest products. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of WG II to the Fourth Assessment Report of the IPCC, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, eds., Cambridge University Press, Cambridge, UK, 273-313. - Howden, M., Soussana, J.F. & Tubiello, F.N. (2007). Adaptation strategies for climate change. Proc. Nat. Ac. Sciences 104:19691-19698.

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	- Smith, P., Martino, D., Cai, Z., Gwary, D., Janzen, H., Kumar, P., McCarl, B. ,Ogle, S., O'Mara, F., Rice, C., Scholes, B. & Sirotenko, O. (2007). Agriculture. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. - IPCC. (2007). *Mitigation of Climate Change*. Assessment Report 4, Working Group III, Inter- Governmental Panel on Climate Change. - UNFCCC. (2007). Investment ~~And~~ and Financial Flows To Address Climate Change. UNFCCC, Bonn, Germany. - Climate change adaptation and mitigation: challenges and opportunities in the food sector. Food and Agriculture Organization of the United Nations (FAO) Natural Resources Management and Environment Department Rome, September 2012 - Pathak H, Aggarwal PK and Singh SD (Editors). (2012). Climate Change Impact, Adaptation and Mitigation in Agriculture: Methodology for Assessment and Applications. Indian Agricultural Research Institute, New Delhi. pp xix + 302. - Rosenzweig, Cynthia and Tubiello, Francesco Nicola, "Adaptation and mitigation strategies in agriculture: an analysis of potential synergies" (2007). *NASA Publications*. 25. http://digitalcommons.unl.edu/nasapub/25
Activity	1- Assignment 3.1: Training students on seedlings production under protected conditions The practical part in this course connected with the production of horticultural crops under greenhouses condition and media for production of young plants. Most economically important vegetable plants produced by planting young plants, which is now a big industry because of some advantages such as shorter growing season and more efficient use of land, improved crop uniformity, ~~,~~ more accurate prediction of harvest date, facilitatation ofes the use of a wider range of herbicides, extendings ~~s~~ the growing season, more efficient use of expensive hybrid seed. *Preparation and Introduction (15 minutes)* 1. Before students arrive, all materials will be prepared, including: seeds, planting trays, labels, markers, soil mix ingredients. 2. Each group of student~~s~~'s will get got one tray for sowing seeds that is appropriate for the crops they are going to plant. 3. When students arrive on the farm, they will be introduced to the operation with a general description of what is grown and how the food reaches the consumers. They took on a brief (5 - 10 minutes) tour to point out different crops and their different growth stages. *Making the Soil Mix (15 minutes)*

	1- The students showed what the prepared soil mix looks like and what it contains. Explain each ingredient's function and importance they got. 2- Cleaning the 209 or 84 -cells styrophom trays. 3- Mix the soil ingredients (peatmoss, vermiculite and perilite in 1:1:1 v/v/v) by a solution containing pesticide (Rizolex-T 50% WP). 4- They students demonstrated how to combine the ingredients to make a soil mix, they showed the proportions of each. The students asked to help add water while the lecturer demonstrated wetting and mixing the soil mix. 5- Addition a few chemical fertilizers, such as nitrate ammonium- sulphate potassium and calcium phosphate. 6- They students demonstrated how to fill the tray with mix in preparation for sowing. They asked to be sure to adequately fill and settle the soil mix within the trays. 7- Two of the students are asked to be responsible for the soil mixing process and instruct the other students to start filling the trays. Once the two students complete mixing, all of the students finished filling the trays with the newly made soil mix. 8- Each group of students asked to make up labels for their tray before sowing. They instructed to include the variety, species name, date and any other important information. *Sowing Seeds (15 minutes)* 1- The students are demonstrated how to sow the seed. 2- The students are informed how many seeds to place in each cell. 3- They are asked to start sowing. A and assist students as needed. 4- After every group has finished sowing their seeds, they are asked to place the trays in the selected area of the greenhouse. Demonstrated how to irrigate the trays, they showed how to be sure the trays are well soaked during the first watering. Also they showed how to water in the future by demonstrating on some more mature seedling trays in the greenhouse. 5- After the students are finished, they looked to a mature seedling tray and showed how the plants come out of each cell when the root development is strong and the plants are ready for transplanting. 2- Assignment 3.2: Training students on grafting process Concerning of vegetable grafting, the commercial use of vegetable grafting is a relatively recent innovation. Commercial vegetable grafting originated in Japan and Korea and was practiced for about 30 years. However, the technique is still limited in Egypt in on a commercial scale. Even though the benefits of using

	grafted plantlets are widely recognized, many other factors must be carefully considered to ensure successful cultivation and satisfactory income with this new technology. For example, generous use of chemical fertilizers and synthetic pesticides should be minimized for the production of environmentally friendly produces, in which interest has been exploding in recent years *Demonstration (10-15 min)* The invited person has experience in vegetable grafting to demonstrate to the students ~~showed the students~~ the grafting process as follows: After rootstock has fully developed cotyledons and scion has cotyledon and first true leaf, plants are pulled out from the tray and laid on a table (before doing the grafting, trays should be watered heavily). She started to cut an angle (35° to 45° angle) into the hypocotyl of rootstock approximately halfway with a razor blade and make an oppositely angled cut on the hypocotyls of the scion. These cuts need to be made so that the scion will be on top of the rootstock when completed. Two cut hypocotyls are placed together, then sealed with aluminum foil to help healing and prevent the graft from drying out. The two plants are then transplanted into a seedling tray with bigger cell (49 cells) that will accommodate the two root balls. Grafted plantlets are then watered heavily until soil is completely wet. The grafting seedling placed under plastic tunnel in the healing chamber under optimum temperature (25-30°c) and humidity (>85% RH). *Student's responsibility (50-60 min)* The demonstrator asked each student to graft a scion onto rootstock as showed. The demonstrator evaluated each student work. She asked the students to irrigate the trays only as needed. After five days she came again to train the students how to cut the top of the rootstock and the bottom of the scion. 3- Assignment 3.3: Collecting materials and preparing a report on advantageous and disadvantageous of protected cultivation under Egyptian conditions.
SD Pillars	Environment: This module dealing with environmental issue by overcomes the effect of high and low temperature degrees using cultivation under greenhouses conditions. Also, the production of grafted plants are useful ~~in~~ to overcome biotic and a biotic stresses such as heat, salinity, draught, diseases..etc which decrease ~~the~~ environmental pollutions caused by high application of pesticides. Economy:- Production of crops under protected greenhouses will increase the soil productivity by Optimal use of cultivated area by vertical expansion. Availability of production at times other than the specific planting dates for each crop. Crop production at times other than planting dates can be high prices and can be exported abroad to bring other currency such as dollars and EUR. Also, production of grafted plants could be decrease the amount of pesticide and increase the yield at the end. Social: Agriculture under protected greenhouses will provide new employment opportunities for young people and thus change their social status. Agriculture in greenhouses changes the economic lifestyle of farmers which positively affects

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	their social life. Such as renovating farmers' homes or marrying young people…..etc. Culture: Agriculture under protected greenhouses will change agricultural culture by learning new agricultural processes and the presence of new crops under the conditions of villages where protected farming communities are spread will change the food culture of the region.
21st ESD	- In this module the students should be learning to know the constriction of greenhouse and how to handle the plants inside it. Also, the students should be learning to know the effect of environmental factors on crops inside greenhouses - In this module we expect that the students should be learning to be an expertise in the field of cultivation under greenhouse conditions. - The students should following the treatments inside the greenhouses which decrease the use of pesticide and how to graft the seedlings with high experience. - The students asked during this module to have an activity in their society to change their behaviors such as how to treat the plants to decrease the pesticide and should explain the advantageous of the grafted plants in comparison the un-grafted one.
SDGs Sub goals	- End poverty - End hunger, achieve food security and improved nutrition and promote sustainable agriculture - Ensure availability and sustainable management of water
Vision 2030	
Module 4	Production of healthy grains and fruits by application of organic fertilizers and other safe treatments using modern irrigation systems
Key Concepts	Chemical , organic and bio- fertilizers,
Overview	The excessive applications of chemical fertilizers, especially nitrogen, contaminate the soil and reduce the possibility of future use in food production. In the last decade, great efforts have been directed to overcome the problem of excess of chemical fertilizers which caused soil pollution. Fortunately under such conditions, it has become essential to use the untraditional fertilizers as a partial substitute or supplement for chemical fertilizers, reduce the costs of produced yield and environmental pollution as well as increase production and improve quality of field and horticultural crops such as Plant Growth Promoting Rhizobateria (PGPR) and Salicylic acid. This module will introduce students to the whole cultivation process to keep the soil with less contamination from inorganic fertilizers such as nitrate and with application of safe materials using modern irrigation systems to have high grain and fruit yield with high quality. Questions to be addressed in this module are: How you can describe the production of field as well as horticultural crops for high fruit yield and quality? What is the agricultural treatment or safe materials could reduce the pesticides and inorganic fertilizers use?

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	What are the agricultural treatments or safe materials could increase plant resistance to a biotic stresses?
Aim	The overriding aim of this module is to ~~e~~Enhances understandings on how the students can produce field and horticultural crops with high yield and quality under extreme temperature degrees to meet the circumstances of CCSAFS.
Learning Outcomes	By the end of this module learners will be able to: Identify the factors affect the yield and quality under unsuitable climate conditions. ~~Show~~ Understand~~ing~~ of the role of safety chemicals and fertilizers for production high yield and quality of field and horticultural crops under varying climate conditions ~~to meet the circumstances of CCSAFS~~. Appreciate the advantages of modern irrigation systems for decreasing water amount and increase the soil fertility.
Units	Unit 4.1a: Changing kind and rate of organic and chemical fertilizer to maintain grain or fruit quality (field trip) Unit 4.1b: Changing amounts and timing of irrigation and other water management using sprinkler and drip irrigation systems (field trip) Unit 4.2a: Altering the timing or location of cropping activities (field trip) Unit 4.2b: Application of safe materials to overcome biotic and abiotic stresses
Readings	- Course Notes. - Bakkegaard, R.K; L.R. M○ller and F. Bakhtiari. Adaptation and mitigation in agriculture and forestry. For more on the Climate Resilient Development (CRD) programme, see http://www.unepdtu.org/What-We-Do/Thematic-Programmes/Climate-Resilient-Development
Activity	Overview 1- Assignment ~~2~~T.1: Training students on application of chemical as well as organic fertilizers *Preparation and Introduction (15 minutes)* 1- Before students arrive, all types of fertilizers will be prepared, including: chemical and organic fertilizers. 2- They students are introduced to the advantages and disadvantages of as well as the importance of each type of fertilizer. *Student's responsibility (30-40 min)* For applying ~~of~~ fertilizers, the students are shown educated how to apply fertilizers such as chemical and organic fertilizers. They will be divided into four groups ~~to for~~ apply~~ing~~ complete organic fertilizer or PGPR strains, chemical

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	fertilizers, half dose of chemical plus half dose of organic fertilizers and ¾ dose of chemical and ¼ of organic fertilizers. Assignment 4.2:Training students on the application of safe materials for increasing use efficiency of chemical fertilizers such as Salicylic acid It is well reported that foliar application of SA improved photosynthetic characteristics of plants and increased salt tolerance by increasing antioxidant metabolism. The students will establish an experiment under hot summer season using tomato plants. Salicylic acid dissolved in a few drops of dimethyl sulfoxide and the final volume was reached using distilled water. The pH was adjusted with KOH (1.0 N) to a value of 7.0. All sprays well in the morning (8:00-9:00 a.m.). The students will be divided in ~~t~~o two groups for establishing two experiments: the first ~~one~~ examines the response of three genotypes with different resistance to heat stress, and the second experiment examines the effect of application of different salicylic acid levels such as from 0.0 to 100 µM.
SD Pillars	Environment: This module dealing with environmental issue by decreasing use of chemical fertilizers and low ground water pollution~~s~~. Use of safe materials will decrease the use of pesticides. Economy: ~~-~~Agriculture using organic fertilizers and safe substances leads to reduced human health costs. Health food has a positive effect on the daily human activity ~~of man~~ which in turn leads to an increase in working hours and increase yield production. Social: Increase the value of caring for animal husbandry and preserving farm residues to provide organic fertilizer Culture: Organic agriculture will change food culture directed to healthy food and sound attention to healthy food, which will raise the economic value of agricultural products.
21st ESD	- In this module~~, S~~students should know the value of organic manure and confiscate the different - characteristics of organic agriculture - how to add organic manure and bio fertilizers. Also, the students should learn the advantage~~ou~~s of modern irrigation systems. - Students should learn to be encouraged to use organic and biological fertilization and to use safe substances. Students should learn to be encouraged to switch from irrigation system to drip irrigation systems and spray to provide water, improve productivity and soil fertility. - Students must learn to live with the culture of clean organic farming and transfer this culture after being convinced to their communities. - Students must learn to ~~do how to~~ prepare organic fertilizer~~s~~ and ~~how to prepare~~ a drip irrigation network - Students should learn to give and share information about clean, organic and bio-farming, and about modern irrigation systems - Students must learn to transform self and society in the direction of clean agriculture in order to protect the health of the individual and society
SDGs	- End hunger, achieve food security and improved nutrition and promote sustainable agriculture

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Sub goals	- Ensure availability and sustainable management of water
Vision 2030	
Module 5	Introduce new genotypes and lines to overcome climate change and a biotic stresses
Key Concepts	Genotype selection, evaluation, diversity, new lines, high temperature, salinity, draught.
Overview	The crop improvement is dependent upon the availability and use of genetic diversity. There is a continual need for a greater understanding of the extent of genetic diversity and the nature of genetic relationships within germplasm collection. More accurate and complete descriptions of genotypes and patterns of genetic diversity could help determine future breeding strategies and facilitate introgression of diverse germplasm into the current commercial genetic base
Aim	The overriding aim of this module is to enhances understandings on how the students can evaluate the response of the local genotypes, new genotypes and strains produced from *in vitro* culture protocol to temperature diversity to produce high yield as well as to use *in vitro* culture technique to produce new lines tolerate high temperature degrees as well as other a biotic stresses such as salinity and draught ~~to meet the circumstances of CCSAFS~~.
Learning Outcomes	At the end of this module learners will be able to: - Evaluate new genotypes and strains to overcome ~~a~~ biotic stresses. - Identify the advantage~~ou~~s of in vitro culture technique for producing strain lines tolerate heat stress with high fruit yield and quality to meet the circumstances of CCSAFS.
Units	Unit 5.1a: Use genetic diversity within local germplasm to find more tolerate genotypes for hot as well as other a biotic stresses. Unit 5.1b: Introduce new imported varieties and genotypes tolerate biotic and abiotic stresses *Unit 5.2:* Use *in vitro* culture technique to produce new lines carrying biotic and abiotic stresses.
Readings	- Course Notes. - Barkmann, T.; R. Siebert and A. Lange. (2015). Climate change adaptation and mitigation in agriculture, forestry and water management at the regional scale. Outlook on AGRICULTURE Vol 44, No 4, 2015, pp 257-265 doi: 10.5367/oa.2015.0220
Activity	Overview 1- Assignment 5.1:Evaluate different genotypes under hot temperature The students will establish an experiment under normal and hot summer season using different genotypes of such crop . Collecting data on vegetative, flowering and yield

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	during growing season. Analysis the collected data to compare among tested genotypes grown under different conditions. 2- Assignment 5.2: Production of tissue culture lines to overcome abiotic stress The students will prepare a medium containing auxin such as 2,4-D with different concentrations to cultivate different explants from wheat, rice and tomato plant for callus production. The students will transfer the callus to different medium to get plantlets from callus. The students will evaluate the plantlets morphologicalymorphologically and genetically under greenhouse conditions using different stresses (drought, heat and salt).
SD Pillars	Environment: This module dealing with environmental issue by production of new lines overcome the diverse in temperature and draught and salinity tolerant Economy:- The production of new lines reduces the material costs borne by Egypt in the purchase of new varieties from foreign countries. Cultivation of new lines in new lands with a salinity problem increases the cultivated area, which helps in the provision of food in part Social: Cultivate new spaces that increase employment and build new communities Culture: Cultivation of new areas affected by salinity will change the culture of farmers with the value of these lands and will lead to cultivation of these lands with non-traditional crops such as Aspargas.
21st ESD	- In this module, Sstudents should know Knowledge ofthe properties of saline-affected land - Determination of crop classification by salinity tolerance and plant resistance mechanism for a biotic stresses. - Students should learn to be Students must learn to be able to cultivate saline tolerant lands and to select crops and varieties capable of coping with climate change - Students must learn to live with the problems of temperature deviations and produce a crop of uncultivated land and learn how to overcome their problems - Students must learn to do all the agriculture treatments that could be enhanced the yield production. - Students should learn to give and share information on affected lands by salinity or draught and how to solve their problems. - Students must learn to transform self and society in the direction to use the marginal lands and to cultivate crops during the very hot season.
SDGs Sub goals	- End poverty - End hunger, achieve food security and improved nutrition and promote sustainable agriculture - Ensure availability and sustainable management of water
Vision 2030	
Module 6	Changes in Arthropod pests Phenology

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Key Concepts	Phenology , Migration, Athropoda and Natural enemies
Overview	We begin~~ing~~ our discussion with two challengingdifficult questions: What are the arthropod pests , and what is a Phenology? At first these questions seem easy. Anyone, after all, can tell the relation between the climate change and pests, or impact of climate change on arthropoda . However, absolute definitions are not nearly as easy. Questions to be addressed in this module include the following: Why study Insect Migration? What are the insects Adaptation and mitigation?.
Aim	The overriding aim of this module is to turn students able to discourse on complex balance of phenology. How climate change could impact plant pests management practices.
Learning Outcomes	At the end of this module learners will be able to: • Describe and install of the Phenology • Evaluate and compare crop pests and climate change and risk. • Recognize insects adaptation and mitigation
Units	Unit 1.1 what is Phenology? Unit 1.2: Effect of climate change on insect migration Unit 1.3: Impact of climate change on pests adaptation and mitigation
Readings	Whitney, S, J. Whalen, M. VanGessel, B. Mulrooney. 2000. Crop Profile for Corn(sweet)inDelaware. http://www.ipmcenters.org/CropProfiles/docs/DEcorn-sweet.html Shelton, A.M., W.R. Wilsey, and D.M. Soderlund. 2001. Classification of insecticides and acaricides for resistance management. Dept. of Entomology, NYSAES,Geneva,NY14456.315-787-2352. http://www.nysaes.cornell.edu/ent/faculty/shelton/pdf/res_mgmt.pdf
Activity	Overview Assignment 1: The scientific study of some crop pests Students are askedYou will be observingto prepared slides and living specimens using the compound light microscope. Insects and spiders representing each of living organisms are available. They should prepare a Your lab report ~~should~~that includes microscopic drawings and answers to the questions found at the end of the lab. D ~~Your d~~rawings should be complete~~d~~ with titles, magnification and labels. Students are asked to D~~d~~raw the cells you observe at a magnification that best represents the cell or organism. ~~It is always helpful to use your book, lab manual, or other reference material while making observations and writing up your lab report.~~

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	Assignment 2: Changes in insect phenology can be studied through long-term experiments with variable sowing dates for observing the appearance of pests on crops. Likewise, the timing of arrival of insect species can also be recorded through light traps, suction traps or pheromone traps. Analysis of long-term data on phenology would reveal changes in the timings of pest appearance under the climate change. Assignment 3: Design a power point presentation that addresses the Phenology and relation with pests you should use resources from both suggested readings and alternative resources Assignment 4: Brainstorming activity: This activity is designed to generate creative ideas about Adaptation , mitigation of pests in ~~and~~ relation with climate change in agriculture through group discussion. Every participant will be encouraged to think aloud and suggest as many ideas as possible.

SD Pillars	environment	economy	social	culture
21st ESD	Learning to know (√)	Learning to be (√)	Learning to do (√)	Learning to live together (√)	Learning to transform oneself and society (√)	Learning to give and share (√)

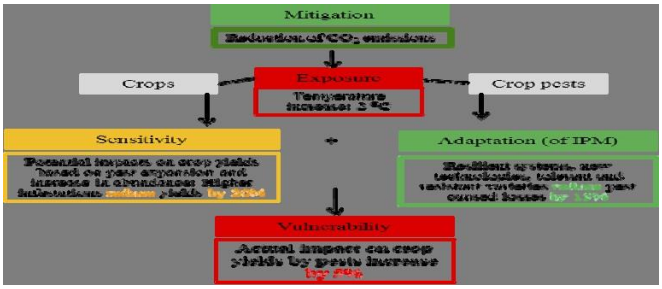
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sub goals	(√)	(√)		(√)		(√)		(√)		(√)			(√)		(√)		

Vision 2030	
Module 7	Pest Managements strategies in the face of climate change
Key Concepts	Diversity, Climate change- pest Management

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Overview	Integrated Pest Management (IPM) is a systematic plan which brings together different pest-control tactics into one program. It reduces the emphasis on pesticides by including cultural, biological, genetic, physical, regulatory, and mechanical controls. To carry out an IPM program, you need to scout and monitor your fields, recognize abnormal conditions and identify their causes, understand the different control methods available, and determine the economic costs and climate change effects. A good IPM program requires planning, monitoring and evaluation finally Adaptation of integrated pest management to future pest risks. Climate change will expose crops and pests to higher temperatures. Predictions until the year 2050 assume an increase of 2°-3°C, if CO_2 emissions cannot be reduced (Fig. 1)  Fig1: Reducing crop vulnerability to new and emerging pests by adaptation of IPM. Figures given on yield reductions are only examples to highlight the importance of adaptation in order to reduce the magnitude of higher pest infestations due to climate change.
Aim	The overriding aim of this module is to the climate change and Pest Managements strategies
Learning Outcomes	At the end of this module learners will be able to: • Apply ~~that knowledge as they~~ practice control pests in the field • Explain the evolution Arthropod diversity and extinction • Recognize of some meaning like IPM
Units	Unit 2.1: Change geographic distribution and population dynamics of insect pests.

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	Unit 2.2: The Diversity of Arthropods Unit 2.3: Effects on expression of resistance . Unit 2.4: Adaptation of integrated pest management to future pest risks.
Readings	Joshi S and Viraktamath C A 2004.The sugarcane woolly aphid, Ceratovacuna lanigera Zehntner (Hemiptera:Aphididae): its biology, pest status and control. Current Science, 87: 307-316. Kaiser J 1996.Pests overwhelm Bt cotton crop. Nature 273 :423. Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. FactSheet. http://www.climateandfarming.org/clr-cc.php 2) Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. Powerpoint file. http://www.climateandfarming.org/clr-cc.php 3) Wolfe DW, L Ziska, C Petzoldt, A Seaman, L Chase, K Hayhoe. 2008. Projected change in climate thresholds in the Northeastern U.S.: implications for crops, pests, livestock, and farmers. Mitigation and Adaptation Strategies for Global Change. 13:555-575 , eds.,New York: CAB International,2000 Website http://animaldiversity.ummz.umich.edu/site/index.html
Activity	Assignment1: Each learner carries out several tasks and the results are shared in a collaborative learning project. Task 1: research on integrated pest managements Task 2: 300-word summary of each control, including defenders (authors), period, application, several examples, and limitations of the control Task 3: sharing by email or through a forum, chat room, or mailing list Task 4: shared two-page paper Task 5: production of a reflective report. For example: task 5 Each member of the group produces a reflective report that answers the following ,questions, among others:

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<table>
<tr><td></td><td colspan="17">- What have I learned about the design, technical aspects, and individual and group organization of work in collaborative learning?
- How did I learn?
- What helped me to learn?
- How much time did I spend on this activity?
Assignment 2:
Design a plan taking into consideration As a group of organisms is being classified, each sorting stage gives us a new level in the system of classification. At the first level, sorting results in the kingdom level, for instance' animal' kingdom or' plant' kingdom. The groups that result from the second sorting make up the phylum level, the third sorting gives us the class level and further sorting gives us the order, family, genus and species levels in turn. In this way most organisms are sorted into plant and animal kingdoms. Animals can then be classified into a number of phyla and each phylum in turn may then be classified into several classes, each class into several orders and so on. As we do this and move from a higher to a lower level of Classification, we find the animals in groups become more and more alike in structure</td></tr>
<tr><td>SD Pillars</td><td colspan="4">environment</td><td colspan="3">economy</td><td colspan="4">social</td><td colspan="6">culture</td></tr>
<tr><td>21st ESD</td><td colspan="3">Learning to know (√)</td><td colspan="3">Learning to be (√)</td><td colspan="3">Learning to do (√)</td><td colspan="3">Learning to live together (√)</td><td colspan="3">Learning to transform oneself and society</td><td colspan="3">Learning to give and share (√)</td></tr>
<tr><td>SDGs
Sub goals</td><td>1
(√)</td><td>2
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(√)</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15
(√)</td><td>16</td><td>17</td></tr>
<tr><td>Vision 2030</td><td colspan="17"></td></tr>
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Comments on the overall course:

1) The ECTS Student Workload Rubric for Assessing ECTS Integration in Course Curriculum is missing

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ECTS and workload. This course is 8 ECTS

- Reaching the learning outcomes of a course and course modules is directly linked with the *workload* of a course (based on ECTS).
- Workload refers to the expected time an average student might need to complete the required learning outcomes.
- Student workload covers all educational components of a study program (attending lectures, face-to-face and/or online, seminars, reflections, work placements, dissertations, projects, laboratory work, self-study and examinations). Student workload covers all aspects of learning and is not related solely to formal teaching hours.
- It is very critical to weight each component in line with the learning objectives and outcomes, in total and separately for each course module.

That said, there is not rubric for the ECTS that shows this!

You should include an ECTS Student Workload Rubric for Assessing ECTS Integration in CCSAFS Course Curriculum

The workload is divided into a series of learning components, each involving an estimated number of hours of work (time factor). The total workload should match the learning hours indicated by the credit value of the course and be consistent with the rubric.

ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face to face)										
Online										
Lab work										
Reading articles (3 pages per hour)										
Reading book chapters (5 per/h)										
Preparing course activities										
Project work										
Preparation for exam										
Writing the exam										
Total										

Be careful on the following:

a) Alignment: The allocation of student workload should match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.

b) Balance: There should be strong evidence that the distribution of the working hours is done appropriately between the course modules.

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c) Coverage: The allocation of student workload should match up well with course activities and assessments.
d) Communication: There should be strong evidence that the student workload allocation is clearly understood and communicated to students.
e) Monitoring: There should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

2) CCSAFS Community-Based / Service Learning Activity

There are different activities in the course, but none of them is carefully designed to reflect a community-based / service learning perspective. To improve the activities described:

a) The connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.
b) The activity should meet an actual need in the community and is coordinated through collaboration with the community.
c) The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
d) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

I have provided you with a clear checklist that summarizes all the above-mentioned points. Please try to re-think the activities as suggested.

3) SDG Rubric

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I have provided you with a summary table where you can do these connections. It is not clear in your modules. Please follow the same format.

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Course Syllabus

~~Course Name:~~ GIS & RS Applications in Climate Change, Sustainable Agriculture and Food Security

Suez Canal University, Faculty of Agriculture, Spring Semester, 2018

Instructor Information

Instructor: El-Sayed Ewis Omran, Professor
Office Location: Suez Canal University, Faculty of Agriculture
Telephone: …….
Office Hours: ……
E-mail: ee.omran@gmail.com
Website: ……

Course Identification

Course Number: …….
Course Name: GIS & RS Applications in Climate Change, Sustainable Agriculture and Food Security
Course Location: …….
Class Times: Will be identified for each semester
Prerequisites: ……..
Faculty Web Page:

Course Description/Overview

This course focuses on the geographic information systems technology (GISs) and remote sensing (RS), which ar~~e~~ a powerful data visualization, data analysis, and image processing tools. This course is designed to introduce students to advanced concepts of geographic information science in climate change, sustainable agriculture and food security for the purpose of spatial analysis and geo-visualization of environmental issues. Students will learn to understand and apply GIS and RS technologies and methodologies to important topics in environmental studies. Students will learn the fundamentals of mapping, photogrammetry, GIS, and RS. Students will learn to acquire and prepare data for analysis related to environmental research, model and analyze data, and interpret and map environmental data they might encounter in their careers. Students will also read, assess, and discuss peer-reviewed literature to become ~~exposed to~~familiar with the latest methodologies and techniques to examining environmental issues.
Topics ~~may~~ include exploring geoscience methods, geoscience methods for climate change, sustainable agriculture and food security, casting climate variability and change, relating information from different sources, data collection for environmental management, water footprints, irrigation and groundwater mining, impacts of land use, soil characteristics and their relationship to land use practices, predicting the effects of climate change on soil loss, global food security, systems thinking and the wicked problem of global food security, climate change and food security.
The course is designed to MSc students from Faculties of Agriculture and Science.

Course Learning Objectives

By the end of this course, students ~~you~~ will be able to:

- Identify GIScience concept and how it is used to gather, manage, check, process, analyze, model, and interpret environmental spatial data.

- ~~Provide students with~~learn scientific knowledge and practical experience of geographic information systems technology and remote sensing.
- Evaluate environmental GIS data and information produced by government agencies, industry, academia, and popular media
- Identify environmental spatial data needed for particular tasks used in climate change, sustainable agriculture and food security
- Use commonly available GIS and remote sensing software (e.g. ArcGIS, Google Earth) to view, assess, and present spatial datasets (e.g. shapefiles, satellite imagery).
- Develop, analyze, and produce research to apply GIS and RS in climate change, sustainable agriculture and food security
- Present products of their environmental analyses in written and oral/visual form as maps, interactive graphics, videos, etc.

Course Content Learning Outcomes

1- Knowledge and concepts:

- Describe the fundamental concepts of Geographic Information Science and Technology.
- Demonstrate proficiency in the basic functions of QGIS, SAGA, and ArcGIS Pro software.
- Give an overview of remote sensing instruments and platforms, ENVI software, as well as analysis and visualization methods in GIS

2- Intellectual and mental skills

- Display own results and ~~identifies how to~~ write ~~a~~ scientific reports ~~out of these results~~.
- Demonstrate awareness of fundamental remote sensing and spatial analysis techniques.
- Carry out digital image processing of remote sensing data with analysis and visualization in GIS.

3-Professional and practical skills:

- Apply good practices in GIS and RS software.
- Demonstrate basic proficiency in map creation and design principles, including thematic map display, employment of map projections, and cartographic design.
- Demonstrate proficiency in the creation and acquisition of spatial data.
- Perform different analysis (e.g. raster and vector models, geoprocessing problems, sampling design with GIS, vegetation indices in RS, optical RS, and classification).
- Execute a project based on remote sensing and GIS.
-

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4- General and transferable skills:

- Communicate effectively with others
- Use appropriate audiovisual aids in a presentation
- Deal with information and interpret phenomena verbally by report writing
- ~~Write and speak English language well~~
- ~~Capable for~~Improve self- assessment
- Identify the personal learning needs
- Define~~d~~ rules for assessing the performance of others
- Develop indicators for assessing the performance of others
- Work in a team and understand group behavior
- Manage ~~with~~ time efficiently
- Demonstrate self and continuous learning

Course Resources

Course Website(s)

Websites and Internet articles

1. http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html

2. ESRI, 2013. ArcGIS II: Essential Workflows (Student Edition), ESRI Press, Redland, California.
A. ENVI and ENVI EX, http://www.ittvis.com
B. ESRI website: http://www.esri.com
C. ESRI ArcLessons: http://gis2.esri.com/industries/education/arclessons/arclessons.cfm

Required Course Texts and Materials

- PowerPoint presentations prepared by the instructor for the participants.
- Hand outs will be distributed at the beginning of each lecture.
- Hands-outs prepared by the instructor for the class

Textbooks:

1. Bolstad, P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition), Eider Press, White Bear Lake, Minnesota. (http://www.paulbolstad.net/gisbook.html).
2. Remote Sensing for GIS Managers. By Stan Aronoff. ESRI Press, 2005.
3. Bolstad, P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition), Eider Press, White Bear Lake, Minnesota. http://www.paulbolstad.net/gisbook.html
4. Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition, McGraw Hill, New York.
5. MANUALS: 1. ENVI and ENVI-EX Tutorials (available online)

Other equipment/software/websites/online resources
This course requires the use of the following software: ArcGIS Pro
Google Earth
Optional software requirements: R, QGIS

Assignments and Grading Scheme

Writing assignments are required and may include, but are not limited to, the following:

I. Writinge short answer responses given questions related to remote sensing.
II. Documenting the workflow involved in acquiring and processing earth images for data analysis appropriate to intended users..
III. Writinge and then presenting a final semester project, which includes a demonstration of problem solving and incorporates imagery acquisition, data processing and formal written presentation.

Assignments and Grading Scheme
Grading System
0 to 10 (where 5 is the least pass mark)

Grading Policy
Grades can be based on the following: (Example)

Final Examination	50%
Oral Examination	5%
Mid-Term Examination	5%
Semester Work	5%
Practical Examination	15%
GIS project	20%
Class participation	
Total Points	100

Course Policies

Late Assignments
It is essential that papers and ~~other~~ assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come to ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation, which counts for 20% of the grade.

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Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Course Schedule

Week	Date	Topics, Reading, and Assignments (Details on assignments and more bibliography are available in the course modules)
1		Exploring Geoscience methods
2		Introduction to Geoscience methods and climate change
3		Introduction to Geoscience methods and sustainable agriculture
4		Introduction to Geoscience methods and food security
5		Forecasting Climate Variability and Change: A Matter of Survival
6		Relating information from different sources
7		GPS data collection for environmental management
8		What is Sustainability in the Context of Water? Water Footprints
9		Irrigation and Groundwater Mining
10		Impacts of Land Use
11		Soil Characteristics and Their Relationship to Land Use Practices
12		Predicting the Effects of Climate Change on Soil Loss
13		Systems Thinking and the Wicked Problem of Global Food Security.
14		Climate Change and Food Security
15		Oral and Final Examination

Course	GIS & RS Applications in Climate Change, Sustainable Agriculture and Food Security
Module 1	Introduction and definitions of key concepts
Key Concepts	Geoscience, Climate change, Sustainable agriculture, Food security
Overview	The module is designed to introduce students to geoscientific thinking and to utilize these techniques in solving a climate change, sustainable agriculture and food security problem through a systems approach. Parts of this module may be done outside of class time and some aspects (e.g., parts of Unit 2 and much of Unit 3) may be adaptable to online use. Climate change, sustainable agriculture and food security are problems that were chosen as the vehicle for exploring the methods of geoscience owing to the importance of the topic for society and because of the tremendous volume of data available for building lessons and activities. This module gives students the opportunity to use and reflect on geoscientific thinking. The module begins with an exploration of how geoscience methods are similar to and different from the stereotypical experimental scientific method. Then, students use methods of geoscience (e.g., systems thinking, multiple converging lines of evidence, developing spatial and temporal frameworks) in a data-rich, interdisciplinary exploration of the human impacts of global climate change. They will use spatial and

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	temporal data, data visualizations and Google Earth to address the climate change, sustainable agriculture and food security problem. Finally, students explore high-quality, freely available curricular resources to develop a standards-based, interdisciplinary lesson that embeds geoscientific thinking and content as part of biology, chemistry, Earth science, physics or social science instruction. The module can be taught in 6-12 hours of class time, plus substantial homework (how many hours. This is part of the ECTS).
Aim	Students explore geoscientific thinking in comparison to the generalized (experimental) scientific method, investigate global climate change and its impact on human systems, explore high-quality resources for geoscience, and prepare interdisciplinary lessons that address geoscience methods and content along with other scientific or social science content.
Learning Outcomes	At the end of this module learners will be able to: • Develop a deeper understanding of the process of science and how to foster that understanding in their students • Engage in a data-rich activity that is well-aligned with the Next Generation Science Standards • Make an argument about the development of coastal communities based on evidence from sea level rise and tropical storm intensity • Become familiar with high-quality, online resources
Units	• Unit 1.1: Exploring Geoscience methods • Unit 1.2: Introduction to Geoscience methods, sustainable agriculture, climate change and food security
Readings	• Quantitative Remote Sensing in Thermal Infrared (2014) Tang, Huajun, Li, Zhao-Liang • Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition, McGraw Hill, New York. • DeMers, M. N. 2009. Fundamentals of Geographical Information Systems, 4th Edition, John Wiley and Sons. • Gorr W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press.
Activity	[Overall Time: 20 hours] Activity 1 [Time: 600 minutes] Linked to Learning Outcome Motivates and engages students through the issue of climate change in a socio-scientific context. This activity first assesses students' prior knowledge and then familiarizes students with a data-rich, interdisciplinary exploration of the human impacts of global climate change by watching a video about climate change, analyzing CO_2 and temperature data, and critically reading an editorial about Hurricane Sandy. By the end of this activity, students will be able to: • Describe climate change and its impact on the human-built systems such as coastal communities. Description and Teaching Materials *Materials:* Provide students with the After the Storm handout (student directions) (Microsoft Word 2007 (.docx)) or the electronic version of the student page. Provide students with Table 1: The Issue from the Tables 1, 2, and 3 (student work) (Microsoft Word 2007 (.docx)). NOTE: If you print Table 1, it may need to be expanded so that students have more room to record their responses. Another suggestion is to use Google Docs. Students then can share and edit the document with all group members. Other materials for Activity 1 include the following: • Environmental Protection Agency (Climate Change Indicators in the United States) (Acrobat

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(PDF))
- Rising Sea Levels
- Earth System Research Laboratory (Trends in Atmospheric Carbon Dioxide)

Students should also have a print copy of After Sandy: Why We Can't Keep Rebuilding on the Water's Edge, an article from *Time* magazine.

Activity Outline:

Interpret Air Temperature and CO_2 Data (200 min)

First, display (e.g. a projector) the temperature and CO_2 data using the links below. For each data set, have students record and analyze the air temperature and CO_2 data in the "observed" row of Table 1: The Issue (OWL chart). The instructor should guide what data sets students record and analyze in Table 1. In the second row of the OWL chart, have students record what they "wondered" regarding both data sets. If students do not elicit a possible correlation between the data sets, then it is recommended that the instructor prompt them to do so.

- Environmental Protection Agency: Climate Change Indicators (Acrobat (PDF)): Use figures 1, 2, and 3.
- Earth System Research Laboratory: Trends in Atmospheric Carbon Dioxide: Examine all tabs.

Watch the Video: Rising Sea Levels (200 min)

Next, have students watch Rising Sea Levels. This engaging and dramatic ~~6~~six-minute video highlights the effects of climate change on coastal communities. As students watch the video, have them record what they "observed" and "wondered" in the first column of Table 1: The Issue (OWL chart). Then, discuss their responses with the class.

Read the Editorial: After Sandy, Why we Can't Keep Rebuilding on the Water's Edge (200 min)

Finally, give students a hard copy of a short editorial from *Time* magazine titled: After Sandy: Why We Can't Keep Rebuilding on the Water's Edge, by Brian Walsh. You may also choose other motivating articles (see resources below) for students to read. As they read the article, have them complete the third column of Table 1: The Issue (OWL chart). Again, students record what they "observed" and "wondered" about. Then, students discuss their responses with the class.

Activity 2.1 Formative Assessment [Time: 600 minutes] Linked to Learning Outcome

To conclude, have students record what they learned from the video, the article, and the data in the in the second to last row of Table 1. Discuss their responses with the class.

Note: The entire OWL chart is really one large formative assessment, not just the last row. However, this row will provide the instructor with information about students' overall knowledge and understanding of the topic before they conduct their research and help the instructor identify possible student misconceptions.

In addition, have students describe what they feel is their "muddiest point" about the data (e.g., Does an increase in global CO_2 concentration increase global air temperature?). This will provide the instructor with evidence of what students do and do not understand.

Teaching Notes and Tips

The following modifications can save in-class instructional time:

Have students complete the first row of Table 1 as well as the "observed" and "wondered" rows of Table 1 independently outside of class. Then, review students' responses in class. It is suggested to complete the "Learned" row of Table 1 and the muddiest point in class. This adjustment could save 40 minutes of class time.

Module 1	Time-load
Directed Learning Online - Viewing presentations and reading articles	3 hours

as specified in the activities	
Dynamic Interaction online □ Discussing or engaging with the e-tutor and/ or peers	1.5 hour
Assessment □ Individual and Group Contributions and Discussion Forum [Note: Time allowed for preparing Assessment work can vary from 1-7 hours on average per module]	Expected from 25-55 hours for this module, as the student may be directly working on the creation of for assessment.
Independent Learning □ Private online or offline engagement with readings, peers or experts [Note: Time available to spend on Independent learning can vary from 7-30 hours in final weeks]	At the discretion of the student
Total Time for Module 1	Approximately 29.5- 59.5 hours required for engagement within this module, plus an additional 7-30 hours for independent learning at your own discretion.

SD Pillars	environment			economy				social			culture					
21st ESD	Learning to know □			Learning to be □			Learning to do □			Learning to live together □			Learning to transform oneself and society □			Learning to give and share □
SDGs Sub goals	1	2	3	4 □	5	6	7	8	9 □	10	11	12	13	14	15	16	17
Vision 2030	Through a systems approach, geoscientific thinking techniques utilize solving a climate change, sustainable agriculture and food security problem. This will ensure that all economic, social and technological progress occurs in harmony with nature.															

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6 h	**4.5 h**	**2h**	**11 h**	**36 h**	**-**	**-**	**-**	**59.5**

Key Concepts	GIS, Climate variability, Climate data, Climate change survey, Data collection
Overview	In this three-week module, students use QGIS to explore short-term climate variability resulting from atmosphere-ocean-ice interactions. The module promotes awareness of past and contemporary cultures and regions strongly affected by permanently altered or increasingly uncertain climates as students consider human adaptation to climate fluctuations. Students investigate the dynamics and impacts associated with climate variability by examining and analyzing atmosphere, and ocean data; completing a series of readings; and engaging in group discussions. Materials and teaching descriptions for gallery

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	walks, interactive discussions, group work, and lab exercises are provided.
Aim	Use QGIS to analyze climate data and evaluate how interactions between climate system components lead to climate variability that impacts human societies. Identify to which climate change opinion group they belong (alarmed, concerned, cautious, disengaged, doubtful, or dismissive) using a climate change survey instrument. Compare the class distribution of climate change opinions to the national distribution. Determine their own and their community's social vulnerability to climate change based on demographic factors. Distinguish between climate change mitigation and adaptation and the potential pros and cons of each strategy. Summarize several methods of 21st-century adaptations to climate change, including agroforestry, floodplain reclamation, and response to extreme heat waves.
Learning Outcomes	This module has a positive focus on adaptations to climate change. Activities provide students opportunities to think locally, regionally, and globally. They drive thinking about climate change and social vulnerability. Students use real, current ocean and atmosphere data to learn about climate change. Activities provide concrete ways to learn abstract concepts like uncertainty, anomalies, and feedback. Students consider questions about climate and society for which they can't Google the answer. Activities get students out of their chairs. A diverse suite of activities (gallery walks, games, discussions, lab exercises, and small-group activities) provides students opportunities to be involved. This engages quieter students, and both professors and students have fun!
Units	Unit 2.1: Forecasting Climate Variability and Change: A Matter of Survival Unit 2.2: Relating information from different sources Unit 2.3: GPS data collection for environmental management
Readings	Article: Climate Change Is Here-and It's Worse Than We Thought. 8/12 *Washington Post* opinion article by James Hansen of NASA's Goddard Institute for Space Studies. This piece includes an effective description of Hansen's "climate dice" analogy to distinguish climate change from variations in weather. Article: Global Warming Debate Needs Cooler Heads to Prevail. Article on Americans' response to the climate change debate. Report: Climate Change War Game: Major Findings and Background from Center For A New American Security, 2009. Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition, McGraw Hill, New York. Allen D. W. 2010. GIS Tutorial 2: Spatial Analysis Workbook, 2nd Edition for ArcGIS 10. Redland, California, ESRI Press. Gorr W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press.
Activity	Overall Time: 20 hours This unit is designed to engage students in the topics of climate variability and climate change by introducing them to impacts of changes on human society and cultures. A class discussion focuses on examining the differences between climate change and climate variability, the impacts on different cultures, and the causes of climate change.
	Case Study 1- Adapting to a Changing World [Time: 400 minutes] Linked to Learning Outcome My goals in creating this activity were to: Provide an understanding of current national attitudes about climate change. Illustrate the difference between climate change mitigation and climate change adaptation

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strategies.

- Provide structured opportunities to identify effective 21st-century climate change adaptation efforts.
- Encourage reflection about one's own beliefs about the existence of climate change, humans' contribution to climate change, and the potential impacts of climate change on society.
- Provide opportunities for reflection about the inequity of climate change and the need for climate resilience in industrialized and developing countries.

Context for Use

Class format: This activity is suitable for use in a lecture or lab setting but can also be done outside of class as a homework assignment. If this activity is done in class, the desired format is a gallery walk, during which groups of two to four students read several examples of climate change adaptation case studies, followed by a compilation of ideas about personal and local adaptations to climate change in the future. Alternatively, students may read the case studies individually outside of class and write a response to personal and local adaptations to climate change in the future.

Time required: approximately 50 minutes, including a discussion on public opinion about climate change, climate change adaptation vs. mitigation, and the adaptation case studies.

Description and Teaching Materials

- Adapting to a Changing World: Climate Change and Agriculture (Microsoft Word 2007 (.docx)) (student handout)
- Adapting to a Changing World: Flooding (Microsoft Word 2007 (.docx)) (student handout)

Gallery walk questions: (these will also be posted as a downloadable file) [Time: 800 minutes] Linked to Learning Outcomes

Post each question on a piece of poster paper or whiteboard. In groups, students will be provided with a marker and copies of the climate adaptation case studies. Start each group at a particular topic, and after students have read the climate adaptation case studies for that topic, allow each group time to make notes under each question. After each group has visited each question, each group will verbally summarize, for the rest of the class, the information on the first poster that they visited. In low-enrollment classes, each group (depending on group size) could summarize the results of two questions. In high-enrollment classes, each group will likely summarize the results of one question.

Adaptation to Flooding

1. How does the Dutch strategy for adapting to climate change-related flooding differ from flood adaptation strategies in Egypt? Which country's strategy do you believe is more effective?
2. How has the government differed in its approach to adaptation in rural areas compared to adaptation in urban areas?
3. How do you feel about the government relocating individuals, whose land lies in a designated flood zone, and widening areas along the River, allowing some communities to flood?
4. The Netherlands is a wealthy, industrialized country. Which of their adaptations would be feasible in poorer, developing countries? Which of their adaptations would not?

Teaching Notes and Tips

- In getting students to differentiate between mitigation vs. adaptation, there are many geologic and nongeologic analogies that may be utilized other than "the aging starlet" story provided in the PowerPoint slides. For example, faculty using this case study in an environmental geology or natural hazards course could discuss public response to debris flow hazards. The instructor could present two debris flow response scenarios and ask students to consider which is an adaptation strategy, which is a mitigation strategy, and pros and cons of each.
- There are several methods that may be used in implementing the climate change adaptation

examples activity:

- Gallery walk #1:
  - Each student is given a handout with all of the climate change adaptation examples.
  - Questions about each set of examples are displayed on large pieces of paper, whiteboards, etc., around the classroom.
  - In groups, students visit each station, read the climate change adaptation examples from their handout, and write their responses to the questions directly on the large pieces of paper/whiteboards.
  - If the instructor chooses/if time allows, a group discussion summarizing the answers to the questions may follow.
- Gallery walk #2:
  - Enlarge the font for the climate change adaptation examples and display the examples on large pieces of paper, whiteboards, etc. around the classroom.
  - Each group is given a handout with questions for each climate change adaptation strategy.
  - In groups, students rotate around the classroom and read the climate change adaptation examples.
  - In groups, students answer the questions (on their handout) for each set of examples.
- Virtual gallery walk: if students have computer access, they may read the climate change adaptation examples online on the climate change adaptations page.
- Seated, small-group discussion: same procedure as gallery walk #1, only rather than students answering the questions on large pieces of paper/whiteboards around the classroom, they answer the questions on their handout in small groups.

- If possible, the audio clips on flood adaptation in the Netherlands would be an excellent addition to this activity during class. In a gallery walk setting, students could be prompted to listen to the audio clips before their group answers the flood adaptation questions. Alternatively, the clip could be played for the entire class at once.

Case Study: Uses of GIS & RS in Climate Change Detection

This case will offer a set of methods and techniques that use GIS and Remote Sensing for analysis and monitoring of climate change, with applications in climate change impacts and adaptation. Climate change is major problem in recent years and it is a geographic problem. And we can solve it by providing geospatial solution. Skillful expertize is required for the climate change detection through GIS techniques. Different information, ex pests, plant genetic resources and crop production and then these data united with the environmental datasets, such as land cover, weather for measurement of their current distribution and potential future estimated distribution under various scenarios of climatic change. Many environmental analysts using this technology for understanding such climatic complex issues and offering some important solutions.

Module 2	Time-load
Directed Learning Online • Viewing presentations and reading articles as specified in the activities	2.5 hours
Dynamic Interaction online • Discussing or engaging with the e-tutor and/ or peers	1 hour
Assessment • Individual and Group Contributions and Discussion Forum [Note: Time allowed for preparing Assessment work can vary from 1-7 hours on average per	Expected from 30-50 hours for this module, as the student may be directly working on the creation of for assessment.

	module]	
	Independent Learning □ Private online or offline engagement with readings, peers or experts [Note: Time available to spend on Independent learning can vary from 7-30 hours in final weeks]	At the discretion of the student
	Total Time for Module 2	Approximately 33.5- 53.5 hours required for engagement within this module, plus an additional 7-30 hours for independent learning at your own discretion.

SD Pillars	environment	economy	social	culture
21st ESD	Learning to know □	Learning to be □	Learning to do □	Learning to live together □	Learning to transform oneself and society □	Learning to give and share □

SDGs Sub goals	1	2 □	3	4	5	6 □	7	8	9	10	11	12	13 □	14 □	15	16	17

Vision 2030	The module promotes awareness of past and contemporary cultures and regions strongly affected by permanently altered or increasingly uncertain climates as students consider human adaptation to climate fluctuations. This will lead to protect the environment through sustainable consumption and production, sustainably managing its natural resources.

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	9 h	**3.5 h**	**4h**	**13 h**	**24 h**	**-**	**-**	**-**	**53.5**

Key Concepts Overview	Water resource, Freshwater availability, Virtual water amounts, Water footprints, Geographic variability, Irrigation, Groundwater mining, Ecosystem impacts Water is *the* most critical substance for the sustenance of life, but the prognosis for the quality and supply of water resources in much of the world is somewhere between troubling and dire. This module provides a framework for students to learn about how people interact with water, peer into our water future, and consider ways we might foster more sustainability in water management.
Aim	The students learn about the concepts of water sustainability, virtual water trade, and water footprints. The focus then turns to the interplay between agriculture and water resources, as agriculture has the greatest impact on freshwater consumption and quality. The module has allows students to use several types of data to understand the patterns of crop irrigation in Egypt and link this to groundwater levels in different parts of the country. The module also helps~~has~~ students assess how agriculture impacts the quality of freshwater resources and employ systems thinking as it relates to nutrient runoff.
Learning Outcomes	At the end of this module students will be able to: - Evaluate the sustainability of fresh water resource use on global and regional scales.

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	- Explain how freshwater availability and management practices pose threats to ecosystem integrity, human well-being, security, and agricultural production. - Explain what goes into the calculation of virtual water amounts and water footprints and the application of these concepts. - Explain what controls geographic variability in irrigation, groundwater mining, and ecosystem impacts of agriculture in Egypt. - Apply geoscience information and methods in interdisciplinary assessments of the sustainability of water systems.
Units	Unit 3.1: What is Sustainability in the Context of Water? Unit 3.2: Water Footprints Unit 3.3: Irrigation and Groundwater Mining This unit kicks off the Water, Agriculture, and Sustainability module. It is broken up into three sub-units, each designed to take one 60-minute class period. □ In Unit 1.1 students are confronted with the problems associated with water availability, access, equity, and quality from a global perspective. They are also challenged to work together to evaluate statistics and communicate quantitative information in a graphical way. □ In Unit 1.2 students learn about sustainability as a concept and water management objective. After the readings and participation in the class activity of this sub-unit, students should understand that sustainability is a contestable concept and different approaches to fostering a more secure and just *water* future are part of a larger ideological conflict. □ Unit 1.3 focuses on case studies of unsustainable water use in agriculture. This provides a segue into the following units, which largely focus on the challenges and options associated with agricultural use of water. Class Format: The in-class activities of this unit are designed for working in small groups of 4-6 students. The instructor provides materials such as handouts, flip chart paper, and colored markers and moderates the activities. PowerPoint presentations are provided for class instruction. Time Required: The in-class activities associated with this unit are designed to take three 1-hour class periods. If the instructor opts to work through the optional slide presentations of Units 1.1 and 1.2, that could stretch out Unit 1 to four 1-hour class periods. Special Equipment: Unit 1.1 calls for small groups to make graphs using large sheets of paper and colored markers. Units 1.1 and 1.2 recommend that instructors foster online discussions of readings prior to the class periods for those sub-units. If instructors do not have access to online teaching platforms like Blackboard or Canvas, they could try out free online chat services like Google Hangouts. Skills or concepts that students should have already mastered before encountering the activity: Students can start the module with no shared preparation. Before each in-class activity of this first unit, each student will need to do the assigned readings, participate in the online discussions and (for unit 1.3) complete a homework assignment. This will give them the background necessary to analyze and critique the unit concepts and data. This unit can stand on its own, if desired. It is appropriate for college students at all levels and majors. It is of particular value in introducing Earth Science majors to the concept of sustainability and the roles of culture, politics, economics, and agriculture in the watery aspects of the Earth system.
Readings	□ Brown, A. and Matlock, M. (2011).A Review of Water Scarcity Indices and Methodologies. The Sustainability Consortium, White Paper #106. University of Arkansas. □ Di Nunzio, J (2013). Conflict on the Nile: The Future of Transboundary Water Disputes Over the World's Longest River. Future Directions International. Conflict on the Nile (Acrobat (PDF)) □ Hoekstra, A.Y. (2011). The Global Dimension of Water Governance: Why the River Basin

	Approach Is No Longer Sufficient and Why Cooperative Action at Global Level Is Needed. *Water*, 3: 21-46. - Hoekstra, A.Y. (2012). The Hidden Water Resource Use Behind Meat and Dairy. *Animal Frontiers*, 2(2): 3-8. - Hoekstra, A.Y., Mekonnen, M.M., Chapagain, A.K., Mathews, R.E., and Richter, B.D. (2012). Global Monthly Water Scarcity: Blue Water Footprints versus Blue Water Availability. *PLoS ONE*, 7(2): e32688. - Mekonnen, M.M. and Hoekstra, A.Y. (2011). National Water Footprint Accounts: The Green, Blue and Grey Water Footprint of Production and Consumption. Value of Water Research Report Series No. 50, UNESCO-IHE, Delft, the Netherlands.
Activity	Overall Time: 33.3 hour This unit is broken up into the following 3 sub-units. Each is designed to take a minimum of 1 class period, where a class is assumed to last 1 hour. Unit 1.1 - Are We Sliding into a Water Crisis? [Time: 400 minutes] Linked to Learning Outcomes Are we in the midst of a water crisis? Is the global situation improving or deteriorating? What are the big issues? This unit delves into these matters and provides the primary justification for having a module devoted to water sustainability. The readings of this unit have a global perspective. As such, they impress upon the students how dire the situation already is in many regions of the world and how the problems are not limited to remote areas. They also highlight how water + sustainability is a highly politicized subject, providing a natural segue to the next sub-unit on sustainability. Participation on the students' part should enhance their critical and holistic thinking, numeracy, and communication and collaboration skills. Activity 1.1a - Homework: Reading Assignment and Online Discussion on the Water Crisis Assign homework in preparation for the class period of Unit 1.1b. Students will read 3 short readings, watch a short video, and participate in an online discussion of the readings. The readings and discussion challenge students to assess whether or not our global water situation constitutes a "crisis." Suggested readings and discussion prompts are found in the following guidance document, as are the broader learning goals. Instructors are encouraged to award a small amount of points to students for satisfactory participation in the discussion. If instructors do not have access to online teaching platforms like Blackboard or Canvas, they could try out free online chat services like Google Hangouts. - Instructor Guidance for Activity 1.1a: Reading and Online Discussion (Microsoft Word 2007 (.docx)) Activity 1.1b - Group Work: Analyze/Display Water-related Statistics (60 minutes, in class) The downloadable Word documents below provide context, guidance, and handouts for the Activity 1.1b - Group Work: Analyze/Display Water-related Statistics. The purpose is to get students to work with and discuss water related statistics, causing them to sink in to a greater degree than simply skimming over them in a reading. The activity is also designed to enhance the critical thinking, numeracy, and communication skills of the students. As they review the statistics in small groups, they are asked to do the following: - Identify a common theme for your water statistics. - Decide which statistics you think are most important to share with the rest of the class. - Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. - Make graphical representations of the quantitative data. Provide each graph or figure with a title and a caption. Cite the source of the information. Each group gets a handout featuring a set of statistics centered around a different theme. By graphically illustrating some of their statistics and sharing them with each other, the entire class will learn more

about our global and national level water issues. This activity sets up a discussion about the state of water resources around the world and impacts of water problems on people and ecosystems.
For classes with more than 30 students, you can have two Group 1s, two Group 2s, two Group 3s, etc., so the group sizes don't get too large. For classes with 7-12 students, you can have them work in pairs. If you have <7 students, they will each get their own water statistics handout to digest and illustrate.

- Instructor Guidance for Activity 1.1b: Group Work on Water Statistics (Microsoft Word 2007 (.docx))
- Student Handout for Activity 1.1b: Group Work on Water Statistics (Microsoft Word 2007 (.docx))

OPTIONAL Activity 1.1c - Interactive Lecture: Overview of the Water Crisis
If desired and there is sufficient time, you can also bounce through the following slide presentation to provide a framework for thinking about water problems and an overview of the geographic variability in water scarcity.

- Slides for 'Are We Sliding into a Water Crisis?' (PowerPoint)

Unit 1.2 - What is Sustainability in the Context of Water? [Time: 400 minutes] Linked to Learning Outcome

If our working presumption is that we want to foster a future with more sustainable water resource management, then we need to get some clarity on what is meant by sustainable, sustainability, and sustainable development. This sub-unit provides an introduction to the concepts of sustainability and relates them to water resource management.

Activity 1.2a - Reading Assignment and Online Discussion of Readings
In preparation for the class period of Unit 1.2, students are assigned 3 readings and asked to participate in an online discussion of the readings. The readings and discussion introduce students to the concept of sustainability, its ethical underpinnings, and how it can relate to water resource problems and management. Suggested readings and discussion prompts are found in the following guidance document, as are the broader learning goals. Instructors are encouraged to award a small amount of points to students for satisfactory participation in the discussion. If instructors do not have access to online teaching platforms like Blackboard or Canvas, they could try out free online chat services like Google Hangouts.

- Instructor Guidance for Activity 1.2a: Reading and Online Discussion (Microsoft Word 2007 (.docx))

Activity 1.2b - Group Work: Evaluate Definitions of Sustainability and Sustainable Development (60 minutes, in class)
How sustainability is regarded-as a process, an ideal state, or simply nonsense-is dependent on one's culture, ideology, and education. As a consequence of this and the relative youth of the sustainability movement, there is no universally accepted definition of sustainability. Accordingly, students should approach the concept and the writing around it critically. They should not simply accept as gospel their first readings about it or let their initial notions of it fossilize without further investigation. This activity, along with Activities 1.2a and 1.2c, are designed to help foster this deeper exploration into the concepts of sustainability and sustainable development and how proposals meant to foster them serve as ideological flashpoints.
As the activity title suggests, this group work activity has students evaluating various definitions of sustainability and sustainable development. Critical themes of the sustainability and sustainable development concepts are revealed by identifying common (and differing) elements in the various definitions. The first document below provides guidance for the instructor in running Activity 1.2b. The second document below contains the handout to be distributed to each student for this activity.

- Instructor Guidance for Activity 1.2b: Group Work Evaluating Definitions of Sustainability and Sustainable Development (Microsoft Word 2007 (.docx))
- Student Handout for Activity 1.2b: Group Work Evaluating Definitions of Sustainability and

Sustainable Development (Microsoft Word 2007 (.docx))

OPTIONAL Activity 1.2c - Interactive Lecture: Defining Sustainability and Sustainable Development

If you have more time in your class, you can work through as much of the following PowerPoint presentation as you like. It is designed to elaborate on the concepts and controversies embedded in the terms sustainability and sustainable development. It also encourages students to evaluate the Sustainability Criteria for Water in the assigned reading by Peter Gleick et al., 1995 (Ch 3. Water and Sustainability*)*.
The last page in the handout provided with Activity 1.2b above goes with the lecture/slides of Activity 1.2c.

- Presentation Slides for 1.2c - Defining Sustainability and Sustainable Development (PowerPoint 2007 (.pptx))

To learn more about sustainability, particularly how cultural theory and political psychology provide insight into the different ideological perspectives that drive conflict over policies and proposals related to sustainability, instructors can access a set of relevant literature in a bibliography included in the References and Resources section below.

Unit 1.3 - Case Studies in Unsustainable Water Use in Agriculture (1 class period) [Time: 400 minutes] Linked to Learning Outcomes

In this unit, we turn our attention to agriculture and its impacts on water resources.
Activity 1.3a - Homework/Reading Assignment on Case Studies in Unsustainable Water Use in Agriculture
In preparation for the class period of Unit 1.3, each student is assigned 1 of 5 readings and asked to consider multiple thinking prompts. Each reading provides an overview of regionally-specific unsustainable water use primarily associated with agricultural practices. Each reading can be accessed in the References and Resources section at the bottom of this page. As part of the assignment, students are asked to come to class prepared to share how the tales of agricultural water use detailed in their reading do not meet the criteria of water sustainability as outlined by Peter Gleick (1998) in his article from the preceding sub-unit (Water in Crisis: Paths to Sustainability). The first document below provides guidance on the activity for the instructor, along with the context and learning objectives for the assignment. The second document below serves as a handout to be distributed to students that walks them through the homework/reading assignment.

- Instructor Guidance for 1.3a - Homework and Reading Assignment (Microsoft Word 2007 (.docx))
- Student Handout for Activity 1.3a: Homework and Reading Assignment on Case Studies in Water Unsustainability (Microsoft Word 2007 (.docx))

Activity 1.3b - Group Analysis of Case Studies in Unsustainable Water Use in Agriculture (60 minutes, in class)
Students participate in a jigsaw activity to discuss the readings (learn more about jigsaws). Students are first divided into groups with students that have had the same reading for the day. Each of these groups are challenged to come to some collective consensus on the water resource problems detailed in their article. They are also prompted to evaluate how the agricultural practices and the associated use of water in their article failed to meet the sustainability criteria outlined by Gleick (1998). Then, the students are shuffled into new groups so that each group has a representative for each of the 5 articles. After each student outlines from their article how water use in agriculture is not sustainable, the groups are challenged to identify the common problems between their articles and then come up with viable solutions for water sustainability in agriculture. The first document below provides guidance for the instructor to run Activity 1.3b, with context, learning objectives and teaching tips for the activity. The second document is the student handout.

- Instructor Guidance for 1.3b - Group Analysis of Case Studies in Water Unsustainability (Microsoft Word 2007 (.docx))

- Student Handout for 1.3b - Group Analysis of Case Studies in Water Unsustainability (Microsoft Word 2007 (.docx))

This PowerPoint slide presentation can be used to run Activity 1.3b.

- Slides for Activity 1.3b - Case Studies in Water Unsustainability (PowerPoint 2007 (.pptx))

Activity 2.1a - [Time: 400 minutes] Linked to Learning Outcomes

Homework: Reading Assignment and Online Discussion on Virtual Water

This activity is to be completed as homework in advance of the class period. Suggested readings and discussion prompts are found in the following guidance document, as are the specific learning goals. Instructors are encouraged to offer a small amount of points for satisfactory participation in the online discussion.

- Instructor Guidance for Activity 2.1a: Reading Assignment and Online Discussion for Virtual Water (Microsoft Word 2007 (.docx))

Activity 2.2b - Group Work: Analysis of Individual Water Footprints and Footprints of Nations (80 minutes stretched over 2 class periods - 20 minutes on day 2 of the unit, 60 minutes on day 3)

This activity will extend over 2 class periods. After the virtual water debate (Activity 2.1c), students will work in small groups to share their individual water footprint results for 20 minutes. During the second class period, students will work in small groups to analyze various water footprint statistics and figures. Students apply this information to discuss water footprint regulation, whether or not there should be a maximum allowable water footprint amount per person or nation. The first document below provides detailed guidance for the instructor on how to run Activity 2.2b, with context and learning goals. The second document is the student worksheet.

- Instructor Guidance for Activity 2.2b: Analysis of Water Footprints (Microsoft Word 2007 (.docx))

Student Handout for Activity 2.2b: Analysis of Water Footprints (Microsoft Word 2007 (.docx)) Power Point presentation on Water Footprints for use in class.

- Slides for Activity 2.2b: Water Footprints (PowerPoint)

Activity 4.1c - [Time: 400 minutes] Linked to Learning Outcome

Analyzing Well Records and Google Earth Satellite Imagery (50 minutes)

In this exercise, students will look at groundwater well level records for six pProvinces to observe changes in water table levels over time. The exercise is based on Groundwater Watch records and Google Earth Satellite imagery. The optimal scenario is for students to have printed records of the groundwater records and Google Earth on a web-enabled computer. If computers are not available, the other option is to use the printed imagery. The advantage of using Google Earth is that students can zoom in/out and get a more complete view of each region.

The full exercise uses two wells in each of the two Province. If the instructor is constrained for time or feels that students may be overwhelmed with this much information, there is an option to use one well per state.

Commented [NK6]:

Commented [NK7]: Two or six?

If Using Google Earth:

- Students can work independently or in pairs using laptops or desktop computers that have Google Earth installed on them. First, hand out the printed copies of the Unit 4 Student Worksheet (Microsoft Word 2007 (.docx) 30kB Jan23 17) to each student. Each student, for pair of students, should have a copy of the well records (PowerPoint 2007 (.pptx) 119kB Jan23 17) either printed out or as a file that they can download and view on the computer (students seem to do better with a printed handout).
  - If the instructor is using the shortened version of the exercise, then use the well records with one well per Province (PowerPoint 2007 (.pptx)).
- Have students download the .kmz file Groundwater Well Sites (KMZ File) and have them open this in Google Earth.

- If the instructor is using the shortened version of the exercise, then use the .kmz file with one well per state(KMZ File).
- The students can now follow the directions on the worksheet. The main part of this is recording observations from both the water table vs time plots and the terrain characteristics from the satellite imagery. In particular, students should be looking for evidence of agriculture and irrigation (such as crop circles).

If NOT Using Google Earth:

- Students should work in groups of two to four. Each student should receive a printed copy of the Unit 4 Student Worksheet (Microsoft Word 2007 (.docx) 30kB Jan23 17) and each group should have a printout of the well records and terrain images (PowerPoint 2007 (.pptx)).
- If the instructor is using the shortened version of the exercise, then use the well records and maps (PowerPoint 2007 (.pptx)) with one well per Province.
- The students can now follow the directions on the worksheet. The main part of this is recording observations from both the water table vs. time plots and the terrain characteristics from the satellite imagery. In particular, students should be looking for evidence of agriculture and irrigation (such as crop circles).

Case Study - Adapting to a changing water level in High Dam Lake

Through field trip to Aswan High Dam, study the Environmental Impacts of the GERD Project on Egypt's Aswan High Dam Lake and Mitigation and Adaptation Options.

Module 3	Time-load
Directed Learning Online - Viewing presentations and reading articles as specified in the activities	1.5 hours
Dynamic Interaction online - Discussing or engaging with the e-tutor and/ or peers	1.5 hour
Assessment - Individual and Group Contributions and Discussion Forum [Note: Time allowed for preparing Assessment work can vary from 1-7 hours on average per module]	Expected from 20-60 hours for this module, as the student may be directly working on the creation of for assessment.
Independent Learning - Private online or offline engagement with readings, peers or experts [Note: Time available to spend on Independent learning can vary from 7-30 hours in final weeks]	At the discretion of the student
Total Time for Module 3	Approximately 23- 63 hours required for engagement within this module, plus an additional 7-30 hours for independent learning at your own discretion.

SD Pillars	environment	economy	social	culture

	21st ESD	Learning to know □		Learning to be □		Learning to do □		Learning to live together □		Learning to transform oneself and society □		Learning to give and share □					
	SDGs Sub goals	1	2	3	4	5	6 □	7	8	9	10	11	12	13	14 □	15	16	17
	Vision 2030	This module provides a framework for students to learn about the concepts of water sustainability, virtual water trade, and water footprints, and consider ways we might foster more sustainability in water management. This will lead to all human beings can fulfill their potential in dignity and equality and in a healthy environment.															

Commented [NK8]: Which one you target in this module?

ECTS WORK	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total	
LOAD	9 h	**3h**	**3h**	**16 h**	**22 h**	**-**	**-**	**-**	**53 h**	

Module 4	Soil Resources for Sustainable Agriculture
Key Concepts	Soil Characteristics, Land Use Practices, Climate Change, Soil Loss
Overview	Continued agricultural productivity and the ability to feed the earth's growing population hinges on understanding how to manage soil resources. This module addresses this need by providing students the opportunity to examine the differences between intensively managed agricultural landscapes (e.g. grazelands, conventional tillage) and "natural" landscapes (forested or prairie).
Aim	Using learning-centered strategies, students will develop a working knowledge of soil physical properties and geospatial data at both local and global scales. The module culminates with a project centered on making sustainable soil management decisions under global climate change.
Learning Outcomes	This module addresses soil sustainability in the context of land management and climate change. Students are engaged through an active learning environment (e.g. physical modeling, think-pair-share, and jigsaw exercises), encouraging critical thinking and reflection. The entire process requires that students develop interdisciplinary thinking skills to synthesize how soil erosion relates to land management decision-making. Students investigate the basic interactions between Earth's spheres, a key component of which is the positive feedback between agricultural practices and the sustainability of soil as a vital resource. They apply systems thinking as they consider how predicted changes in climate will impact soil sustainability in their local area. Students challenge their conceptual models about soil erosion and sustainability using real-world geoscientific data, both data they generate and data gathered from existing databases. In the process, they develop data collection and analysis skills and the ability to access existing data using technology tools. Students gain an understanding of the nature and methods of geoscience through building observational skills, using charts to characterize soil samples, and working with geospatial data to understand how humans alter geologic rates of change. Geoscientific habits of mind will grow through working with authentic data and translating scaffolded knowledge into decision-making as students take on the role of agricultural "experts."
Units	Unit 4.1: Impacts of Land Use Unit 4.2: Soil Characteristics and Their Relationship to Land Use Practices

Commented [NK9]: It is preferable to list the learning outcomes clearly:

At the end of this module students will be able to:

	Unit 4.3: Predicting the Effects of Climate Change on Soil Loss
Readings	• United States Department of Agriculture Soil Quality Information Sheet, retrieved 7/30/14, Soil Quality Resource Concerns: Soil Erosion • United States Department of Agriculture Soil Quality Information Sheet, retrieved 7/30/14, Soil Quality Indicators: Organic Matter • Wortmann, Charles S., and Paul J. Jasa, Rev. October 2009, NebGuide: Management to Minimize and Reduce Soil Compaction, University of Nebraska - Lincoln Extension • Montgomery, D. R., 2007, Soil erosion and agricultural sustainability: Proceedings of the National Academy of Sciences of the United States of America, v. 104, no. 33, p. 13268-13272. • Wilkinson, B. H., and McElroy, B. J., 2007, The impact of humans on continental erosion and sedimentation: Geological Society of America Bulletin, v. 119, no. 1-2, p. 140-156. • Gorr W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press. • Allen D. W. 2010. GIS Tutorial 2: Spatial Analysis Workbook, 2nd Edition for ArcGIS 10. Redland, California, ESRI Press.
Activity	Overall Time: 21.6 hour Overview Small group work [Time: 100 minutes] Linked to Learning Outcome *Small group work* The small group work starts by having students practice their powers of observation, followed by the small groups discussing and interpreting their observations. Observation (15 minutes): Divide students into small groups of three or four and either give each group a stack of photos of each type of landscape or project Slides 8 and 9 for a few minutes each, switching back and forth several times during the small group work time. If slides are projected, the instructor may want to make one or two sets of the photographs available for close-up viewing. Provide each group with the student instructions and one response table: • Student Instructions (MS Word version) (Microsoft Word 2007 (.docx) 17kB Feb2 15) • Response Table (MS Word version) (Microsoft Word 2007 (.docx) 18kB Feb2 15) Remind them to start by simply making observations without making any interpretations of their observations. They should then observe and list the physiographic features of the landscapes they are viewing. Discussion (15 minutes): The students should then begin discussing their observations in small groups as follows: • Groups should compare the physiographic similarities and differences between the two landscape/land use types. Each group should use the questions on the Student Instructions sheet to help them interpret the effects of agriculture on the landscape and, to a lesser extent, the effects of weather/climate. • Each group should record all of their observations and all of their responses to the questions on one Response Sheet. • Students should then organize their thoughts as a group and summarize their conclusions as a short presentation for the classroom discussion that follows. *Classroom discussion* (10 minutes) Bring the groups back together and encourage students to use the remaining time to describe their observations and interpretations of how the obvious physiographic impacts of agricultural land use compare to natural land. Follow with a classroom discussion of the impacts of different types of agriculture. Project Slides 8 and 9 during the discussion so that the class can view the photographs as

they are being discussed. The Talking Points provided for this exercise include important discussions about soil erosion, sustainable agriculture, and systems thinking, including exploring the potential impacts of climate change on agriculture.

Talking points for classroom discussion (MS Word version) (Microsoft Word 2007 (.docx) 19kB Oct15 14)

- The classroom discussion should begin with the instructor checking that the students understand some of the potentially unfamiliar terms described in Section 1 of the Talking Points for Classroom Discussion (which are also shown on Slide 10). Ask students to identify images that they believe best feature soil erosion, runoff/infiltration, organic matter, anthropogenic effects, and ecosystems. Use the definitions provided in Section 1 of the Talking Points for Classroom Discussion.
- Next, ask students to use their observations to reflect aloud on why it's important to care about soil erosion. Use Section 2 of the Talking Points to support their reflections.
- Lastly (Section 3 of the Talking Points), ask them to use the photos to infer examples of what they think are either sustainable or unsustainable agricultural practices. Also ask if they are able to infer the influence of weather or climatic effects on the agricultural landscapes.
- Wrap up by asking them to discuss, as a group, what they think humans will do if our agricultural practices disrupt our food supply.

Wrap-up homework (very short)

Provide the following homework sheet or, if class time allows, complete this activity at the end of the classroom discussion. The purpose of this part of the exercise is to have to students look at the big picture to take what they learned and consider the various connections as Earth's spheres are all interrelated. The activity is provided as Slides 15 through 17 in the Landscapes PowerPoint™ for use in the classroom.

- Unit 1 Wrap-Up Homework (MS Word version) (Microsoft Word 2007 (.docx) 1.9MB Jul20 15)

Answer Key to Unit 1 Wrap-Up Homework -- private instructor-only file

Photographs, separated by land use

- Agricultural Landscape Photos (Acrobat (PDF) 493kB Aug11 13)
- Non-Agricultural Landscape Photos (Acrobat (PDF) 697kB Aug26 13)

Student instructions and response table—instructions and leading questions for small groups to use in making observations of the photographs

Pre-work (before class)

Each student will complete a reading, then answer questions provided on the Pre-work for Unit 5 student page. Students will investigate one of four different factors that influence erosion rates. They will bring their responses to the discussion questions and use this information in an in-class activity.

The instructor will need to assign students to one of the four factors in roughly equal numbers.

The four assigned topics are:

1. Rainfall and runoff erosivity (R factor)
2. Soil properties (K factor)
3. Landscape characteristics (LS factor)
4. Agricultural practices (C and P factors)

Note: These factors are based on the Revised Universal Soil Loss Equation (RUSLE) defined by Renard et al. (1991), where:

Estimated average soil loss (tons/acre/year) = R*K*LS*C*P

R = rainfall-runoff erosivity factor

- K = soil erodibility factor
- LS = length slope factor
- C = cover-management factor
- P = support practice factor

Guided lecture and activities (50 minutes)

Click to view

The in-class portion of this unit is a guided lecture that intersperses active learning activities throughout. The instructor can use the provided presentation (PowerPoint 2007 (.pptx) 3.4MB Jul30 14) to guide the class period. Instructions are provided in the Notes section of the Powerpoint slides and an outline of the guided lecture is included below.

A lecture notes outline (MS Word (Microsoft Word 2007 (.docx) 3.1MB Sep18 14) or pdf (Acrobat (PDF) 911kB Sep21 14)) is provided as a handout that instructors can distribute to students if desired.

- Slide 1: Overview and learning objectives
  - Display as students enter the classroom
- Slides 2-3: RUSLE homework follow-up small group activity (15 minutes)
  - Students will divide into groups with classmates who had the same factor. The size of the groups is up to the instructor; four or five students is recommended. Students will compare answers from their homework and work together to address any questions that arise. Once students have discussed their answers and reached consensus, one group for each factor will present information about their factor to the class and list any remaining unanswered questions. If there were multiple groups for each factor, each group for a given factor should get a chance to add comments and questions. If desired, the instructor can record key ideas on the board as the groups present to provide a visual reminder students can refer to throughout the class period. Once all of the factors have been discussed, the instructor will summarize the key information for each one and address any outstanding questions before moving on.
- Slides 4-6: Using the RUSLE (5 minutes)
  - In this set of slides, students will consider how the factors work together to produce a rate of soil loss. Two short thought problems are provided that can be used for quick think-pair-share discussions.
- Slide 7: Human activity vs. natural processes activity (10 minutes)
  - This activity gets students moving around the room and allows them to consider whether factors are influenced by human or natural processes, or both. The activity is structured like the classic "getting to know you" game in which participants are asked to make a choice and move to a designated space indicating their choice. In this case, you should designate one space for human activity and another for natural processes. Opposite sides of the classroom work well. If it is difficult to move around your classroom, you could also use clickers, index cards, or a show of hands.
  - How it works:
    - Tell students that when each component is revealed, they must decide if they think it is influenced more by human activity or by natural processes, then move to the designated space.
    - Advance the slide to reveal the component and corresponding photo, remind students what it means, and tell them to move to the designated space.
    - Once everyone has made their choice, have students explain to a neighbor their reasoning for choosing that side. Then ask for a few volunteers from each side to share with the whole class.
    - Clear up any confusion or ideas that need to be addressed before moving on to the next component. Note: Many components are influenced by both so there is no single correct answer. Students should be encouraged to consider multiple processes that can impact the same thing.
  - Expected answers:
    - Support practices (human)
    - Soil porosity (both: texture, organic matter, and biological activity are examples of natural processes; tillage and driving machinery are examples of human activities; these are introduced in the Unit 2 homework)

- Slope steepness (mostly natural, except in areas where terracing is a common practice)
- Surface roughness (both: Tillage can increase surface roughness up to a point when clods are broken up too much; rainfall causes depressions to fill with sediment and decrease surface roughness over time)
- Rainfall intensity (natural)

- Wrap-up:
  - Use rainfall intensity as a transition to the next section on impacts of climate change by asking students what controls rainfall (climate). End with the idea that climate change influences natural processes such as rainfall and heightens the need for human action. The video in the next slide discusses this idea in the context of agriculture.
- Slide 8: Climate change and agriculture video: "Science for a Hungry World" from NASA (5 minutes)
  - The video addresses the effects of increasing atmospheric CO_2 on plant growth, discusses decreasing crop yields with increasing temperatures from a global perspective, and ends with a bit about how NASA satellite data in gathering this type of data. Before starting the video, the instructor should ask the class to predict how global climate change might impact agriculture.
- Slide 9: Local impacts of climate change
  - It is important to help students bridge global (as presented in the video) and local impacts of climate change. Use the map of modeled changes in precipitation for North America to have students determine one predicted impact in their local region.
- Slides 10-12: Introduction to systems diagrams
  - This series of slides links the idea of changing precipitation patterns back to soil sustainability. The RUSLE allows us to calculate changes in erosion, but a systems diagram (presented in Slide 12) allows for a more nuanced investigation of the mediating processes that link precipitation and erosion.
- Slides 13-22: Interpreting systems diagrams
  - This series of slides walks students through each component of the systems diagram and explains how to interpret the relationships indicated by the various symbols. The headings are written so that students can review them on their own if needed.
- Slides 23-25: Example
  - These slides give students a chance to practice using the systems diagram by considering data from a particular region (in Nebraska) and how the same climate change effects (decrease in precipitation) can have different effects on erosion when you consider the needs of the plants themselves.
- Slide 26: Wrap-up
  - In the corn/wheat example, students see that a change in the system can impact individual crops in different ways. What is planted and the management practices employed are ultimately human decisions that have a big impact on the agro-ecosystem. This slide of the U.S.-Mexico border is provided as an example of how economics and politics also affect the agricultural system. You can use this to guide a closing discussion about the idea that sustainable solutions to mitigating the impacts of climate change must address environmental, social, and economic factors.

Case Study - Prepare Land Use Land Cover and DEM Map using ArcMap

Prepare digital data set of land use/land cover, soil and digital elevation model (DEM) using RS and GIS techniques.

Follow-up homework [Time: 100 minutes] Linked to Learning Outcome

In the homework, students will synthesize what they have learned in this unit and practice using systems

language to describe relationships in the system under investigation.

Module 4	Time-load
Directed Learning Online □ Viewing presentations and reading articles as specified in the activities	2.5 hours
Dynamic Interaction online □ Discussing or engaging with the e-tutor and/ or peers	1.5 hour
Assessment □ Individual and Group Contributions and Discussion Forum [Note: Time allowed for preparing Assessment work can vary from 1-7 hours on average per module]	Expected from 15-25 hours for this module, as the student may be directly working on the creation of for assessment.
Independent Learning □ Private online or offline engagement with readings, peers or experts [Note: Time available to spend on Independent learning can vary from 7-30 hours in final weeks]	At the discretion of the student
Total Time for Module 4	Approximately 19- 29 hours required for engagement within this module, plus an additional 7-30 hours for independent learning at your own discretion.

SD Pillars	environment	economy	social	culture
21st ESD	Learning to know □	Learning to be □	Learning to do □	Learning to live together □	Learning to transform oneself and society □	Learning t give and share □
SDGs Sub goals	1	2 □	3	4	5	6	7	8	9 □	10	11	12	13	14	15 □	16	17
Vision 2030	The module culminates with a project centered on making sustainable soil managemen decisions under global climate change. This will lead to a spirit of strengthened globa harmony, focused in particular on the needs of the poorest and most vulnerable and																

ECTS WORK	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
LOAD	9 h	**3h**	**3h**	**1h**	**3h**	**4h**	**20 h**	**-**	**34 h**

Module 5	Overview of the Wicked Problem of Food Security
Key Concepts	Food security, Food (in)security, Global food system, ArcGIS Online, Earth system, Systems thinking
Overview	The 1996 World Food Summit declared food security to be "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life." Over the next several decades, food security will continue to be one of the most pressing issues facing our planet. In this three-week module, we take an GIS and RS approach to understanding and addressing world food insecurity issues, and explore how social, economic, and political factors impact decision making and can improve or compromise the biogeochemical interactions provided by the Earth system as they pertain to food production. Students will explore the very factors that cause food insecurity (including climate, socio-economic, and physical) through readings, lecture, case studies, and geospatial analysis using ArcGIS Online. The module will culminate with a summative assignment where students will design a community-based action plan utilizing a variety of data sources addressing food insecurity in a location of their choosing. This module begins by contextualizing food security as an example of a wicked problem. Wicked problems are problems that are unsolvable in the traditional sense, and have complex multiscalar causal factors that contribute to the creation of new issues as old ones are addressed. Both global food security and climate change are examples of wicked problems. This module presents systems thinking as a way to identify complex problems and explore solutions. Using a flipped classroom model, students complete a self-study tutorial that presents system concepts in the context of Earth system science. The slide stack includes two guided activities related to the carbon cycle and soils. A short reading, "Why Systems Thinking?" and a video clip is included in the tutorial. Authentic assessment of the homework activity is an Earth system diagram connected to one of the issues of global food security from Unit 1 that they will bring to class.
Aim	Students will be able to use systems thinking to evaluate and assess food insecurity in a location by analyzing authentic geospatial and socioeconomic data; be able to identify components, processes, and fluxes of Earth system science and apply these concepts in a location and assess the role the Earth system plays in the food system and contributes to food insecurity; and be able to propose plans to promote food security in a locality that include an understanding of the present day food vulnerability, the interaction of human and natural systems, and impacts of climate change.
Learning Outcomes	After completing this unit, students will be able to: 1. Define food security. 2. List the major causes of food (in)security. 3. Describe and illustrate the components of the global food system. 4. Be able to create a simple map using ArcGIS Online. 5. Describe the major components of the Earth system. 6. Apply systems thinking to wicked problems like global food security. 7. Create a diagram that identifies connections between the Earth system and the global food system.
Units	Unit 5.1: Introduction to Global Food Security. Unit 5.2: Systems Thinking and the Wicked Problem of Global Food Security. Unit 5.3: Climate Change and Food Security
Readings	Hanning, I., O'Bryan, B., Crandall, C.A., and Ricke, S. C. (2012) Food Safety and Food Security. Nature Education Knowledge 3(10):9. McDonald, B.L. (2010). *Food Security*. Malden, Ma: Polity. Paci-Green, R. and Berardi, G. (2015). Do global food systems have an Achilles heel? The potential for regional food systems to support resilience in regional disasters. *Journal of Environmental Studies and Sciences* 5: 685-698.

<table>
<tr><td></td><td>Pinstrup-Andersen, P. and Watson, D.D. II. (2011). Food Policy for Developing Countries: The Role of Government in Global, National, and Local Food Systems. Ithaca: Cornell University Press.
Sage, C. (2012). Environment and Food. London: Routledge.
Berhe, A. A., Arnold, C., Stacy, E., Lever, R., McCorkle, E. & Araya, S. N. (2014) Soil erosion controls on biogeochemical cycling of carbon and nitrogen. Nature Education Knowledge 5(8):2.
Brodt, S., Six, J., Feenstra, G., Ingels, C. & Campbell, D. (2011) Sustainable Agriculture. Nature Education Knowledge 3(10):1.
Connolly, A., and Phillips-Connolly, K. (2012) Can agribusiness feed 3 billion new people...and save the planet? A glimpse into the future. International Food and Agribusiness Management Review, 15 (Special Issue B):139-152.
Dentoni, D., Hospes, O., and Ross, R. (2012) Managing Wicked Problems in Agribusiness: The Role of Multi-Stakeholder Engagements in Value Creation. Special Issue, International Food and Agribusiness Management Review, 15(B): 1-165. This resource provides numerous papers addressing different aspects of food production and food security. http://www.wageningenportals.nl/sites/default/files/resource/ifama_managing_wicked_problems_in_agribusiness.pdf#page=7 'whole issue'
McLusky, S. and Sessa, R. (2015) Making It Count: Increasing the Impact of Climate Change and Food Security Programmes. FAO.</td></tr>
<tr><td>Activity</td><td>Overall Time: 30 hour
Overview
1.1 - Pre-class Activity [Time: 200 minutes] Linked to Learning Outcome
1. Instructors should give the students the following prompt BEFORE they read the PDF. Students should type/write out their responses and bring to class for discussion.

When you hear the words food security, what images, places, characteristics come to mind? Spend a few minutes writing your impressions (a couple sentences). You could also search for images that illustrate your thoughts. Paste those images into your word document. Students should submit their responses to the course management system.
(Estimated time to complete: 5 minutes)
2. Assign the following activity Student Handout on Food Security (Microsoft Word 2007 (.docx)) as a pre-class homework/reading assignment. (Student Handout will include information defining and explaining the key concepts of this unit i.e. food security, malnutrition, and global food network.) Students will then take a Food Security Quiz (Microsoft Word 2007 (.docx)) over the material either before class (using an online learning platform) or at the start of class.
(Estimated time to complete: 15 minutes)
3. Students should complete the 4x5 Activity to Orient to AGO (Microsoft Word 2007 (.docx)), four activities that take five minutes each, to familiarize students with ArcGIS Online (AGO)
(Estimated time to complete: 30 minutes)

1.2 - In-Class Activity: Mapping the Global Food System [Time: 200 minutes] Linked to Learning Outcome

Students will create a map tracing the commodity of chocolate through the global food system considering the multiple factors involved.
□ Student activity handout: The Global Food System: Chocolate (Microsoft Word 2007 (.docx))
(Estimated time to complete: 60 minutes)

1.3 - Post-Class Activity [Time: 400 minutes] Linked to Learning Outcome

Students who do not finish their maps should complete them outside of class.
Teaching Notes and Tips</td></tr>
</table>

- Sample assignment guide for module (Microsoft Word 2007 (.docx)) should be given to students before the start of the food security module.
- Instructor version of pre-class quiz on food security: Quiz Instructor Version With Answers (Microsoft Word 2007 (.docx))
- Prior to starting the Food Security module, students might want to read Bryan L. McDonald. (2010). *Food Security*. Malden, Ma: Polity or *The State of World Food Insecurity 2015* FAO. This will provide a more detailed understanding of the social, economic, and environmental factors impacting food security.
- Students should submit their responses to Activity 1.1 to the course management system.
- Instructor may want to devote a few minutes of class to describing the geographic grid (information on latitude and longitude) prior to starting the ArcGIS Online activity.

Assessment

Learning goals are listed with their associated summative and/or formative assessment. A Universal Rubric for Assignments Units 1-5 (Excel 2007 (.xlsx)) is available.

Learning Goal 1: Define food security

Learning Goals 1-3: Students will reinforce their understanding of the assigned PDF reading by taking a quiz before class: Professors can utilize the multiple choice quiz by uploading it to their online learning platform or give the students the quiz at the start of class.

Learning Goal 2: List five contributing factors to food (in)security

Learning Goals 1-3: Students will reinforce their understanding of the assigned PDF reading by taking a quiz before class: Professors can utilize the multiple choice quiz by uploading it to their online learning platform or give the students the quiz at the start of class.

Learning Goal 3: Define and describe components of the global food system

Students will create a map describing the global food system through the case study of chocolate.

Learning Goal 4: Create a simple map using ArcGIS Online

Students will create a map describing the global food system through the case study of chocolate.

2.1 Pre-class Activity: Homework to be completed in preparation for this unit [Time: 200 minutes] Linked to Learning Outcome

For a flipped classroom format, assign students the reading assignment and the slide stack before class. The reading describes global food security as a "wicked problem," which has complex attributes and are notoriously difficult or impossible to solve. It explains to the student why they will be learning about systems thinking, and how this tool will help them to navigate the complexity of the global food security problem. These skills will be applied when they assess and identify parts of the problem that they may want to address when they conduct a case study analysis of an aspect of food security pertinent to their assigned region.

Reading: *The Wicked Problem of Global Food Security* (Microsoft Word 2007 (.docx)).
(Estimated time to complete: 15 minutes).

Review: Unit 2 Pre-Class Homework Tutorial (PowerPoint 2007 (.pptx)). Students can use the homework organizer supplied here to take notes and complete their homework assignment: Unit 2 Homework Organizer (Microsoft Word 2007 (.docx)).
(Estimated time to complete: 45 minutes)

2.2 Introductory Class Discussion [Time: 200 minutes] Linked to Learning Outcome

Self-evaluation: As part of the homework tutorial, students are instructed to bring to class the system diagram they created that identifies parts of the Earth system and how they are connected to any one of the socioeconomic, geopolitical, and cultural factors that result in food insecurity. The provided rubric

	that shows expectations for the diagram can be projected as students enter the classroom so they can check their work and make changes as needed. Alternatively, the diagrams can be collected as homework. (Estimated time to complete: 5 minutes) Discussion: A short slide stack to initiate classroom discussion is provided that reviews Earth system concepts covered in pre-class assignment. Unit 2 Discussion Slides (PowerPoint 2007 (.pptx)). What were impressions of students ~~last class~~? What were some of the big takeaways? Was anyone overwhelmed when they took a closer look at the scope of the problem of food security? Review the idea of "wicked problems" as discussed in the homework, and stress that food security is characterized by complexity and can only be approached through the use of a systems perspective. Review the parts of a system. Students were introduced to systems thinking in the homework tutorial, using the Earth system as an example. They also read a short piece by a computer scientist why he thinks Earth systems are a good way to learn about systems thinking. Draw a simple Earth system diagram on the board, and ask a few students to volunteer how they connected a part of the global food system to the Earth system diagram in their homework. When satisfied that the students have a working knowledge of these concepts, break the students into groups of 3-5. (Estimated time to complete: 15 minutes). 2.3 Activity: Creating a Systems Diagram of the Global Food System [Time: 400 minutes] Linked to Learning Outcome
	Group work. Provide each group with a piece of poster paper and marker. Their goal is to identify the parts of the food system as it was presented last class. In the Earth system, there are 4 components identified (hydrosphere, atmosphere, lithosphere, biosphere). What are the components they want to use to organize their diagram? (It might be economic, social, political; or food safety, transportation, storage, or production, for instance). How will they integrate parts of the Earth system? Stress that complex wicked problems will benefit from exploring several different approaches to organizing information, so there is no right or wrong answer, but together the class will identify appropriate approaches for issues they plan on examining. (Estimated time to complete: 20 minutes) Gallery walk. With chart paper diagrams posted on the wall or on tables, invite the class to do a gallery walk and see the variety of ways that different teams conceptualized the global food system. After the gallery walk, the teams are welcome to make additions or changes on their own diagram. Groups are asked to evaluate their diagram, using the systems diagram rubric. (Estimated time to complete: 15 minutes) Self evaluation. Students are provided with an example of a generalized food system diagram, and are asked to identify the components, using system science vocabulary. (Estimated time to complete: 20 minutes) Written exit assignment. Ask each student to submit a short paragraph or diagram describing any one aspect of the global food system that interests them, and how it is linked to other parts of the global food system, including both the human and Earth system aspects. Have them use labels to identify at least one cycle or feedback, flux of matter or energy, as they link the components they have selected. Ask them to speculate on 1) what kind of data they would need to learn more about this part of the food system, and 2) what kinds of changes in human behavior, in what sectors of society, would be required to increase global food security. (Estimated time to complete: 10 minutes) Assessment In this class students are building conceptual skills that build toward the completion of an authentic assessment in Unit 6. The self evaluation at the beginning of classes will assist students in determining whether they can:

- Identify the parts of a system: flux, reservoirs, residence time, cycles, and feedbacks

Describe the major components of the Earth system

Creation of the group global food system diagram serves as a formative assessment of the following learning goals:

- Be able to articulate how systems thinking is critical to understanding wicked problems like global food security
- Apply systems concepts in creating a diagram that identifies one or more links between the Earth system and the global food system for future analysis.

The short paragraph submission at the end of the class will enable the instructor to evaluate whether individual students are able to generalize from their guided understanding of the Earth system to creating system diagrams in another context.

To facilitate self-evaluation or assessment by the instructor, a product rubric is provided that includes guidance for creating diagrams and written work. This rubric can be distributed to students at the beginning of the module so that expectations are explicit for graded work. Universal Rubric for Assignments Units 1-5 (Excel 2007 (.xlsx)).

Module 5	Time-load
Directed Learning Online - Viewing presentations and reading articles as specified in the activities	2 hours
Dynamic Interaction online - Discussing or engaging with the e-tutor and/ or peers	1 hour
Assessment - Individual and Group Contributions and Discussion Forum [Note: Time allowed for preparing Assessment work can vary from 1-7 hours on average per module]	Expected from 17-20 hours for this module, as the student may be directly working on the creation of for assessment.
Independent Learning - Private online or offline engagement with readings, peers or experts [Note: Time available to spend on Independent learning can vary from 7-30 hours in final weeks]	At the discretion of the student
Total Time for Module 5	Approximately 20- 23 hours required for engagement within this module, plus an additional 7-30 hours for independent learning at your own discretion.

SD Pillars	environment	economy	social	culture
21st ESD	Learning to know 	Learning to be 	Learning to do 	Learning to live together 	Learning to transform oneself and society 	Learning to give and share
SDGs Sub goals	1 2 	3 4 5	6 7 8	9 10 11	12 13 14 15 16 17
Vision 2030	Using systems thinking, students will be able to assess the role the Earth system plays in the food system and contributes to food insecurity; and be able to propose plans to promote food security in a locality that include an understanding of the present day food vulnerability, the interaction of human and natural systems, and impacts of climate change. This will lead to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment.			

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	9 h	**3h**	**3h**	-	-	**15 h**	**20 h**		**50 h**

	SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere					
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture		Students work with Gallery walk: "Impact of climate change on agricultural production There are several activities that may be used in implementing the climate change adaptation to achieve food security and promote sustainable agriculture, examples activity:	Students work with Case Study: "Application of sustainable agriculture practices to enhance adaptation to climate variables. In this activity, students consider how several communities are adapting to climate change-related problems including drought's impacts on agriculture, loss of assets due to climate-related hazards, freshwater availability, and extreme heat waves. They will read brief case studies about agro-forestry, insurance strategies	* Students work individually and use internet searching engine and prepare a presentations/seminar on: "Food security of local and regional agro- ecosystems in the context of socio-economic trends" "Food security dimensions in an interdisciplinary fashion". **working in groups: investigate social and technological progress occurs in food security.	Module 2

		Each student is given a handout with all of the climate change adaptation examples.				
3	Ensure healthy lives and promote well-being for all at all ages					
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Students work individually and describe climate change and its impact on the human-built systems such as coastal communities. Next, have students watch Rising Sea Levels video. This engaging video highlights the effects of climate change on coastal communities. As students watch the video, have them record what they "observed" and "wondered" in the first column of Table 1: The Issue (OWL chart). Then, discuss their responses with the class.	Case Studies in Unsustainable Water Use in Agriculture. Each groups are challenged to come to some collective consensus on the water resource problems. They are also prompted to evaluate how the agricultural practices and the associated use of water failed to meet the sustainability criteria. "Application of sustainable agriculture practices to enhance food security problem.	* Students work individually and use internet searching engine and prepare a presentations/seminar on: "Utilize geoscientific thinking techniques in solving a food security problem through a systems approach". "Food security dimensions in an interdisciplinary fashion". working in groups	Module 1	
5	Achieve gender equality and empower all women and girls					
6	Ensure availability and sustainable management of water and sanitation for all					
7	Ensure access to affordable, reliable, sustainable, and modern energy for all					
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all					
9	Build resilient infrastructure,					

Commented [NK10]: You may delete those SDGs that you have not addressed in the course modules

Maybe you can add some items to target more SDGs.

	promote inclusive, and sustainable industrialization and foster innovation					
10	Reduce inequality within and among countries					
11	Make cities and human settlements inclusive, safe, resilient, and sustainable					
12	Ensure sustainable consumption and production patterns					
13	Take urgent action to combat climate change and its impacts					
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development					
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss	How Full is Full activity. This activity can be conducted as a whole-group activity. Give all students soil samples that will be used to simulate an agricultural soil under global climate change to enhance adaptation to climate variables. collecting and preparing soil for the activity from, a local soil sample.	Students work on Soil property identification in-class activity consists of an opening "think/pair/share" activity, followed by a hands-on soil porosity and permeability activity, making sustainable management to restore the terrestrial ecosystems, combat desertification, and reverse land degradation. The activity wrapped up by a class discussion and a homework assignment.	* Students work individually and use internet searching engine and prepare a presentations/seminar on: Agricultural productivity and the ability to feed the growing population. **working in groups: understanding how to manage soil resources in the context of food security.	Module 4	
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels					
17	Strengthen the means of implementation and					

	revitalize the Global Partnership for Sustainable Development				

Name of University: Suez Canal University Title of Course: GIS & RS Applications in Climate Change, Sustainable Agriculture and Food Security					
Name of evaluator: Dr. El-Sayed Ewis Omran					
Community/service-based learning goals and domains	Strong Impact (4 points)	Good Impact (3 points)	Some Impact (2 points)	Minimal Impact (1 point)	Grade
Define Activity Goals, Objectives and Outcomes This activity defines clearly the goals, the purpose of community or service learning component and the expected learning outcomes.	The community-based or service-learning activity goals, purpose and expected learning outcomes clearly identified as well as connections between academic achievement, civic engagement, and personal growth supporting transformative learning.	The community-based activity goals, purposes and outcomes are clearly defined and include: academic achievement, civic engagement, personal growth in line with transformative learning.	Certain goals, purposes and outcomes are defined, but academic achievement, civic engagement, personal growth are not adequately defined.	Activity goals and learning outcomes are not clearly defined or do not address academic achievement, civic, personal outcomes.	4
Critical comments: Provide your constructive and critical comments aiming to improve the activity	Activity Objective: Mapping the Global Food System Students will create a map tracing the commodity of chocolate through the global food system considering the multiple factors involved. Activity Goal 1: Define food security Activity Goal 2: List five contributing factors to food (in)security Activity Goal 3: Define and describe components of the global food system Activity Goal 4: Create a simple map using ArcGIS Online Activity Outcome: Students will create a map describing the global food system through the case study of chocolate.				
Meet Actual Community Needs Collaboratively This activity meets an actual need in the community and is coordinated through collaboration with the community.	The community-based activity is based on a thorough review of needs and collaboration with the community	The activity is decided upon basic research and collaboration between the responsible instructor and community.	The activity is based on a guess as to what the community needs may be. No collaboration with faculty instructor or community.	The community needs are not taken into consideration and no collaboration is evidenced.	3
Critical comments: Provide your constructive and critical comments aiming to improve the activity	Students are provided with an example of a generalized food system diagram (chocolate case), and are asked to identify the components, which meets an actual need in the community using system science vocabulary and is coordinated through collaboration with the community.				
Merging Theory with Practice & Course Curriculum Connection This community-based activity provides the students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.	The community-based activity is structured in a way that provides opportunities to students apply new knowledge and skills in a real-life context and shows a strong connection to the whole course.	Through the activity students have some active application of new knowledge and skills, showing a good connection to the whole course.	Through the activity students can experience some application of new knowledge and skills, showing minimal connection to the whole course.	Through the activity student do not apply any new knowledge and skills without connection to the whole course.	4

Commented [NK11]: This is a rubric that the evaluator will fill. Delete it

Critical comments: Provide your constructive and critical comments aiming to improve the activity	The activity describes global food security as a "wicked problem," which has complex attributes and are notoriously difficult or impossible to solve. It explains to the student why they will be learning about systems thinking, and how this tool will help them to navigate the complexity of the global food security problem (chocolate case). These skills will be applied when they assess and identify parts of the problem that they may want to address when they conduct a case study analysis of an aspect of food security pertinent to their assigned region.				
Enhance Active Student Reflection This activity will challenge students to make meaning of their community service experience, provide them an opportunity to reflect upon their own learning and their role in society.	In the community-based activity, it is evident that students can actively reflect on their learning experiences that can eventually lead to personal and societal transformation.	Through the activity students have opportunities to reflect on provides their learning experiences that can reinforce some personal and societal transformation.	Through the activity student reflection is minimal and there is no clear evidence of personal and societal transformation.	There is absence of true active student reflection and any potential for personal and societal transformation.	4
Critical comments: Provide your constructive and critical comments aiming to improve the activity	Provide each group with a piece of poster paper and marker to reflect upon their own learning and their role in society. Their goal is to identify the parts of the food system as it was presented in the case study. What are the components they want to use to organize their diagram? (It might be economic, social, political; or food safety, transportation, storage, or production, for instance). How will they integrate parts of the system? Stress that complex wicked problems will benefit from exploring several different approaches to organizing information, so there is no right or wrong answer. Groups are asked to evaluate their diagram, using the systems diagram rubric.				
Develop Learning to Give and share This community-based or service-learning activity will provide the student with the opportunity to develop learning to give and share.	The community-based or service learning activity helps solve a real-life problem, meet a need or address an issue in community served.	Service activity provides some change or insight. Service enhances an already good community situation.	Service mainly decorative, but activity provides some benefit to community served.	Service mainly decorative, but service provides limited community benefit or does not offer any new or unique opportunity.	4
Critical comments: Provide your constructive and critical comments aiming to improve the activity	With chart paper diagrams posted on the wall or on tables, invite the class to do a gallery walk and see the variety of ways that different teams conceptualized the global food system. This service-learning activity provides the student with the opportunity to develop learning to give and share. After the gallery walk, the teams are welcome to make additions or changes on their own diagram.				
Make a Difference in Community This community-based activity will provide the student the opportunity to contribute in solving a real community need.	The community-based activity includes actions that empowers students to make a difference, in relation to the community problem or issue to be solved.	The students are given the opportunity to engage in actions that ensure to a good extent to make a difference.	The students show limited understanding of the importance of service in making a difference.	The students show no understanding of what making a difference means.	3
Critical comments: Provide your constructive and critical comments aiming to improve the activity	Each student submit a short paragraph or diagram describing any one aspect of the global food system that interests them, and how it is linked to other parts of the global food system, including both the human and Earth system aspects. This activity provides the student the opportunity to contribute in solving a real community need. Have them use labels to identify at least one cycle or feedback, as they link the components they have selected. Ask them to speculate on 1) what kind of data they would need to learn more about this part of the food system, and 2) what kinds of changes in human behavior, in what sectors of society, would be required to increase global food security.				

ECTS WORK

Learning Components	No	Time Factor	Workload	Course Modules					Workload
				1	2	3	4	5	
Lecture (face- to- face)	10	4	40	6	8	8	9	9	40
Online	5	3	15	3.5	3.5	3	3	3	15
Lab Work	5	3	15	2	4	3	3	3	15
Reading	80	0.5	41	11	13	16	1	-	41
Course activities	6	14	85	36	24	22	3	-	85
Project Work	1	20	19	-	-	-	4	15	19
Prepare exam	1	40	40	-	-	-	20	20	40
Writing the exam	1	3	3	-	-	-	-	3	3
Total			258	59.5	53.5	53	34	50	258

GENERAL COMMENTS

Overall, well structured course.

COURSE OUTCOMES: I suggest keeping the same format by listing the learning outcomes and using verbs.

References should follow same style

MODULES

Make sure that readings *and data sheets should be updated*

Activities are stimulating and thought provoking. They match learning outcomes.

The community-based or service-learning activity goals and expected learning outcomes are clearly identified. The instructor should show more the connections between academic achievement, civic engagement, and personal growth that supports transformative learning.

Teaching Methods:

Based on a student-centred approach, the course supports an active role for students, supporting opportunities for formative assessment, self-evaluation, and cooperative learning.

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Course Syllabus

Course Name: Climate Change Mitigation and Adaptation

Suez Canal University

Faculty of Agriculture

Fall Semester, 2018

Instructor Information

Instructor: Khalid El-Sayed Abd El-Hamed Ibraheim, Mohammed Wasfi Elwan, Marwa Samir Kamel.
Office Location: Faculty of Agriculture, SCU, New Campus
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Website: ----------

Course Identification

Course Name: Climate Change Mitigation and Adaptation

Course Location: Center of Excellence in Climate Change, Sustainable and Food Security

Class Times: Lecturer:

Practical Session:

Prerequisites: None

Faculty Web Page: http://agri.scuegypt.edu.eg/?page=pages&page_id=479

Course Description/Overview

The impacts of climate change on agriculture could be devastating in many areas. Adaptation and mitigation measures are urgently needed– to reduce the adverse impacts of climate change.

Mitigation - reducing climate change - involves reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing sources of these gases or enhancing the "sinks" that accumulate and store these gases. The goal of mitigation is to avoid significant human interference with the climate system, and stabilize greenhouse gas levels in a timeframe sufficient to allow ecosystems to adapt naturally to climate change and ensure that food production is not threatened .

Adaptation - adapting to life in a changing climate - involves adjusting to actual or expected future climate. The goal is to reduce the vulnerability to the harmful effects of climate change (e.g.sea-level rising, more intense extreme weather events or food insecurity).

Course Learning Objectives

This course is designed to provide students with comprehensive knowledge and skills concerning climate change adaptation and mitigation approaches. This course examines issues related to the impacts of climate change on agriculture and adaptation responses and to the mitigation of greenhouse gases. In particular, the course analyses achieving reductions in greenhouse gas emissions through the implementation of different actions in the agricultural sector. The overall goal of the course is to help guide policy makers in the design of policies to address climate change issues in agriculture.

Commented [NK1]: I did not see any section in this syllabus addressed to policies, not even in the learning outcomes

Course Content Learning Outcomes

At the end of this course participants will be able to:

- Analyze the impacts of climate change on the agricultural sector.
- Explain the main factors that affect agricultural productivity.
- Examine adaptation and mitigation measures needed to reduce the adverse impacts of climate change on agriculture.
- Explain the major sources of greenhouse gas emissions, and how agriculture can help in reducing emissions through specific agricultural practices.
- Show ability of grafting technique.
- Identify the factors that affect the yield and quality under unsuitable climate conditions.

- Understand the role of safety chemicals and fertilizers for production high yield and quality of field and horticultural crops under varying climate conditions.
- Assess the advantages of modern irrigation systems for decreasing water amount and increase the soil fertility.
- Evaluate new genotypes and strains to overcome biotic stresses.
- Identify the advantageous of *in vitro* culture technique for producing strain lines tolerate heat stress with high fruit yield and quality to meet the circumstances of CCSAFS.
- Evaluate and compare crop pests and climate change and risk.
- Recognize insects' adaptation and mitigation.
- Apply practice control pests in the field.
- Explain the evolution Arthropod diversity and extinction.
- Apply Integrated Pest Management techniques.

Course Resources

Required Course Texts and Materials:

- Course Notes (Class note will be prepared and distributed at the beginning of the lectures).
- Reddy P.P. (2015) Impacts of Climate Change on Agriculture. In: Climate Resilient Agriculture for Ensuring Food Security. Springer, New Delhi.
- Tubiello, F. (2012). Climate change adaptation and mitigation: challenges and opportunities in the food sector. Natural Resources Management and Environment Department, FAO, Rome.
- Altieri, M. A., and Nicholls, C. I. (2017). The adaptation and mitigation potential of traditional agriculture in a changing climate. Climatic Change, 140(1), 33-45.
- Howden, M., Soussana, J.F. & Tubiello, F.N. 2007. Adaptation strategies for climate change. Proc. Nat. Ac. Sciences 104:19691-19698.
- IPCC. 2007. *Mitigation of Climate Change*. Assessment Report 4, Working Group III, Inter- Governmental Panel on Climate Change.
- Bakkegaard, R.K; L.R. Møller and F. Bakhtiari. 2016 Adaptation and mitigation in agriculture and forestry. For more on the Climate Resilient Development (CRD)

programme, see http://www.unepdtu.org/What-We-Do/Thematic-Programmes/Climate-Resilient

- Petzoldt, C. and A. Seaman. (2007). Climate Change Effects on Insects and Pathogens. Fact Sheet.
- http://www.climateandfarming.org/clr-cc.php.
- Petzoldt, C. and A. Seaman. (2007). Climate Change Effects on Insects and Pathogens. Powerpoint file. http://www.climateandfarming.org/clr-cc.php
- Wolfe DW, L Ziska, C Petzoldt, A Seaman, L Chase, K Hayhoe. 2008. Projected change in climate thresholds in the Northeastern U.S.: implications for crops, pests, livestock, and farmers. Mitigation and Adaptation Strategies for Global Change. 13:555-575, eds., New York: CAB International,2000

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Optional Course Texts and Materials

- Mendelsohn, R. (2008). The impact of climate change on agriculture in developing countries. *Journal of Natural Resources Policy Research*, *1*(1), 5-19.
- Climate change adaptation and mitigation: challenges and opportunities in the food sector. Food and Agriculture Organization of the United Nations (FAO) Natural Resources Management and Environment Department Rome, September 2012
- Pathak H, Aggarwal PK and Singh SD (Editors). 2012. Climate Change Impact, Adaptation and Mitigation in Agriculture: Methodology for Assessment and Applications. Indian Agricultural Research Institute, New Delhi. pp xix + 302.
- Rosenzweig, Cynthia and Tubiello, Francesco Nicola, "Adaptation and mitigation strategies in agriculture: an analysis of potential synergies" (2007). *NASA Publications*. 25. http://digitalcommons.unl.edu/nasapub/25
- Whitney, S, J. Whalen, M. VanGessel, B. Mulrooney. 2000. Crop Profile for Corn (sweet) in Delaware. http://www.ipmcenters.org/CropProfiles/docs/DEcorn-sweet.html
- Shelton, A.M., W.R. Wilsey, and D.M. Soderlund. 2001. Classification of insecticides and acaricides for resistance management. Dept. of Entomology, NYSAES, Geneva, NY14456.315-787-2352. http://www.nysaes.cornell.edu/ent/faculty/shelton/pdf/res_mgmt.pdf

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Assignments and Grading Scheme

Grading Policy

Assignments	10%
Practical Exam	20%
Oral Exam	10%
Final Exam	60%
Total Points	100

Course Schedule

Week	Date	Topics
1		Unit 1.1: Climate change terminology.
2		Unit 1.2: Historical overview of climate change.
3		Unit 1.3: Climate change: evidence and causes.
4		Unit 2: Climate Change Impact on Agriculture I.
5		Unit 2: Climate Change Impact on Agriculture II.
6		Unit 3: Climate change adaptation. I
7		Unit 3: Climate change adaptation. II
8		Unit 3: Climate change adaptation. III
9		Unit 4: Climate change mitigation. I
10		Unit 4: Climate change mitigation. II
11		Unit 4: Climate change mitigation. III
12		Unit 5.1: what is Phenology? Unit 5.2: Effect of climate change on insect

		migration Unit 5.3: Impact of climate change on pests adaptation and mitigation
13		Unit 6.1: Change geographic distribution and population dynamics of insect pests. Unit 6.2: The Diversity of Arthropods
14		Unit 6.3: Effects on expression of resistance . Unit 6.4: Adaptation of integrated pest management to future pest risks.
15		Final Exam

Course	Climate Change Mitigation and Adaptation Developed by Dr. Khalid El-Sayed Abd El-Hamed, and Dr. Marwa Samir Kamel, Suez Canal University
Module 1	Climate change terms, concepts and the physical science basis
Key Concepts	Global warming, greenhouse gas, carbon footprint, fossil fuel, vulnerability.
Overview	The module examines climate change from an international perspective, with particular emphasis placed on Egypt case. The course opens with a brief review of the latest scientific findings and the most recent developments in climate change. The module covers the terminology, history and evolution of climate change. This module is an introductory step for student to the other advanced modules and courses and helps pave the road for studying climate change impacts on agricultural sector.
Aim	Introduce student to a comprehensive knowledge on causes and impacts of climate change with a special emphasis on agricultural and natural resources systems.
Learning Outcomes	At the end of this module participants will be able to: - Understanding of climate change meaning from global viewpoint. - Recognize the most important terminology and history of climate change. - Recognize the scientific evidence for climate change.
Units	Unit 1.1: Climate change terminology. Unit 1.2: Historical overview of climate change. Unit 1.3: Climate change: evidence and causes.
Readings	- Course Notes.

<table>
<tr><td></td><td>- The United Nations Framework Convention on Climate Change glossary of climate change acronyms and terms (http://unfccc.int/essential_background/glossary/items/3666.php).
- NASA global climate change (https://climate.nasa.gov/evidence/).
- Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.(https://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter1.pdf).
(https://royalsociety.org/~/media/Royal_Society_Content/policy/projects/climate-evidence-causes/climate-change-evidence-causes.pdf).</td></tr>
<tr><td>Activity</td><td>Overview
Assignment 1:
1. Search for 5 possible terms dealing with climate change (other than what were listed in the lecture)
2. Then consider whether these terms are important/used in our community
3. From your list, choose one and write 3-4 paragraphs telling more about it. Why it is a suitable climate change term? How does it fit into our community's and personal interest? Explain why it is applied in the current climate change context?
Assignment 2:
Design a power point presentation that addresses the history of the climate change you should use resources from both suggested readings and alternative resources.
Assignment 3:
Using the internet, search for educational video clips addressing climate change evidence and cause (using your solid knowledge, decide which of these clips were more convincing to you and in turn the public about climate change awareness)
- Video viewing (https://www.youtube.com/watch?v=rxbQDXhZ4fs)

(https://www.youtube.com/watch?v=ReR8Tv--5jQ). The video is about Climate change: evidence and causes which will open a discussion after viewing on how do scientists know that recent climate change is largely caused by human activities?</td></tr>
<tr><td>SDGs</td><td>
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<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td></tr>
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<tr><td>ECTS WORK</td><td>
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<tr><td>Lecture</td><td>Online</td><td>Lab</td><td>Reading</td><td>Course activity</td><td>Project</td><td>Prepare exam</td><td>Writing exam</td><td>Total</td></tr>
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LOAD	9h	-	8h	10h	10h	8h	-	-	45h

Module 2	Climate change impact on agriculture and natural resources
Key Concepts	Rising global temperatures, less precipitation, intense droughts and floods, salinization.
Overview	The impacts of climate change on agriculture could be devastating in many areas. Many regions already feel these impacts, which will get progressively more severe as mean temperatures rise and the climate becomes more variable. Scientific evidence about the seriousness of the climate threat to agriculture is now unambiguous, but the exact magnitude is uncertain because of the complex interactions and feedback processes in the ecosystem and the economy. Five main factors will affect agricultural productivity: changes in temperature, precipitation, carbon dioxide fertilization, climate variability, and surface water runoff.
Aim	This module is designed to provide students with comprehensive knowledge and skills concerning the impacts of climate change on agriculture and adaptation responses and to the mitigation of greenhouse gases.
Learning Outcomes	At the end of this module participants will be able to: - Show understanding of the impacts of climate change on agricultural sector - Explain the main factors that affect agricultural productivity.
Units	Unit 2: Impacts of climate change on agriculture
Readings	- Course Notes. - Reddy P.P. (2015) Impacts of Climate Change on Agriculture. In: Climate Resilient Agriculture for Ensuring Food Security. Springer, New Delhi. - Mendelsohn, R. (2008). The impact of climate change on agriculture in developing countries. *Journal of Natural Resources Policy Research*, *1*(1), 5-19.
Activity	Overview Storytelling activity: Climate change impacts and adaptation: Story from my Nepalese village: Madan Poudel, a youth agriculture activist and student from Nepal, personal story on how climate change is affecting his community, and how farmers are trying to adapt to an increasingly variable climate. (https://ccafs.cgiar.org/blog/climate-change-impacts-and-adaptation-story-my-nepalese-village#.WjLl-fVrxdg) The story won the Climate Change, Agriculture and Food Security (CCAFS) open

	blog competition for the South Asia region. Video viewing: Climate Change and Agriculture: Impacts, Adaptation, and Mitigation(https://www.youtube.com/watch?v=QAg-g5VhxGs) Assignment 1: Design a power point presentation that addresses the impact of climate change on agriculture you should use resources from both suggested readings and alternative resources. Assignment 2: Using the internet, search for video clips addressing impact of climate change on agriculture (using your solid knowledge, decide which of these clips were more robust to you as agricultural specialist)

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		X				X							X		X		

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	3h	-	4h	5h	5h	4h	-	-	21h

Module 3	Adaptation to and mitigation of climate change in agriculture
Key Concepts	Adaptation, mitigation, deforestation, ecosystem
Overview	Climate change will have far-reaching consequences for agriculture that will affect the poor. Greater risks of crop failures and livestock deaths are already imposing economic losses and undermining food security and they are likely to get far more severe as global warming continues. Adaptation and mitigation measures are needed urgently to reduce the adverse impacts of climate change, facilitated by concerted international action and strategic country planning. As a major source of greenhouse gas emissions, agriculture also has much untapped potential to reduce emissions through reduced deforestation and changes in land use and agricultural practices.
Aim	This module is designed to provide students with comprehensive knowledge and skills concerning climate change adaptation and mitigation approaches. This module examines issues related to adaptation responses and to the mitigation of greenhouse gases.

Learning Outcomes	At the end of this module participants will be able to: - Show understanding of adaptation and mitigation measures needed to reduce the adverse impacts of climate change on agriculture. - Explain the major source of greenhouse gas emissions, and how agriculture can help in reducing emissions through specific agricultural practices.
Units	Unit 3: Climate change adaptation Unit 4: Climate change mitigation
Readings	- Course Notes. - Tubiello, F. 2012. Climate change adaptation and mitigation: challenges and opportunities in the food sector. Natural Resources Management and Environment Department, FAO, Rome. High-level conference on world food security: the challenges of climate change and bioenergy, Rome, 3-5 June 2008. - Altieri, M. A., and Nicholls, C. I. (2017). The adaptation and mitigation potential of traditional agriculture in a changing climate. Climatic Change, 140(1), 33-45.
Activity	Overview Brainstorming activity: This activity is designed to generate creative ideas about adaptation to and mitigation of climate change in agriculture through group discussion. Every participant will be encouraged to think aloud and suggest as many ideas as possible. Assignment 1: Similar to the ones introduced to you in the lectures; prepare a poster representing a mind map about several adaptation to and mitigation of climate change in agriculture techniques. -Video viewing: Linking Climate Change Adaptation And Mitigation In Agriculture And Forestry (https://www.youtube.com/watch?v=Y6UF9i7yllM)

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	X	X			X			X		X					X		

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	12h	-	8h	15h	15h	8h	-	-	58h

Module 4	Changes in Arthropod pests, Phenology
Key Concepts	Phenology , Migration, Athropoda and Natural enemies
Overview	We being our discussion with two difficult questions: What are the arthropod pests , and what is a Phenology? At first these question seem easy. Anyone,

	after all, can tell the relation between the climate change and pests, or impact of climate change on arthropoda . However, absolute definitions are not nearly as easy. Questions to be addressed in this module include the following: Why study Insect Migration? What are the insects Adaptation and mitigation? .
Aim	The overriding aim of this module is to turn students able to discourse on complex balance of phenology. How climate change could impact plant pests management practices.
Learning Outcomes	At the end of this module learners will be able to: • Describe and install of the Phenology • Evaluate and compare crop pests and climate change and risk. • Recognize insects adaptation and mitigation
Units	Unit 5.1: what is Phenology? Unit 5.2: Effect of climate change on insect migration Unit 5.3: Impact of climate change on pests adaptation and mitigation
Readings	Whitney, S, J. Whalen, M. VanGessel, B. Mulrooney. 2000. Crop Profile for Corn(sweet)inDelaware. http://www.ipmcenters.org/CropProfiles/docs/DEcorn-sweet.html Shelton, A.M., W.R. Wilsey, and D.M. Soderlund. 2001. Classification of insecticides and acaricides for resistance management. Dept. of Entomology, NYSAES,Geneva,NY14456.315-787-2352. http://www.nysaes.cornell.edu/ent/faculty/shelton/pdf/res_mgmt.pdf
Activity	Overview Assignment 1: The scientific study of some crop pests You will be observing prepared slides and living specimens using the compound light microscope. Insects and spiders representing each of living organisms are available. Your lab report should include microscopic drawings and answers to the questions found at the end of the lab. Your drawings should be complete with titles, magnification and labels. Draw the cells you observe at a magnification that best represents the cell or organism. It is always helpful to use your book, lab manual, or other reference material while making observations and writing up your lab report. Assignment 2: Changes in insect phenology can be studied through long-term experiments with variable sowing dates for observing the appearance of pests on crops. Likewise, the timing of arrival of insect species can also be recorded through light traps, suction traps or pheromone traps. Analysis of long-term data on phenology would reveal changes in the timings of pest appearance under the climate change.

	Assignment 3: Design a power point presentation that addresses the Phenology and relation with pests you should use resources from both suggested readings and alternative resources Assignment 4: Brainstorming activity: This activity is designed to generate creative ideas about Adaptation ,mitigation of pests and relation with climate change in agriculture through group discussion. Every participant will be encouraged to think aloud and suggest as many ideas as possible.

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	X	X		X		X		X		X			X		X		

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6h	-	4h	4h	6h	4h	20h	-	44h

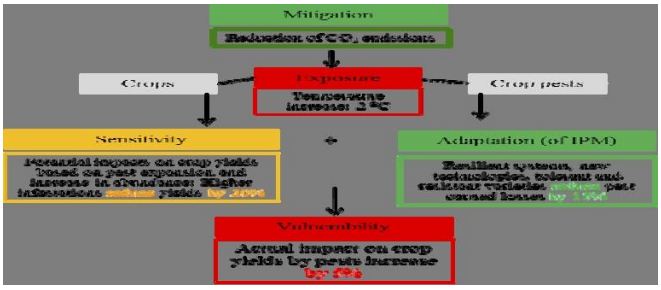
Module 5	Pest Managements strategies in the face of climate change
Key Concepts	Diversity, Climate change- pest Management
Overview	Integrated Pest Management (IPM) is a systematic plan which brings together different pest-control tactics into one program. It reduces the emphasis on pesticides by including cultural, biological, genetic, physical, regulatory, and mechanical controls. To carry out an IPM program, you need to scout and monitor your fields, recognize abnormal conditions and identify their causes, understand the different control methods available, and determine the economic costs and climate change effects. A good IPM program requires planning, monitoring and evaluation finally Adaptation of integrated pest management to future pest risks. Climate change will expose crops and pests to higher temperatures. Predictions until the year 2050 assume an increase of 2°-3°C, if CO_2 emissions cannot be reduced (Fig. 1) 

	Fig1: Reducing crop vulnerability to new and emerging pests by adaptation of IPM. Figures given on yield reductions are only examples to highlight the importance of adaptation in order to reduce the magnitude of higher pest infestations due to climate change.
Aim	The overriding aim of this module is to the climate change and Pest Managements strategies
Learning Outcomes	At the end of this module learners will be able to: • Apply that knowledge as they practice control pests in the field • Explain the evolution Arthropod diversity and extinction • Recognize of some meaning like IPM
Units	Unit 6.1: Change geographic distribution and population dynamics of insect pests. Unit 6.2: The Diversity of Arthropods Unit 6.3: Effects on expression of resistance . Unit 6.4: Adaptation of integrated pest management to future pest risks.
Readings	Joshi S and Viraktamath C A 2004.The sugarcane woolly aphid, Ceratovacuna lanigera Zehntner (Hemiptera:Aphididae): its biology, pest status and control. Current Science87 :307-316. Kaiser J 1996.Pests overwhelm Bt cotton crop. Nature 273 :423. Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. FactSheet. http://www.climateandfarming.org/clr-cc.php 2) Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. Powerpoint file. http://www.climateandfarming.org/clr-cc.php 3) Wolfe DW, L Ziska, C Petzoldt, A Seaman, L Chase, K Hayhoe. 2008. Projected change in climate thresholds in the Northeastern U.S.: implications for crops, pests, livestock, and farmers. Mitigation and Adaptation Strategies for Global Change. 13:555-575 , eds.,New York: CAB International,2000 Website

	http://animaldiversity.ummz.umich.edu/site/index.html
Activity	Overview Assignment1: Each learner carries out several tasks and the results are shared in a collaborative learning project. Task 1: research on integrated pest managements Task 2: 300-word summary of each control, including defenders (authors), period, application, several examples, and limitations of the control Task 3: sharing by email or through a forum, chat room, or mailing list Task 4: shared two-page paper Task 5: production of a reflective report. For example: task 5 Each member of the group produces a reflective report that answers the following ,questions, among others: - What have I learned about the design, technical aspects, and individual and group organization of work in collaborative learning? - How did I learn? - What helped me to learn? - How much time did I spend on this activity? Assignment 2: Design a plan taking into consideration As a group of organisms is being classified, each sorting stage gives us a new level in the system of classification. At the first level, sorting results in the kingdom level, for instance' animal' kingdom or' plant' kingdom. The groups that result from the second sorting make up the phylum level, the third sorting gives us the class level and further sorting gives us the order, family, genus and species levels in turn. In this way most organisms are sorted into plant and animal kingdoms. Animals can then be classified into a number of phyla and each phylum in turn may then be classified into several classes, each class into several orders and so on. As we do this and move from a higher to a lower level of Classification, we find the animals in groups become more and more alike in structure The community-based or service-learning activity: After introducing the IMP concept to student during classes and

	practical work, they will be asked to transfer their scientific knowledge to farmer's field through field trips organized by the course staff members. The location where the activity will be applied will be chosen wisely as it should be within low income, small farmers who lack the access to agricultural extension. The activity will be down under the supervision of course instructors. The damage caused by pests is one of the primary factors leading to the reduced production of major crops. The economic impact related to the direct damage caused by pests is to the purchase of expensive pesticides. For small scale farmers any strategies which will reduce their expenses such as IPM, will be highly beneficial. For more effectiveness, the activity will be coordinated with the other agencies which are more familiar with applying such action. For example, the university community convoy or directorate of agriculture in Ismailia governorate are among those agencies. Integrated Pest Management (IPM) is a major component of climate change adaptation and mitigation course curriculum and it occupy a separate module. The module will provide the student with knowledge, skills and tools for developing agricultural practices that meet IPM. The activity will help merge the theoretical background gained through curriculum with real world situation in farmer's field. Practical skills will be gained through engaging in such activity. Again the choice of activity location is a key point in its success. The location should reflect local community needs. It can be selected within the local communities where the students reside. In this case the student will have the opportunity to work with their local people and bring a great help to close society. It's suggested as part of the activity that student should design a flyer in simple non-scientific langue which will be distributed through their field visits. In this way, the knowledge gained by the students will be able to transfer and shared with the local farmers. Again, the damage caused by pests is one of the main factors leading to the reduced production of main crops. This community-based activity is absolutely providing the student the chance to contribute in

	resolving a real community need.																
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	X	X			X			X		X					X		

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	3h	-	4h	6h	4h	4h	20h	4h	45

Learning Components	No	Time Factor	Workload	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)	14	3	42	9	6	18	6	3	42
Lab work	14	2	28	8	4	8	4	4	28
Reading articles (3 pages per hour)	160	0.25	40	10	5	15	4	6	40
Reading book chapters (5 per/h)									
Preparing course activities	10	4	40	10	5	15	6	4	40
Project work	1	28	28	8	4	8	4	4	28
Preparation for exam	2	20	40	-	-	-	20	20	40
Writing the exam	1	4	4	-	-	-	-	4	4
Total			222	45	24	64	44	45	222

Course	Climate Change Adaptation and Mitigation
Module 1	Impacts of climate change on agriculture
Key Concepts	Rising global temperatures, less precipitation, intense droughts and floods, salinization.
Overview	The impacts of climate change on agriculture could be devastating in many areas. Many regions already feel these impacts, which will get progressively more severe as mean temperatures rise and the climate becomes more variable. Scientific evidence about the seriousness of the climate threat to agriculture is now unambiguous, but the exact magnitude is uncertain because of the complex interactions and feedback processes in the ecosystem and the economy. Five main factors will affect agricultural productivity: changes in temperature, precipitation, carbon dioxide fertilization, climate variability, and surface water runoff.
Aim	This module is designed to provide students with comprehensive knowledge and skills concerning the impacts of climate change on agriculture and adaptation responses and to the mitigation of greenhouse gases.
Learning Outcomes	At the end of this module participants will be able to: - Show understanding of Analyze the impacts of climate change on agricultural sector - Explain the main factors that affect agricultural productivity.
Units	Unit 1: Impacts of climate change on agriculture
Readings	- Course Notes. - Reddy P.P. (2015). Impacts of Climate Change on Agriculture. In: Climate Resilient Agriculture for Ensuring Food Security. Springer, New Delhi. - Mendelsohn, R. (2008). The impact of climate change on agriculture in developing countries. *Journal of Natural Resources Policy Research*, 1(1), 5-19.
Activity	Storytelling activity: Climate change impacts and adaptation: Story from my Nepalese village: Madan Poudel, a youth agriculture activist and student from Nepal, personal story on how climate change is affecting his community, and how farmers are trying to adapt to an increasingly variable climate.

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	(https://ccafs.cgiar.org/blog/climate-change-impacts-and-adaptation-story-my-nepalese-village#.WjLl-fVrxdg) The story won the Climate Change, Agriculture and Food Security (CCAFS) open blog competition for the South Asia region. Video viewing: Climate Change and Agriculture: Impacts, Adaptation, and Mitigation(https://www.youtube.com/watch?v=QAg-g5VhxGs) Assignment 1: Design Prepare a power point presentation that addresses the impacts of climate change on agriculture. Y you should use resources from both suggested readings and alternative resources. Assignment 2: Using the internet, search for video clips addressing the impacts of climate change on agriculture (using your solid knowledge, decide which of these clips were more robust to you as agricultural specialist)																	
SD Pillars	environment			economy			social			culture									
21st ESD	Learning to know (√)			Learning to be (√)			Learning to do (√)			Learning to live together (√)			Learning to transform oneself and society			Learning to give and share (√)		
SDGs Sub-goals	1 (√)	2 (√)	3	4	5 (√)	6	7	8 (√)	9	10 (√)	11	12	13	14	15 (√)	16	17		
Vision 2030																			
Module 2	Adaptation to and mitigation of climate change in agriculture																		
Key Concepts	Adaptation, mitigation, deforestation, ecosystem																		

Commented [NK5]: Where is gender equality shown?

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Overview	Climate change will have far-reaching consequences for agriculture that will affect the poor. Greater risks of crop failures and livestock deaths are already imposing economic losses and undermining food security and they are likely to get far more severe as global warming continues. Adaptation and mitigation measures are needed urgently to reduce the adverse impacts of climate change, facilitated by concerted international action and strategic country planning. As a major source of greenhouse gas emissions, agriculture also has much untapped potential to reduce emissions through reduced deforestation and changes in land use and agricultural practices.
Aim	This module is designed to provide students with comprehensive knowledge and skills concerning climate change adaptation and mitigation approaches. This module examines issues related to adaptation responses and to the mitigation of greenhouse gases.
Learning Outcomes	At the end of this module participants will be able to: - Show understanding ofExamine adaptation and mitigation measures needed to reduce the adverse impacts of climate change on agriculture. - Explain the major source of greenhouse gas emissions, and how agriculture can help in reducing emissions through specific agricultural practices.
Units	Unit 2: Climate change adaptation Unit 3: Climate change mitigation
Readings	- Course Notes. - Tubiello, F. (2012). Climate change adaptation and mitigation: challenges and opportunities in the food sector. Natural Resources Management and Environment Department, FAO, Rome. High-level conference on world food security: the challenges of climate change and bioenergy, Rome, 3-5 June 2008. - Altieri, M. A., and Nicholls, C. I. (2017). The adaptation and mitigation potential of traditional agriculture in a changing climate. Climatic Change, 140(1), 33-45.
Activity	
	Brainstorming activity: This activity is designed to generate creative ideas about adaptation to and mitigation of climate change in agriculture through group discussions. Every participant will be encouraged to think aloud and suggest as many ideas as possible. Assignment 1: Similar to the ones introduced to you in the lectures; prepare a poster representing a mind map about several adaptation to and mitigation of climate change in agriculture techniques.

	- Video viewing: Linking Climate Change Adaptation And Mitigation In Agriculture And Forestry (https://www.youtube.com/watch?v=Y6UF9i7yllM)																	
SD Pillars	environment			economy			social			culture								
21st ESD	Learning to know (√)			Learning to be (√)			Learning to do (√)			Learning to live together (√)			Learning to transform oneself and society			Learning to give and share (√)		
SDGs Sub-goals	1 (√)	2 (√)	3	4	5 (√)	6	7	8 (√)	9	10 (√)	11	12	13	14	15 (√)	16	17	
Vision 2030																		
Module 3	Sustainable agriculture and food security by production of crops under protected conditions																	
Key Concepts	Greenhouses, food scarce, sustainability and adaptation ,																	
Overview	Egypt has is an arid and semi-arid lands country, which coverings an area of about one million square kilometres in the north-east corner of Africa and Sinai Peninsula of south-west Asia. More than 100 million inhabitants now occupy only 5% of this area, which is mainly concentrated in the Nile Valley, the Delta and the coastal zone along the Mediterranean Sea. Thus, Egypt has one of the highest population densities in the world with an average of 2000 inhabitants per km^2. More importantly, Egypt is one of the countries that suffer severe salinity problems. For example, 33% of the total cultivated land, in Egypt (approximately 8-9 million feddans) is already salinized. This salinization is mainly due to low precipitation (<25 mm annual rainfall), high temperature, high surface evaporation (1500-2400 mm/year), poor drainage system with 98% of the cultivated land under irrigated, rising water table (less than one meter below the soil surface), and irrigating with low quality water (up to salinity of 4.5 dS/m). The reduction in production capacity of soils affected by salinity is about 30%, threatening the livelihoods of the poor farmers and having a significant negative impact on the food production of Egypt as a whole. Each year about 40000 ha of land becomes unavailable for agricultural production worldwide due to salinisation, and																	

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	approximately 50% of irrigated lands are currently affected by salinity. Projected population and socio-economic growth will double current food demand by 2050. To meet this challenge in developing countries, cereal yields need to increase by 40 %, net irrigation water requirements by 40-50 percent, and 100-200 million ha of additional land may be needed. Food insecurity will continue to be a serious issue in coming decades. Despite significant projected overall reductions in hunger projected by the end of the century – from the current 850 million to about 200-300 million – many developing countries will continue to experience serious poverty and food insecurity, due to localized high population growth rates, poor socio-economic capacity and continued natural resource degradation. By the end of the century, 40 to 50 % of all undernourished are expected to live in sub-Saharan Africa. Projections indicate that MDGs SDGs for undernourishment will not be met, despite robust projected economic growth. Indeed, prevalence of hunger may indeed be halved, but not before 2030, unless additional policy measures are implemented. For limited cultivated land in Egypt, the Egyptian governorate established a huge project to cultivate 100,000 greenhouses to cover local and export demand
Aim	The overriding aim of this module is to turn students able to discuss the nature factors affecting production under greenhouses conditions. In addition to agriculture treatments use to increase the production yield.
Learning Outcomes	At the end of this module learners will be able to: - Identify and discuss the different factors affecting crops cultivated under greenhouses conditions. - Discuss how the some agriculture treatments can affect the yield production. - Discuss hHow the greenhouse gas can change the temperature - Show ability of grafting technique and they could do that by themselves.
Units	Unit 3.1a: Production of warm and cool crops under greenhouses conditions to overcome food scarce Unit 3.1b: Production of grafted plant materials under greenhouses conditions to overcome biotic and a biotic stresses and to maintains the sustainability Unit 3.2: Greenhouse Gas Emission and Carbon sequestration: case study by increas number of greenhouses (National Project for establishing 100000 greenhouses in Eg
Readings	- Course Notes. - Easterling, W.E., Aggarwal, P.K. ,Batima, P.,Brander, K.M., Erda, L., Howden, S.M., Kirilenko, A., Morton, J., Soussana, J. F., Schmidhuber, J. & Tubiello, F.N. (2007). Food, fibre and forest products. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of WG II to the Fourth Assessment Report of the IPCC, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, eds., Cambridge University Press, Cambridge, UK, 273-313. - Howden, M., Soussana, J.F. & Tubiello, F.N. (2007). Adaptation strategies for

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		climate change. Proc. Nat. Ac. Sciences 104:19691–19698. - Smith, P., Martino, D., Cai, Z., Gwary, D., Janzen, H., Kumar, P., McCarl, B. ,Ogle, S., O'Mara, F., Rice, C., Scholes, B. & Sirotenko, O. (2007). Agriculture. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. - IPCC. (2007). *Mitigation of Climate Change*. Assessment Report 4, Working Group III, Inter–Governmental Panel on Climate Change. - UNFCCC. (2007). Investment And and Financial Flows To Address Climate Change. UNFCCC, Bonn, Germany. - Climate change adaptation and mitigation: challenges and opportunities in the food sector. Food and Agriculture Organization of the United Nations (FAO) Natural Resources Management and Environment Department Rome, September 2012 - Pathak H, Aggarwal PK and Singh SD (Editors). (2012). Climate Change Impact, Adaptation and Mitigation in Agriculture: Methodology for Assessment and Applications. Indian Agricultural Research Institute, New Delhi. pp xix + 302. - Rosenzweig, Cynthia and Tubiello, Francesco Nicola, "Adaptation and mitigation strategies in agriculture: an analysis of potential synergies" (2007). *NASA Publications*. 25. http://digitalcommons.unl.edu/nasapub/25
Activity		1. Assignment 3.1: Training students on seedlings production under protected conditions The practical part in this course connected with the production of horticultural crops under greenhouses condition and media for production of young plants. Most economically important vegetable plants produced by planting young plants, which is now a big industry because of some advantages such as shorter growing season and more efficient use of land, improved crop uniformity, more accurate prediction of harvest date, facilitatation ofes the use of a wider range of herbicides, extendings the growing season, more efficient use of expensive hybrid seed. *Preparation and Introduction (15 minutes)* 1. Before students arrive, all materials will be prepared, including: seeds, planting trays, labels, markers, soil mix ingredients. 2. Each group of student's will get got one tray for sowing seeds that is appropriate for the crops they are going to plant. 3. When students arrive on the farm, they will be introduced to the operation with a general description of what is grown and how the food reaches the consumers. They took on a brief (5 - 10 minutes) tour to point out different crops and their different growth stages.

		Making the Soil Mix (15 minutes) 1- The students showed what the prepared soil mix looks like and what it contains. Explain each ingredient's function and importance they got. 2- Cleaning the 209 or 84- cells styrophom trays. 3- Mix the soil ingredients (peatmoss, vermiculite and perilite in 1:1:1 v/v/v) by a solution containing pesticide (Rizolex-T 50% WP). 4- They students demonstrated how to combine the ingredients to make a soil mix, they showed the proportions of each. The students asked to help add water while the lecturer demonstratesd wetting and mixing the soil mix. 5- Addition a few chemical fertilizers, such as nitrate ammonium- sulphate potassium and calcium phosphate. 6- They students demonstrated how to fill the tray with mix in preparation for sowing. They asked to be sure to adequately fill and settle the soil mix within the trays. 7- Two of the students are asked to be responsible for the soil mixing process and instruct the other students to start filling the trays. Once the two students complete mixing, all of the students finished filling the trays with the newly made soil mix. 8- Each group of students asked to make up labels for their tray before sowing. They instructed to include the variety, species name, date and any other important information. *Sowing Seeds (15 minutes)* 1- The students are demonstrated how to sow the seed. 2- The students are informed how many seeds to place in each cell. 3- They are asked to start sowing. A and assist students as needed. 4- After every group has finished sowing their seeds, they are asked to place the trays in the selected area of the greenhouse. Demonstrated how to irrigate the trays, they showed how to be sure the trays are well soaked during the first watering. Also they showed how to water in the future by demonstrating on some more mature seedling trays in the greenhouse. 5- After the students are finished, they looked to a mature seedling tray and showed how the plants come out of each cell when the root development is strong and the plants are ready for transplanting. 2- Assignment 3.2: Training students on grafting process Concerning of vegetable grafting, the commercial use of vegetable grafting is a relatively recent innovation. Commercial vegetable grafting originated in Japan and Korea and was practiced for about 30 years. However, the technique is still

	limited in Egypt in on a commercial scale. Even though the benefits of using grafted plantlets are widely recognized, many other factors must be carefully considered to ensure successful cultivation and satisfactory income with this new technology. For example, generous use of chemical fertilizers and synthetic pesticides should be minimized for the production of environmentally friendly produces, in which interest has been exploding in recent years *Demonstration (10-15 min)* The invited person has experience in vegetable grafting to demonstrate to the students showed the students the grafting process as follows: After rootstock has fully developed cotyledons and scion has cotyledon and first true leaf, plants are pulled out from the tray and laid on a table (before doing the grafting, trays should be watered heavily). She started to cut an angle (35° to 45° angle) into the hypocotyl of rootstock approximately halfway with a razor blade and make an oppositely angled cut on the hypocotyls of the scion. These cuts need to be made so that the scion will be on top of the rootstock when completed. Two cut hypocotyls are placed together, then sealed with aluminum foil to help healing and prevent the graft from drying out. The two plants are then transplanted into a seedling tray with bigger cell (49 cells) that will accommodate the two root balls. Grafted plantlets are then watered heavily until soil is completely wet. The grafting seedling placed under plastic tunnel in the healing chamber under optimum temperature (25-30°e) and humidity (>85% RH). *Student's responsibility (50-60 min)* The demonstrator asked each student to graft a scion onto rootstock as showed. The demonstrator evaluated each student work. She asked the students to irrigate the trays only as needed. After five days she came again to train the students how to cut the top of the rootstock and the bottom of the scion. 3- Assignment 3.3: Collecting materials and preparing a report on advantageous and disadvantageous of protected cultivation under Egyptian conditions.
SD Pillars	Environment: This module dealing with environmental issue by overcomes the effect of high and low temperature degrees using cultivation under greenhouses conditions. Also, the production of grafted plants are useful in to overcome biotic and a biotic stresses such as heat, salinity, draught, diseases..etc which decrease the environmental pollutions caused by high application of pesticides. Economy: Production of crops under protected greenhouses will increase the soil productivity by Optimal use of cultivated area by vertical expansion. Availability of production at times other than the specific planting dates for each crop. Crop production at times other than planting dates can be high prices and can be exported abroad to bring other currency such as dollars and EUR. Also, production of grafted plants could be decrease the amount of pesticide and increase the yield at the end. Social: Agriculture under protected greenhouses will provide new employment opportunities for young people and thus change their social status. Agriculture in

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	greenhouses changes the economic lifestyle of farmers which positively affects their social life. Such as renovating farmers' homes or marrying young people…..etc. Culture: Agriculture under protected greenhouses will change agricultural culture by learning new agricultural processes and the presence of new crops under the conditions of villages where protected farming communities are spread will change the food culture of the region.
21st ESD	- In this module the students should be learning to know the constriction of greenhouse and how to handle the plants inside it. Also, the students should be learning to know the effect of environmental factors on crops inside greenhouses - In this module we expect that the students should be learning to be an expertise in the field of cultivation under greenhouse conditions. - The students should following the treatments inside the greenhouses which decrease the use of pesticide and how to graft the seedlings with high experience. - The students asked during this module to have an activity in their society to change their behaviors such as how to treat the plants to decrease the pesticide and should explain the advantageous of the grafted plants in comparison the un-grafted one.
SDGs Sub goals	- End poverty - End hunger, achieve food security and improved nutrition and promote sustainable agriculture - Ensure availability and sustainable management of water
Vision 2030	
Module 4	**Production of healthy grains and fruits by application of organic fertilizers and other safe treatments using modern irrigation systems**
Key Concepts	Chemical, organic and bio-fertilizers,
Overview	The excessive applications of chemical fertilizers, especially nitrogen, contaminate the soil and reduce the possibility of future use in food production. In the last decade, great efforts have been directed to overcome the problem of excess of chemical fertilizers which caused soil pollution. Fortunately under such conditions, it has become essential to use the untraditional fertilizers as a partial substitute or supplement for chemical fertilizers, reduce the costs of produced yield and environmental pollution as well as increase production and improve quality of field and horticultural crops such as Plant Growth Promoting Rhizobateria (PGPR) and Salicylic acid. This module will introduce students to the whole cultivation process to keep the soil with less contamination from inorganic fertilizers such as nitrate and with application of safe materials using modern irrigation systems to have high grain and fruit yield with high quality. Questions to be addressed in this module are: How you can describe the production of field as well as horticultural crops for high fruit yield and quality? What is the agricultural treatment or safe materials could reduce the pesticides and

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	inorganic fertilizers use? What are the agricultural treatments or safe materials could increase plant resistance to a biotic stresses?
Aim	The overriding aim of this module is to eEnhances understandings on how the students can produce field and horticultural crops with high yield and quality under extreme temperature degrees to meet the circumstances of CCSAFS.
Learning Outcomes	By the end of this module learners will be able to: Identify the factors affect the yield and quality under unsuitable climate conditions. Show Understanding of the role of safety chemicals and fertilizers for production high yield and quality of field and horticultural crops under varying climate conditions to meet the circumstances of CCSAFS. Appreciate the advantages of modern irrigation systems for decreasing water amount and increase the soil fertility.
Units	Unit 4.1a: Changing kind and rate of organic and chemical fertilizer to maintain grain or fruit quality (field trip) Unit 4.1b: Changing amounts and timing of irrigation and other water management using sprinkler and drip irrigation systems (field trip) Unit 4.2a: Altering the timing or location of cropping activities (field trip) Unit 4.2b: Application of safe materials to overcome biotic and abiotic stresses
Readings	- Course Notes. - Bakkegaard, R.K; L.R. Møller and F. Bakhtiari. Adaptation and mitigation in agriculture and forestry. For more on the Climate Resilient Development (CRD) programme, see http://www.unepdtu.org/What-We-Do/Thematic-Programmes/Climate-Resilient-Development
Activity	Overview 1. Assignment 24.1: Training students on application of chemical as well as organic fertilizers *Preparation and Introduction (15 minutes)* 1. Before students arrive, all types of fertilizers will be prepared, including: chemical and organic fertilizers. 2. They students are introduced to the advantages and disadvantages of as well as the importance of each type of fertilizer. *Student's responsibility (30-40 min)* For applying of fertilizers, the students are shown educated how to apply fertilizers such as chemical and organic fertilizers. They will be divided into four

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	groups to for applying complete organic fertilizer or PGPR strains, chemical fertilizers, half dose of chemical plus half dose of organic fertilizers and ¾ dose of chemical and ¼ of organic fertilizers. Assignment 4.2:Training students on the application of safe materials for increasing use efficiency of chemical fertilizers such as Salicylic acid It is well reported that foliar application of SA improved photosynthetic characteristics of plants and increased salt tolerance by increasing antioxidant metabolism. The students will establish an experiment under hot summer season using tomato plants. Salicylic acid dissolved in a few drops of dimethyl sulfoxide and the final volume was reached using distilled water. The pH was adjusted with KOH (1.0 N) to a value of 7.0. All sprays well in the morning (8:00-9:00 a.m.). The students will be divided in to two groups for establishing two experiments: the first one examines the response of three genotypes with different resistance to heat stress, and the second experiment examines the effect of application of different salicylic acid levels such as from 0.0 to 100 µM.
SD Pillars	Environment: This module dealing with environmental issue by decreasing use of chemical fertilizers and low ground water pollutions. Use of safe materials will decrease the use of pesticides. Economy: Agriculture using organic fertilizers and safe substances leads to reduced human health costs. Health food has a positive effect on the daily human activity of man which in turn leads to an increase in working hours and increase yield production. Social: Increase the value of caring for animal husbandry and preserving farm residues to provide organic fertilizer Culture: Organic agriculture will change food culture directed to healthy food and sound attention to healthy food, which will raise the economic value of agricultural products.
21st ESD	- In this module, Sstudents should know the value of organic manure and confiscate the different - characteristics of organic agriculture - how to add organic manure and bio fertilizers. Also, the students should learn the advantageous of modern irrigation systems. - Students should learn to be encouraged to use organic and biological fertilization and to use safe substances. Students should learn to be encouraged to switch from irrigation system to drip irrigation systems and spray to provide water, improve productivity and soil fertility. - Students must learn to live with the culture of clean organic farming and transfer this culture after being convinced to their communities. - Students must learn to do how to prepare organic fertilizers and how to prepare a drip irrigation network - Students should learn to give and share information about clean, organic and bio-farming, and about modern irrigation systems - Students must learn to transform self and society in the direction of clean agriculture in order to protect the health of the individual and society

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SDGs Sub-goals	- End hunger, achieve food security and improved nutrition and promote sustainable agriculture - Ensure availability and sustainable management of water
Vision 2030	
Module 5	**Introduce new genotypes and lines to overcome climate change and a biotic stresses**
Key Concepts	Genotype selection, evaluation, diversity, new lines, high temperature, salinity, draught.
Overview	The crop improvement is dependent upon the availability and use of genetic diversity. There is a continual need for a greater understanding of the extent of genetic diversity and the nature of genetic relationships within germplasm collection. More accurate and complete descriptions of genotypes and patterns of genetic diversity could help determine future breeding strategies and facilitate introgression of diverse germplasm into the current commercial genetic base
Aim	The overriding aim of this module is to enhances understandings on how the students can evaluate the response of the local genotypes, new genotypes and strains produced from *in vitro* culture protocol to temperature diversity to produce high yield as well as to use *in vitro* culture technique to produce new lines tolerate high temperature degrees as well as other a biotic stresses such as salinity and draught to meet the circumstances of CCSAFS.
Learning Outcomes	At the end of this module learners will be able to: - Evaluate new genotypes and strains to overcome a biotic stresses. - Identify the advantageous of in vitro culture technique for producing strain lines tolerate heat stress with high fruit yield and quality to meet the circumstances of CCSAFS.
Units	Unit 5.1a: Use genetic diversity within local germplasm to find more tolerate genotypes for hot as well as other a biotic stresses. Unit 5.1b: Introduce new imported varieties and genotypes tolerate biotic and abiotic stresses *Unit 5.2:* Use *in vitro* culture technique to produce new lines carrying biotic and abiotic stresses.
Readings	- Course Notes. - Barkmann, T.; R. Siebert and A. Lange. (2015). Climate change adaptation and mitigation in agriculture, forestry and water management at the regional scale. Outlook on AGRICULTURE Vol 44, No 4, 2015, pp 257-265 doi: 10.5367/oa.2015.0220
Activity	Overview 1. Assignment 5.1:Evaluate different genotypes under hot temperature

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	The students will establish an experiment under normal and hot summer season using different genotypes of such crop . Collecting data on vegetative, flowering and yield during growing season. Analysis the collected data to compare among tested genotypes grown under different conditions. 2- Assignment 5.2: Production of tissue culture lines to overcome abiotic stress The students will prepare a medium containing auxin such as 2,4-D with different concentrations to cultivate different explants from wheat, rice and tomato plant for callus production. The students will transfer the callus to different medium to get plantlets from callus. The students will evaluate the plantlets morphologicalymorphologically and genetically under greenhouse conditions using different stresses (drought, heat and salt).
SD Pillars	Environment: This module dealing with environmental issue by production of new lines overcome the diverse in temperature and draught and salinity tolerant Economy: The production of new lines reduces the material costs borne by Egypt in the purchase of new varieties from foreign countries. Cultivation of new lines in new lands with a salinity problem increases the cultivated area, which helps in the provision of food in part Social: Cultivate new spaces that increase employment and build new communities Culture: Cultivation of new areas affected by salinity will change the culture of farmers with the value of these lands and will lead to cultivation of these lands with non-traditional crops such as Aspargas.
21st ESD	- In this module, Sstudents should know Knowledge ofthe properties of saline-affected land - Determination of crop classification by salinity tolerance and plant resistance mechanism for a biotic stresses. - Students should learn to be Students must learn to be able to cultivate saline tolerant lands and to select crops and varieties capable of coping with climate change - Students must learn to live with the problems of temperature deviations and produce a crop of uncultivated land and learn how to overcome their problems - Students must learn to do all the agriculture treatments that could be enhanced the yield production. - Students should learn to give and share information on affected lands by salinity or draught and how to solve their problems. - Students must learn to transform self and society in the direction to use the marginal lands and to cultivate crops during the very hot season.
SDGs Sub goals Vision 2030	- End poverty - End hunger, achieve food security and improved nutrition and promote sustainable agriculture - Ensure availability and sustainable management of water

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Module 6	Changes in Arthropod pests Phenology
Key Concepts	Phenology , Migration, Athropoda and Natural enemies
Overview	We begin our discussion with two challenging questions: What are the arthropod pests , and what is a Phenology? At first these questions seem easy. Anyone, after all, can tell the relation between the climate change and pests, or impact of climate change on arthropoda . However, absolute definitions are not nearly as easy. Questions to be addressed in this module include the following: Why study Insect Migration? What are the insects Adaptation and mitigation?.
Aim	The overriding aim of this module is to turn students able to discourse on complex balance of phenology. How climate change could impact plant pests management practices.
Learning Outcomes	At the end of this module learners will be able to: Describe and install of the Phenology Evaluate and compare crop pests and climate change and risk. Recognize insects adaptation and mitigation
Units	Unit 1.1 what is Phenology? Unit 1.2: Effect of climate change on insect migration Unit 1.3: Impact of climate change on pests adaptation and mitigation
Readings	Whitney, S, J. Whalen, M. VanGessel, B. Mulrooney. 2000. Crop Profile for Corn(sweet)inDelaware. http://www.ipmcenters.org/CropProfiles/docs/DEcorn-sweet.html Shelton, A.M., W.R. Wilsey, and D.M. Soderlund. 2001. Classification of insecticides and acaricides for resistance management. Dept. of Entomology, NYSAES,Geneva,NY14456.315-787-2352. http://www.nysaes.cornell.edu/ent/faculty/shelton/pdf/res_mgmt.pdf
Activity	Overview Assignment 1: The scientific study of some crop pests Students are asked to prepare slides and living specimens using the compound light microscope. Insects and spiders representing each of living organisms are available. They should prepare a lab report that includes microscopic drawings and answers to the questions found at the end of the lab. Drawings should be completed with titles, magnification and labels. Students are asked to draw the cells you observe at a magnification that best represents the cell or organism. Assignment 2: Changes in insect phenology can be studied through long-term experiments with variable sowing dates for observing the appearance of pests on crops. Likewise, the timing of arrival of insect species can also be recorded through light traps, suction traps or pheromone traps.

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	Analysis of long-term data on phenology would reveal changes in the timings of pest appearance under the climate change. Assignment 3: Design a power point presentation that addresses the Phenology and relation with pests I should use resources from both suggested readings and alternative resources Assignment 4: Brainstorming activity: This activity is designed to generate creative ideas about Adaptation , mitigation of pests in relation with climate change in agriculture through group discussion. Every participant will be encouraged to think aloud and suggest as many ideas as possible.

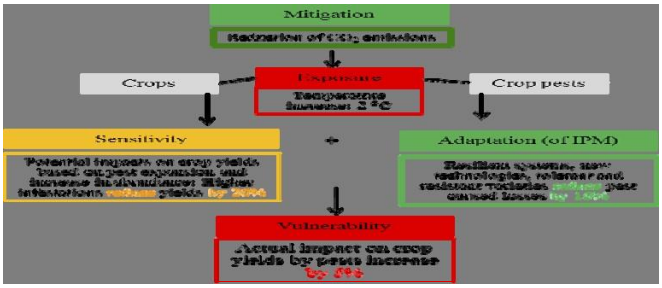
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
~~Sub goals~~	~~(√)~~x	~~(√)~~x		x		x~~(√)~~		~~(√)~~x		x			x		~~(√)~~ x		

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ECTS WORK LOAD	Lecturer	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6h~~(√)~~ ~~(√)~~	-	4h	4h	6h	4h	20h	-	44h

Module 7	Pest Managements strategies in the face of climate change
Key Concepts	Diversity, Climate change- pest Management

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Overview	Integrated Pest Management (IPM) is a systematic plan which brings together different pest-control tactics into one program. It reduces the emphasis on pesticides by including cultural, biological, genetic, physical, regulatory, and mechanical controls. To carry out an IPM program, you need to scout and monitor your fields, recognize abnormal conditions and identify their causes, understand the different control methods available, and determine the economic costs and climate change effects. A good IPM program requires planning, monitoring and evaluation finally Adaptation of integrated pest management to future pest risks. Climate change will expose crops and pests to higher temperatures. Predictions until the year 2050 assume an increase of 2°-3°C, if CO_2 emissions cannot be reduced (Fig. 1)  Fig1: Reducing crop vulnerability to new and emerging pests by adaptation of IPM. Figures given on yield reductions are only examples to highlight the importance of adaptation in order to reduce the magnitude of higher pest infestations due to climate change.
Aim	The overriding aim of this to module is to the climate change and Pest Managements strategies
Learning Outcomes	At the end of this module learners will be able to: - Apply practice control pests in the field - Explain the evolution Arthropod diversity and extinction - Recognize of IPM
Units	Unit 2.1: Change geographic distribution and population dynamics of insect pests. Unit 2.2: The Diversity of Arthropods

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	Unit 2.3: Effects on expression of resistance . Unit 2.4: Adaptation of integrated pest management to future pest risks.
Readings	Joshi S and Viraktamath C A 2004.The sugarcane woolly aphid, Ceratovacuna lanigera Zehntner (Hemiptera:Aphididae): its biology, pest status and control. Current Science, 87: 307-316. Kaiser J 1996.Pests overwhelm Bt cotton crop. Nature 273 :423. Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. FactSheet. http://www.climateandfarming.org/clr-cc.php ~~2)~~ Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. Powerpoint file. http://www.climateandfarming.org/clr-cc.php 3) Wolfe DW, L Ziska, C Petzoldt, A Seaman, L Chase, K Hayhoe. 2008. Projected change in climate thresholds in the Northeastern U.S.: implications for crops, pests, livestock, and farmers. Mitigation and Adaptation Strategies for Global Change. 13:555-575 , eds.,New York: CAB International,2000 Website http://animaldiversity.ummz.umich.edu/site/index.html
Activity	Assignment1: Each learner carries out several tasks and the results are shared in a collaborative learning project. Task 1: research on integrated pest managements Task 2: 300-word summary of each control, including defenders (authors), period, application, several examples, and limitations of the control Task 3: sharing by email or through a forum, chat room, or mailing list Task 5: production of a reflective report. For example: task 5 Each member of the group produces a reflective report that answers the following ~~,~~questions, among others: - What have I learned about the design, technical aspects, and individual and group organization of work in collaborative learning?

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	- How did I learn? - What helped me to learn? - How much time did I spend on this activity? Assignment 2: Design a plan as a group of organisms is being classified, each sorting stage gives us a new level in the system of classification. At the first level, sorting results in the kingdom level, for instance' animal' kingdom or' plant' kingdom. The groups that result from the second sorting make up the phylum level, the third sorting gives us the class level and further sorting gives us the order, family, genus and species levels in turn. In this way most organisms are sorted into plant and animal kingdoms. Animals can then be classified into a number of phyla and each phylum in turn may then be classified into several classes, each class into several orders and so on. As we do this and move from a higher to a lower level of Classification, we find the animals in groups become more and more alike in structure

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	x	x			x			x		x					x		

ECTS WORK LOAD	Lecturer	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	3h	-	4h	6h	4h	4h	20h	4h	45h

~~Comments on the overall course:~~

The ECTS Student Workload Rubric for Assessing ECTS Integration in Course ~~Curriculum is missing~~

~~ECTS and workload. This course is 8 ECTS~~

Reaching the learning outcomes of a course and course modules is directly linked with ~~the~~ ~~*workload* of a course (based on ECTS).~~

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Workload refers to the expected time an average student might need to complete the required learning outcomes.

Student workload covers all educational components of a study program (attending lectures, face-to-face and/or online, seminars, reflections, work placements, dissertations, projects, laboratory work, self-study and examinations). Student workload covers all aspects of learning and is not related solely to formal teaching hours.

It is very critical to weight each component in line with the learning objectives and outcomes, in total and separately for each course module.

That said, there is not rubric for the ECTS that shows this!

You should include an ECTS Student Workload Rubric for Assessing ECTS Integration in CCSAFS Course Curriculum

The workload is divided into a series of learning components, each involving an estimated number of hours of work (time factor). The total workload should match the learning hours indicated by the credit value of the course and be consistent with the rubric.

ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)										
Online										
Lab work										
Reading articles (3 pages per hour)										
Reading book chapters (5 pr/h)										
Preparing course activities										
Project work										
Preparation for exam										

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Writing the exam										
Total										

Be careful on the following:

Alignment: The allocation of student workload should match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.

Balance: There should be strong evidence that the distribution of the working hours is done appropriately between the course modules.

Coverage: The allocation of student workload should match up well with course activities and assessments.

Communication: There should be strong evidence that the student workload allocation is clearly understood and communicated to students.

Monitoring: There should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

CCSAFS Community Based / Service Learning Activity

There are different activities in the course, but none of them is carefully designed to reflect a community based / service learning perspective. To improve the activities described:

The connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.

The activity should meet an actual need in the community and is coordinated through collaboration with the community.

The community based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.

The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their

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own learning and their role in society. The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.

The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.

It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

I have provided you with a clear checklist that summarizes all the above-mentioned points. Please try to re-think the activities as suggested.

SDG Rubric

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I have provided you with a summary table where you can do these connections. It is not clear in your modules. Please follow the same format.

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CCSAFS COURSE SYLLABUS TEMPLATE

Course Syllabus

Course Number: CSAF880

Course Title:

Statistics, and Design and Analysis of Biological Experiments

Semester: II

Instructor Information

Instructor: **Prof.Dr. Abdelrehim A. Ali**
Office Location: Agronomy Department
Telephone:
Office Hours:
E-mail: drrahem@gmail.com
Website:

Course Identification

Course Number: CSAF880
Course Name: Statistics and Design of Biological Experiments
Course Location: Laboratory 2, MSc Program in CCSAFS - Agronomy Building-University New Campus
Class Times: 10.00-1.00
Prerequisites: Non
Faculty Web Page: http://scuegypt.edu.eg

Course Description/Overview

Statistics is a discipline which is concerned with the collection and analysis of data based on a probabilistic approach. Generally one can say that statistics is the methodology for collecting, analyzing, interpreting and drawing conclusions from information. Putting it in other words, statistics is the methodology which scientists and mathematicians have developed for interpreting and drawing conclusions from collected data. Everything that deals even remotely with the collection, processing,

interpretation and presentation of data belongs to the domain of statistics, and so does the detailed planning of that precedes all these activities.

Agriculture belongs to the research fields in which experiments play an outstanding role. A great number of new ideas are based upon results of field and laboratory experiments. Statistics is one of the principal tools, not only when it comes to the analysis of experiments, but already in the planning phase. In this sense statistics means not only management and analysis of numbers, but it defines largely the principles of the scientific method. In this course we try to summarize some aspects deemed important for a good understanding of scientific experimentation, based on the experience of advising students from different fields.
The main purpose of this course is to introduce students to quantitative and qualitative methods for conducting meaningful analysis and research. The course will provide an overview of the important concepts of research design, data collection, statistical and interpretative analysis, and final report presentation. Students will be exposed to the broad range of designs used in communication research from laboratory and field experiments, surveys, focus groups and in-depth interviewing. The course is structured in a logical order of seven modules. It is expected that the statistical knowledge will achieved by the end of this course provide a solid foundation for master degree studies in Biometrics. It is necessary to emphasize the important role of statistics for improving students' general knowledge and for better use of statistical methods in research work.

Statistical methods can be used to find answers to the questions like:
• What kind and how much data need to be collected?
• How should we organize and summarize the data?
• How can we analyze the data and draw conclusions from it?
• How can we assess the strength of the conclusions and evaluate their uncertainty?

So, statistics provides methods for
1. Design: Planning and carrying out research studies.
2. Description: Summarizing and exploring data.
3. Inference: Making predictions and generalizing about phenomena represented.

The course will be delivered through a combination of face-to-face lectures, computer lab practice, individual assignments and seminars. Lectures will explain theories underlying techniques, with real applications of the program disciplines. The course material is designed to offer students a balance between theory and applied examples. In addition the lab practices will provide students opportunities to perform and apply proper statistical analyses for different modules using SPSS package

Course Learning Objectives

The major objective of statistics is to make inferences about population from an analysis of information contained in sample data. This includes assessments of the extent of uncertainty involved in these inferences.
More specifically, we will discuss the process of identifying research questions and selecting appropriate methodologies, understanding the difference between quantitative and qualitative data, and associated benefits and limitations. We will give an overview of common methods, knowledge and skills in statistical techniques using

statistical program such as SPSS and finally discuss the interpretation of findings using multiple data sources.

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Develop research questions and link them to study designs

2. Understand differences between quantitative and qualitative research and their applications

3. Organize and summarize the data.

4. Be familiar with different methods for collecting and analyzing qualitative data

5. Understand simple descriptive analyses for quantitative data

6. Interpret multiple sources of data and develop evidence-based conclusions and recommendations

These learning outcomes will equip students to better understand the data collection methods and tools that are used within the overall CCSAFS research

Course Resources

https://www.google.com/search?q=Springer+Texts+in+Statistics&se_es_tkn=kydnrolv_
SPSS Instruction Manual [PDF]
ftp://public.dhe.ibm.com/software/analytics/spss/documentation/statistics/25.0/en/client/Manuals/IBM_SPSS_Statistics_Core_System_User_Guide.pdf.

https://www.google.com/search?q=SPSS+Instruction+Manual+%5BPDF%5D&se_es_tkn=fvnjly9f

https://www.snapsurveys.com/blog/qualitative-vs-quantitative-research/
https://link.springer.com/book/10.1007/978-1-4419-8408-1

http://dspace.tiss.edu/jspui/bitstream/1/7047/1/Research-MethodologyMethods-and-Techniques-by-CR-Kothari.pdf

Questionnaire design and analysing the data using SPSS
http://teaching.shu.ac.uk/hwb/ag/resources/resourceindex.html.

http://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_multivariable/bs704_multivariable5.html

Chttps://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression

Course Website(s)

Required Course Texts and Materials

Optional Course Texts and Materials

Assignments and Grading Scheme

Grading System

Grading Policy

Grades can be based on the following: (Example)

Assignments	10%
Final Exam	60%
Practical Exam	20%
Oral Exam	10%
Total Points	100

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Course Policies

Late Assignments

Classroom Protocol

Dissability

Important Dates to Remember

Course Schedule

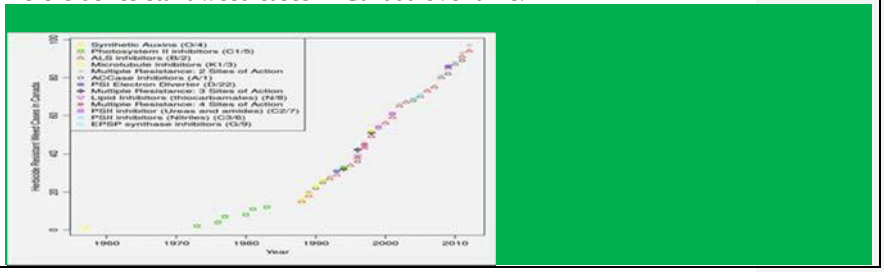
Week	Module	Contents
1	Module 1	Course Overview Discussion of syllabus and assignments, course requirements and prerequisites; assessment criteria and due dates An Introduction to Statistics (2 weeks) Unit 1.1: The CCSAFS Research Context: Trends, Needs &

		Priorities Unit 1.2: Collection, Organizing and Producing Data 1.2.1. Uses of Statistics 1.2.2. Research problem, definition and identification 1.2.3. Types of Variables. 1.2.4. population and sample 1.2.5. Sampling Technique Unit 1.3: Displaying Data (Describing data by tables and graphs) 1.1.Categorical Data (Pie Chart - Bar Charts - Two-way Tables) 1.2.Histograms and the Empirical Cumulative Distribution Function 1.3. Scatterplots
2		Unit 1.4: Measures of center and variation 2.1.Measuring Center (Measures of location) 2.2.Measuring Spread (Measures of spread) 2.3. Confidence interval
3	Module 2	Introduction to SPSS (2 weeks) Unit 2.1. Creating and preparation Data in SPSS 2.1.1: SPSS interface: data view and variable view 2.1.2: Data type, measurement level, and variable list icons 2.1.3: Data entry (create, edit, and format a data file) 2.1.4: Coding data 2.1.5: Data Transformations
4		Unit 2.2. Manipulating and Data analysis in SPSS 2.2.1: Generating Graphical Statistics in SPSS 2.2.2: Statistical Models, Data processing and analysis using SPSS Package
5	Module 3	The Quantitative vs the Qualitative Research Debate (1 week) 3.1. Variables (Type - Scales of measurement). 3.2. Parametric and non-parametric tests. 3.3. Normal distribution curve. 3.4. Normality test 3.5. Applications of SPSS

6	Module 4	Planning Experiments and Developing the Research Design (2 weeks) 4.1. Basic Principles and Techniques of Experimental Design 4.1.1. The Art of Experimentation 4.1.2. Replication 4.1.3. Blocking 4.1.4. Randomization 4.2. Conducting research design and Significance test 4.2.1. Recognition and statement of the problem 4.2.2. Define the objectives of the experiment. 4.2.3. Choice of factors, levels, and ranges 4.2.4. Selection of the response variable(s) 4.2.5. Identify all sources of variation. 4.2.6. Specify the Test, measurements to be made, the experimental procedure, and the anticipated difficulties 4.2.7. Choosing and justifying a research design.. a rule by which to assign the experimental units to the treatments. 4.2.8. Run a pilot experiment. 4.2.9. Conducting the experiment.
7		4.3. An overview of research designs 4.3.1. Simple experiments 4.3.2. Factorial experiments 4.3.3. Multivariate
8	Module 5	Qualitative research methods (2 week) 5.1.Introduction to qualitative research 5.2.Methods of data collection (Observation -Interview - Questionnaires). 5.3. (Questionnaire design) Handling open-ended answers to semi-structured questionnaires. 5.4.Extracting themes, patterns, etc. from qualitative data.
9		5.5.Some important non - parametric tests are used extensively. (Binomial Distributions - Poisson Distributions - Q2).
10	Module 6	Moving from the Quantitative and Qualitative Research Design to the Data Analysis (3 weeks). 6.1. Statistical analysis and drawing conclusions. 6.2. Comparison between two groups (parametric and non-parametric). 6.2.1. One sample T test - Binomial. using SPSS 6.2.2. Paired Samples T Test - Two Related Samples Test (Wilcoxon Signed Ranks Test)…. using SPSS. 6.2.3. Independent Samples Test - Mann Whitney…. Using SPSS. 6.3. Analysis of variance (Comparison between more than two groups) 6.3.1. Hypothesis testing and Test of significance. 6.3.2. F teat - Kuruckal Wallace…. using SPSS.
11		6.4. Types of experiments.

		6.4.1. Simple experiments CRD - RCBD - LS… using SPSS. 6.4.2 Factorial experiments CRD - RCBD - LS… using SPSS. 6.4.3. Split plot experiments using SPSS
12		6.5. Multivariate using SPSS.
13	Module 7	Variables trend and associations (2 weeks) 7.1. Correlation Estimates 7.1.1. Measuring Strength of Association with Correlation using SPSS.
14		7.2. Regression analysis 7.2.1. Linear Regression using SPSS. 7.2.2. Coefficient of determination using SPSS. 7.2.3. Multiple Linear Regression using SPSS.
		General discussions and preparing for the exams

The CCSAFS Course Modules Template

Course	Biostatistics and Design and Analysis of Biological Experiments
Module 1	An Introduction to Statistics (2 weeks)
Key Concepts	Sample and sampling - Variable - Parameter - Statistic - Probability distribution - Discrete and Continuous probability distributions - Symmetrical and skewed probability distributions
Overview	The first module addresses fundamentals and concepts of statistics as a very broad subject, with applications in a program subjects; climate change,sustainable agriculture and food security. When describing quantitative data, we are talking about the distribution of data. The distribution of quantitative data is described by: Shape, Center, Spread, and Outliers. There are two main branches of statistics: descriptive and inferential: Descriptive statistics is used to say something about a set of information that has been collected, describing the main features of a collection of data. For example changes in temperature levels and rainfall variability depend on the operation of climate for the world as a whole. Use descriptive statistics in this context descripe the impacts regionally and their differences internationally. One of the most basic exploratory tasks with any data set involves computing the mean, variance, and other descriptive statistics. This module will demonstrate how to obtain many of these statistics from a data set, using the summary, mean and sd functions. These functions will be used in the context of an entire data set or column from a data set; in most cases it will be more informative to calculate these statistics for groups of data, such as experimental treatments. Inferential statistics is used to make predictions or comparisons about a larger group (a population) using information gathered about a small part of that population. Descriptive statistics are distinguished from inferential statistics (or inductive statistics), in that descriptive statistics aim to summarize a sample, rather than use the data to learn about the population that the sample of data is thought to represent. As indicated in the following figure data represented to show Cumulative number of herbicide resistant weed cases in Canada over time. 

Aim	The main objective of this module is studying and learning different ways to collect, describe and display data. Understanding the essentials of calculating common descriptive statistics for measuring centre, variability, and skewness in data. Also, learning to calculate and interpret these measurements and graphs
Learning Outcomes	At the end of this module students will be able to: 1. Describe the different methods and data collection process. 2. Identify, collect and communicate appropriate quantitative and qualitative data to solve real problems relevant ~~with~~ to CCSAFS themes 3. Organize and summarize the data. 4. Know the difference between categorical & quantitative variables 5. Understand simple descriptive analyses for quantitative data 6. Interpret multiple sources of data and develop evidence-based conclusions and recommendations
Units	Unit 1.1: The CCSAFS Research Context: Trends, Needs & Priorities Unit 1.2: Collection, Organizing and Producing Data Unit 1.3: Displaying Data (Describing data by tables and graphs) Unit 1.4: Measures of center and variation
Readings	*Introductory textbooks* https://www.google.com/search?q=Springer+Texts+in+Statistics&se_es_tkn=kydnrolv Descriptive and Inferential Statistics Descriptive and Inferential Statistics
Activity	Overview
	Assignment 1.1 In Context of study Crop Productivity and Sustainable Agro-ecosystems, write a paragraph explaining how you would take a random sample of wheat plants growing in Ismailia Governorate. Keep in mind; you need to devise a method that will not be biased in any way. Assignment 1.2 (Individuals and variables). We consider two populations - the first is the nations of the world and the second is the people who live in those countries. Below is a collection of variables that might be used to study these populations. nations — people population size — age average rainfall — gender mean income — annual income literacy rate — literacy capital city — mother's maiden name largest river — marital status Classify the variables as quantitative or categorical in the example above. Assignment 1.3 There are many different greenhouse gases, carbon dioxide, or CO2, is the one that has been on the rise during the last century. The concentration of CO2 in the atmosphere has increased by 39 percent. The average Earth surface temperature has

gone up by about 1.4 degrees Fahrenheit (0.8 degrees Celsius) relative to the mid-20th-century baseline (measured between 1951 and 1980)..

In this activity, students will use global temperature data to create models and compare short-term trends to long-term trends. They will then determine whether global temperature is rising based on the data

- CLIMATE CHANGEEARTHGLOBAL WARMINGCLIMATETEMPERATUREMODELSMODELINGTEACHABLE MOMENTS.

1. Explain to students that they will be analyzing average temperatures measured on Earth for the past 136 years, but each group will only be looking at a portion of that data.
2. Distribute the global temperature data, either as a whole set or pre-divided for individuals or groups.
3. Call out each of the date ranges to verify that each one is assigned to a group of students.
4. Tell students that because their graphs will be combined with the graphs from the rest of the class, everyone must use the same horizontal and vertical scale.
5. Ask students to examine the data and determine which value, year or annual mean temperature, should go on the vertical axis. *Although it can be done either way, annual mean temperature should go on the vertical axis for ease of viewing.*
6. When individual graphs are complete, have students determine if they see an increase or decrease in mean global temperature for their group's time frame. Discuss the risk of making climate assumptions and projections when looking at a small data set.

Assignment 1.4

Individually, students will read the data in the following links related with the climate change in Egypt then.

- Each student presents short report about statistics of different items included in these files.
- General discuss in the class about these subjects indicating the role of descriptive statistics generally and in a specific in the program subjects.

https://www.unisdr.org/partners/countries/egy

Egyptian national action program to combat desertification

Egypt: National strategy for adaptation to climate change and disaster risk reduction

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16
	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√ √

Commented [NK2]: Are all SDGs addressed here?
It is preferable to focus on the SDGs that are targeted most in this module

ECTS WORK	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total

LOAD	6h			7h	9h				22

Module 2	Introduction to SPSS (2 weeks)
Key Concepts	Educational SPSS software, inferential statistics, introductory statistics, sampling distribution.
Overview	SPSS is a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. SPSS is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more. SPSS is commonly used in the Social Sciences and in the business world, so familiarity with this program should serve you well in the future. SPSS is updated often. This document was written around an earlier version, but the differences should not cause any problems. Why Computer Applications? Statistical methods are mostly difficult and complicated (ANOVA, regression etc); so, advances in computer technology and statistical software development make the application of statistical method much easier today than before. such analytical software necessary for the Decision support system which serve the management, operations and planning levels of an organization and help people make decisions about problems that may be rapidly changing and not easily specified in advance. To combine the use of models or analytic techniques with traditional data access and retrieval functions.
Aim	Get knowledge and skills to use statistical packages accurately to perform analysis for data and experiments relevant with CCSAFS issues and draw conclusions.
Learning Outcomes	At the end of this module students will be able to: 1. Learn about SPSS and beBecome familiar and aware with Menus and Icons of the program 2. Be familiar with quantitative and qualitative data entry on the SPSS program 3. Use statistical packages accurately to perform analyses for data and experiments relevant with CCSAFS issues. 4. Interpret results and develop evidence-based conclusions and recommendations These learning outcomes will equip students to better understand the data collection methods, data description, analysis and tools to deal with real problems of the overall CCSAFS research (food security, climate change and sustainable agriculture).
Units	Unit 2.1. Creating and preparation Data in SPSS Unit 2.2. Manipulating and Data analysis in SPSS
Readings	SPSS Instruction Manual [PDF] Online introductions and manuals.

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http://www.ats.ucla.edu/stat/spss/sk/default.htm
Indiana University- Getting Started (useful instructions with screenshots)
http://www.psych.utoronto.ca/courses/c1/spss/page1.htm
Central Michigan- Tutorials and Clips (movies, screenshots, instructions- slow loading but good)
http://calcnet.mth.cmich.edu/org/spss/toc.htm
SPSS Statistics Coach and Tutorial (under Help) as well as the ZU library
Online Statistics Textbook
http://www.statsoft.com/textbook/stathome.html
Analysing data using SPSS

http://spss.allenandunwin.com.s3-website-ap-southeast-2.amazonaws.com/data-files.html#.XL5gjDAzbIU
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<tr><td>Activity</td><td>Overview
Assignment 2.1: Working in individual:
Run SPSS, log in and click Start - Programs - IBM SPSS Statistics - IBM SPSS Statistics… Learn about SPSS Statistics three main windows. Follow the instructions of the SPSS guidelines.. Type data into a computer, and organize and format the data so both SPSS and you can identify easily. Tell SPSS what type of analysis you wish to conduct. (data entry, variables characterization, coding of data then descriptive data analysis).

Assignment:2.2:
Students work individually to differentiate, identify and enter the collected data through SPSS program [(traits) either quantitative or qualitative] of different varieties under local and regional agro- ecosystems.
Assignment 2.3:
Working in groups: apply the presented example data in the SPSS
Present your work in 20 min.
Be able to interpret what the SPSS output means and discuss the results with your colleagues.

Assignment:2.4:
Read instructions in the following paper then design questionnaire to study real problem or phenomenon in one axis of the overall CCSAFS researches (food security, climate change and sustainable agriculture).
Questionnaire design and analysing the data using SPSS</td></tr>
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<tr><td>Lecture</td><td>Online</td><td>Lab</td><td>Reading</td><td>Course</td><td>Project</td><td>Prepare</td><td>Writing</td><td>Total</td></tr>
<tr><td>6h</td><td></td><td>2h</td><td>9</td><td>activity 14</td><td></td><td>exam</td><td>exam</td><td>31</td></tr>
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<tr><td></td><td></td></tr>
<tr><td>Key Concepts</td><td>Quantitative/qualitative research, Scales of measurement, Test of normality, Parametric and non-parametric tests</td></tr>
<tr><td>Overview</td><td>There is a long history of discourse of quantitative versus qualitative research traditions. This controversy has created a lot of discussions raising the argument of a</td></tr>
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Commented [NK3]: It is good to specify in the module itself where SDGs are targeted

	mixed methodological approach that combines the strengths and minimizing the weaknesses of quantitative (positivist) and qualitative (interpretive/constructivist) paradigms. Although the differences between qualitative and quantitative research as distinct and opposite, in practice they are often combined or draw on elements from each other. Research is a systematic investigation that aims to generate knowledge about a particular phenomenon. However, the nature of this knowledge varies and reflects study objectives. Some seeks ~~s~~ to make standardised and systematic comparisons, others seek~~s~~ to study a phenomenon or situation in detail. These different intentions require different approaches and methods, which are typically categorised as either quantitative or qualitative.~~.~~ The integration of quantitative and qualitative research can give us a broader understanding of our research subject. Quantitative research can describe the magnitude and the distribution of change, for instance, Whereas qualitative research gives an in-depth understanding of the social, political and cultural context. Mixed methods research allows us to triangulate findings, which can strengthen validity and increase the utility of our work. In statistics, normality tests are used to determine if a data set is well-~~modeled~~modelled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. Testing for normality procedure in SPSS Statistics for the specific statistical test are using to analyze the data, we provide comprehensive guides in our enhanced content. For each statistical test where students need to test for normality, its indicated, step-by-step, the procedure in SPSS Statistics, as well as how to deal with situations where data fails the assumption of normality (e.g., where you can try to "transform" your data to make it "normal"; something we also show you how to do using SPSS Statistics). You can learn about our enhanced content in general here or how we help with assumptions here. However, in this "quick start" guide, we take you through the basics of testing for normality in SPSS Statistics.
Aim	The main aim of this module is to present and discuss the quantitative vs qualitative research arguments and controversies in light of mixed methods designs. Also, ~~,T~~he aim of this module is to overview checking for normality in statistical analysis using SPSS to differentiate between the given data (parametric or nonparametric).
Learning Outcomes	At the end of this module students will be able to: • Understand differences between quantitative and qualitative research and their application. • Apply the normality test to differentiate between the given data (parametric or nonparametric). • Discuss the epistemological underpinnings and controversies of the quantitative/qualitative research. • Demonstrate knowledge of various research methods conducive to quantitative and qualitative research.
Units	Unit 3.1:Variables (Type - Scales of measurement) Unit 3.2: Parametric and non-parametric tests Unit 3.3: Normal distribution curve. Unit 3.4:Test of normality Unit 3.5: Application of SPSS
Readings	https://www.snapsurveys.com/blog/qualitative-vs-quantitative-research/ https://www.simplypsychology.org/qualitative-quantitative.html Rao Sabir Sattar, et. al. (2017). Qualitative and quantitative approaches to study

<table>
<tr><td></td><td>adoption of sustainable agricultural practices: A research-note on mixed method approach. International Journal of Agricultural Extension and Rural Development ISSN 3254-5428 Vol. 5 (2), pp. 539-544.
Hand, Ashley M. (2014). A mixed-methods approach to understanding farmer and rancher interest in supplying woody biomass in the U.S. Northern Great Plains. Graduate Theses and Dissertations. 14145. https://lib.dr.iastate.edu/etd/14145
Oltmans, Shelley Jayne (2013). A case study on the food retail environment of Accra, Ghana. Graduate Theses and Dissertations. 13634.https://lib.dr.iastate.edu/etd/13634
Barrett, Stephen R. (2013). Investigating The Local Food System: A Mixed Methods Study Of Sustainability in Southwest Atlanta." Thesis, Georgia State University, http://scholarworks.gsu.edu/geosciences_theses/65.</td></tr>
<tr><td>Activity</td><td>Overview</td></tr>
<tr><td></td><td>Assignment 3.1:
How would: 1) quantitative; 2) qualitative; and 3) mixed-methods advocates respond to the ontological, epistemological, methodological and axiological questions in connection to the three research paradigms?
Assignment 3.2:
What are the advantages and disadvantages of qualitatizing quantitative data or quantifying qualitative data? Discuss using examples from the field of CCSAFS research.
Assignment 3.3:
Students work individually and in groups to differentiate and identify the collected data [(traits) either quantitative or qualitative] of different varieties under local and regional agro- ecosystems.
Assignment 3.4:
Students work individually and in groups to discuss and criticize the following papers related to application of qualitative and quantitative approaches in fields sustainable agricultural and food security :-
https://www.snapsurveys.com/blog/qualitative-vs-quantitative-research/
https://www.simplypsychology.org/qualitative-quantitative.html

Rao Sabir Sattar, et. al. (2017). Qualitative and quantitative approaches to study adoption of sustainable agricultural practices: A research-note on mixed method approach. International Journal of Agricultural Extension and Rural Development ISSN 3254-5428 Vol. 5 (2), pp. 539-544.
https://lib.dr.iastate.edu/etd/14145
https://lib.dr.iastate.edu/etd/13634
http://scholarworks.gsu.edu/geosciences_theses/65</td></tr>
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10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	3h		3h	9h	12h				27

Module 4	Planning Experiments and Developing the Research Design (2 weeks)
Key Concepts	Hypothesis testing, Research design, problem statement, variable, value, subject/case, descriptive statistics, t-tests, ANOVA, multiple regression analysis, philosophical assumptions.
Overview	An experimental design is a rule that determines the assignment of the experimental units to the treatments. Although experiments differ from each other greatly in most respects, there are some standard designs that are used frequently. These are described briefly in this section. Students must ~~be~~ know ~~what is~~ the Scientific Method~~?~~. They should be able to ~~D~~decide what phenomenon they~~he~~ wish~~es~~ to investigate. Also, they must learn to ~~S~~specify how to~~he can~~ manipulate the factor and hold all other conditions fixed, to insure that these extraneous conditions aren't influencing the response they~~you~~ plan to measure. How many factors are involved when he does an experiment? How many of he have baked a cake? What are the factors involved to ensure a successful Factors might include preheating the oven, baking time, ingredients, amount of moisture, baking temperature, etc. -- what else? Now, should one keep all the factors involved in the experiment at a constant level and just vary one to see what would happen? This is a strategy that works but is not very efficient. This is one of the concepts that we will address in this module. A research design or methodology refers to the overall strategy that you choose to address the research problem and constitutes the blueprint for the collection, measurement, and analysis of data. Since your research problem determines the type of design student should use, before he create a research design, There are different types of research designs depending on the research methodology adopted. Thus, in developing the research design, it is crucial that students examine their philosophical assumptions and those underpinning the research problem and questions, before answering where, when, who and what. Philosophical assumptions relate to ontology, or the nature of reality, the epistemology, the nature of knowledge and axiology, the values guiding to research decisions. The practical steps needed for planning and conducting an experiment include: 1. Recognition and statement of the problem 2. recognizing the goal of the experiment 3. Choice of factors, levels, and ranges 4. Selection of the response variable(s) 5. Choice of design 6. Conducting the experiment 7. Statistical analysis 8. Drawing conclusions, and making recommendations

Commented [NK4]: ??

Commented [NK5]: Better to choose an example related to the CCSAFS themes

	Checklist form must be followed to conduct the research design as steps indicated in:- https://link.springer.com/book/10.1007/b97673 Planning Experiments | SpringerLink - link.springer.com There are different types of research designs depending on the research methodology adopted. Some of them can be: 1) quantitative research design (cause and effect, empirical-analytic, experimental); 2) qualitative research design (action research, case study) and 3) mixed-method research design (combining quantitative and qualitative methodologies). For each of them, despite some similarities, there are also differences as you can see in the examples of the dissertations listed in the readings. What this course will deal with primarily is the choice of the design. This focus includes all the related issues about how we handle these factors in conducting ~~our~~ experiments. Students must be able to understand a problem so that they can apply statistical procedures appropriately and draw suitable conclusions. Knowing when apply particular statistical procedures, such as hypothesis testing, is a difficult skill for students to acquire. They must know the critical features that underlie statistical methods, recognize problems, and apply them appropriately, towards being responsible citizens able to solve community problems.
Aim	The overriding aim of this module is to enhance student's ability to use knowledge, facts, and data to effectively solve problems and to be familiar with the Checklist for Planning Experiments and guide them step by step to the experimental planning process.
Learning Outcomes	At the end of this module students will be able to: - Define research problem and objectives - Explain and identify basic research design concepts - ~~Having~~ Acquire the necessary skills to identify solutions to problems - Specify clearly and explicitly hypothesis [i.e., research questions] central to the problem - Classify and evaluate the strengths and weaknesses of the different research design of CCSAFS research - explain and identify basic research design concepts - Define factors affecting the selection of a research problem. - Distinguish among research designs. - Choose appropriately, and describe in details, a research design for a specific CCSAFS research project - Explain the roles of inference and chance in explaining experimental results.
Units	Unit 4.1: Basic Principles and Techniques of Experimental Design Unit 4.2 Conducting research design and Significance test Unit 4.3: An overview of research designs
Readings	Planning Experiments | SpringerLink - link.springer.com http://tll.mit.edu/help/develop-research-design A First Course in Design and Analysis of Experiments - ... [PDF]

	https://link.springer.com/book/10.1007/978-1-4419-8408-1 http://tll.mit.edu/help/develop-research-design https://www.journals.elsevier.com/global-food-security Kothari, C.R. (2004). Research methodology, Methods and Techniques. NEW AGE International (P) Limited, Publishers, Ansari Road, Daryaganj, New Delhi, India. Available at: http://dspace.tiss.edu/jspui/bitstream/1/7047/1/Research-MethodologyMethods-and-Techniques-by-CR-Kothari.pdf Sustainable Agriculture Theses IOWA STATE UNIVERSITY DIGITAL REPOSITORY https://lib.dr.iastate.edu/gpsa_etd/index.2.html More information about research design see http://tll.mit.edu/help/develop-research-design.
Activity	Overview Assignment 4.1. Define your research design through reflecting on: What? So what? Now what? Think about your own field of study and jot down several of the factors that are pertinent in your own research area? Discuss the operationalization of the statistical models used and the sources of data for the study. Organise a group discussion using the Blended Learning Environment to exchange your reflections on these issues. Assignment 4.2 The purpose of this assignment is for you to explore quantitative, qualitative and mixed-methods research designs. Visit https://lib.dr.iastate.edu/gpsa_etd/index.2.html and choose from the Sustainable Agriculture Theses one example from each of the three research approaches. Read the sections referring to the research methodology. Having these as examples, as continue from the problem statement you formulated in the previous assignment and complete the following: • Background of the research problem • Aims and objectives • Research design be used, and how it was connected to the research subject/discipline • Description of the intervention intended to achieve the objectives • What means will be used to collect the data and what methods will be used to analyse them Upload the assignment and arrange peer-review with another student of your own choice using the Blended Learning Environment. Assignment 4.3: SDGs… End hunger, achieve food security and improved nutrition, and promote sustainable agriculture (CLIMATE CHANGE): Students work in groups to conduct research design based on problem dealing with Impact of climate change on crop production. Students working individually /in groups depending on the number. Students are

<table>
<tr><td></td><td colspan="17">asked to search for published papers exploring the links between climate change and conflicts with most related disciplines (agriculture, livestock, social, economic, culture) and discuss the following points in a form of written report.

-Identify the research problem.

-Describe and explain the research design used

-Interdisciplinary nature of the study

-Different concepts of research designs be used, and how they are connected to the research subject/discipline.

-Studied variables -Sampling procedures and size.

Assignment 4.4: More Real Experiments in Planning Experiments - Springer..[PDF].

Planning Experiments | SpringerLink - link.springer.com</td></tr>
<tr><td rowspan="2">10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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<tr><td rowspan="2">SDGs</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>5</td><td>16</td><td>17</td></tr>
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<tr><td rowspan="2">ECTS WORK LOAD</td><td colspan="2">Lecture</td><td colspan="2">Online</td><td colspan="2">Lab</td><td colspan="2">Reading</td><td colspan="2">Course activity</td><td colspan="2">Project</td><td colspan="2">Prepare exam</td><td colspan="2">Writing exam</td><td>Total</td></tr>
<tr><td colspan="2">6h</td><td colspan="2">3h</td><td colspan="2"></td><td colspan="2">12</td><td colspan="2">10</td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td>31</td></tr>
<tr><td>Module 5</td><td colspan="17">qualitative research methods (2 week)</td></tr>
<tr><td>Key Concepts</td><td colspan="17">Qualitative data, open-ended questions, text analysis, Grounded theory</td></tr>
</table>

Overview	The goal of the service learning activity is to “Implement qualitative assess methods in agro diversity monitoring”. The proposed sService-learning activity provides students a vehicle for integrating experiential learning into the course, select and apply suitable qualitative data collection methods and analysis to assess the crop diversity patterns and its relation with food security. This type of learning will: improve students’ ability to apply appropriate data collection methods and analysis that they have learned to assess for example, crop diversity patterns and relate it to improve community livelihoods, greater interpersonal development, particularly the ability to work well with civil society, interview skills, and build leadership and communication skills, improve social responsibility and citizenship skills, connections with professionals and community members for strengthening learning and career opportunities, excellent opportunity for student’s involvement in community service. Research following a qualitative approach is exploratory and seeks to explain ‘how’ and ‘why’ a particular phenomenon, or programme, operates as it does in a particular context. As such, qualitative research often investigates i) local knowledge and understanding of a given issue or programme; ii) people’s experiences, meanings and relationships and iii) social processes and contextual factors (e.g., social norms and cultural practices) that marginalize a group of people or impact a programme. Qualitative data is non-numerical, covering images, videos, text and people’s written or spoken words. Qualitative data is often gathered through individual interviews and focus group discussions using semi structured or unstructured topic guides. Qualitative type of research relies on close observation, direct or indirect, in-depth interviews, and extensive description of natural settings rather than the quantitative manipulation of variables to verify or reject theoretical constructs (hypotheses), using a deductive approach. Usually, open-ended questions are included in quantitative research instruments. In such cases, the information derived from such qualitative data serves to illuminate the analysis and interpretation of the quantitative results. Sometimes, qualitative data can be used to construct more robust quantitative research designs and vice versa. Summing up, qualitative data analysis has the following characteristics: • Often based on grounded theory practices • Answers the 'why?' questions • Looks further than numerical evidence • Does not concern about generalizability • Pays greater attention to personal cases.
Aim	The main target of this module is:- • Understand when/how to use questionnaires in interaction design • Surveys - - Satisfaction questionnaires (post use) • Learn how to prepare them • ~~Different types of scales - - Questions wording~~

	- Learn about the most common types of questionnaire used in user research - Usability - User research - ~~To~~ help student~~s~~ become familiar with the characteristics, language and logic of qualitative research methods. - ~~To get~~Understand ~~student started in understanding~~ the importance of integrating qualitative data into quantitative studies - ~~Also, to g~~Get knowledge on the processes and practices of qualitative data analysis and theory generation using Grounded Theory.
Learning Outcomes	At the end of this module students will be able to: 1. Be familiar with different methods for collecting and analysing qualitative data 2. Understand the tenets of qualitative research 3. Discuss the ways qualitative data can be integrated into quantitative studies 4. Recognise the processes for extracting meaning from qualitative data. 5. Chunking data into large conceptual categories (composite variables)
Units	Unit 5.1: Introduction to qualitative research Unit 5.2: Methods of data collection (Observation -Interview - Questionnaires). Unit 5.3: (Questionnaire design) Handling open-ended answers to semi-structured questionnaires. Unit 5.4. Extracting themes, patterns, etc. from qualitative data Unit 5.5. Some important non - parametric tests are used extensively. (Binomial Distributions - Poisson Distributions - Q2).
Readings	Grading Rubric for Research Proposal Assignment available at Using Rubrics to Grade, Assess, and Improve Student .. https://dese.mo.gov/sites/default/files/ela-6-my_portfolio_anecdotal-summative_assessment_2-oral_reading_fluency_rubric.pdf Harvard Business Review- Strategies for Effective Interviews accessible at https://hbr.org/1964/01/strategies-of-effective-interviewing See also https://sites.ewu.edu/hr/files/2017/06/Interviewing-Techniques.pdf More information about research design see http://tll.mit.edu/help/develop-research-design https://www.ship.edu/globalassets/student-research/scoring-rubric-1.pdf Questionnaire design and analysing the data using SPSS
Activity	Overview
	Assignment: 5.1: Activity: community service learning This assignment is to get student to practice qualitative data analysis and theory generation using Grounded Theory. You will complete this assignment in three parts. In the first part, student will carry out 2-3 interviews with key experts in the CCSAFS research topic you have chosen, following-up the instructions provided in the Toolkit Part 1, listed in the readings. Then, you are going to use inductive coding to analyze the collected data from the interviews and develop a narrative that answers your research question, following-up the instructions provided in the Toolkit Part 2. More specifically, using the inductive analysis method to code and analyze your data: A) Read through the entire transcript of the data set derived from your interviews a few times. B) Carry out your initial

	coding, generating 20-30 categories. C) Go through your codes and data again, reducing overlap and redundancy, combining related codes, etc. until you have generated 10-15 codes. D) Continue the iterating process on the data until you have roughly 5-8 high-level and meaningful "themes". In the second part, organize an online discussion to discuss examine the differences and work together to reach a consensus between the two sets of codes/themes. Discuss which are the most meaningful to keep and which can be dropped, changed, or consolidated. You may need to rework your codes/themes based on each other's findings. Finally, develop a narrative that explains your data The tasks will be distributed on the team members, since each will has specific role: completing questionnaires, ~~performing~~ conducting interviews, gathering data and information, statistical analyses. Preparing and presenting a report will be performed by the group in front of the class. Then other students will discuss and critique on it. Data on: gender, literacy (read & write), access to agricultural information, land use, types of crops (vegetables, fruits, crops, medicinal plants) and productivity, etc. Before starting the activity, students must prepare necessary documents and needed materials~~stuff~~. Questionnaires and interviews templates must be prepared with the help of course instructor. Data on: gender, literacy (read & write), access to agricultural information, land use, types of crops (vegetables, fruits, crops, medicinal plants) and productivity, intercropping systems, access to land, water availability and resources, etc. it is ~~V~~very important ~~is~~ that students ~~will~~ acquire the skills to carry out interviews and communications with variety of patterns within a community. Assignment 5.2: SDGs End hunger, achieve food security and improved nutrition, and promote sustainable agriculture (SUSTAINABLE AGRICULTURE): Students work individually and in groups to prepare questioner to study some qualitative traits in some crops related to adaptability of these crops to climate change (stress conditions). - Students are requested to collect data on: raising temperature, CO2 levels, precipitation levels, crops productivity, cultivated area, livestock production, fish production, quality of irrigation water, land desertification, fertilizers consumption and women enrol in agricultural activities from published reports. Apply mathematical and illustrative methods to describe these data, and provide general overview on the obtained results. This assignment will be presented and discussed with the course instructor through LMS. - Students are asked to explain the following illustration and discuss how communities perceived different contributing factors to climate change? Students can use data from the following sources #https://data.oecd.org/agriculture.htm #Statistical yearbook 2017, Central Agency for Public mobilization and Statistics.

	http://spss.allenandunwin.com.s3-website-ap-southeast-2.amazonaws.com/data-files.html#.XL5gjDAzbIU

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6h	2h	4	10	10				32

Module 6	Moving from the Quantitative and Qualitative Research Design to the Data Analysis (3 weeks)
Key Concepts	Quantitative and qualitative data, Hypothesis testing, Research design, problem statement, variable, value, subject/case, descriptive statistics, t-tests, ANOVA, multiple regression analysis, philosophical assumptions, data analysis, software (SPSS or PSPP), Cronbach reliability.
Overview	Data Validity: needs to be confirmed prior to any statistical analysis, but it usually begins after a univariate descriptive analysis. Extremes or outliers for a variable could be due to a data entry error, to an incorrect or inappropriate specification of a missing code, to sampling from a population other than the intended one, or due to a natural abnormality that exists in this variable from time to time. The first two cases of invalid data are easily corrected. The latter two require information about the distribution form and necessitate the use of regression or multivariate methods to re-estimate the values. Many research methods derive from the empirical-analytic research paradigm, which seeks to discover facts and causes through the statistical testing of hypotheses. Contrary to that, as you have seen in Module 2, the qualitative or interpretive research paradigm seeks to discover how people see and experience their world, and how they apply meaning to it. Quantitative data is useful when you want to answer what-type questions, while qualitative data is about why people behave the way they do. Unlike quantitative data, qualitative research questions are open than closed generating mostly unstructured information, often in the form of text or narratives. In quantitative data analysis, students are expected to operationalize the conceptual level (e.g. theory-hypothesis formulation) and apply appropriated of the data analysis methods that support data. Quantitative data analysis may include the calculation of frequencies of variables and differences between variables. A quantitative approach is usually associated with finding evidence to either support or reject hypotheses formulated at the earlier stages of the research process (research design). For the analysis of quantitative data, a variety of statistical tests are available, ranging from descriptive statistics (e.g. frequencies, cross-tabs) to correlations, t-tests, comparing means and to the more complex such as the use of ANOVA, regression and factor analysis to develop scales. When analyzing data, always start from review of the research goals. In general, the qualitative type of research relies on close observation, direct or indirect, in-depth interviews, and extensive description of natural settings rather than

	the quantitative manipulation of variables to verify or reject theoretical constructs (hypotheses), using a deductive approach. Usually, open-ended questions are included in quantitative research instruments. In such cases, the information derived from such qualitative data serves to illuminate the analysis and interpretation of the quantitative results. Sometimes, qualitative data can be used to construct more robust quantitative research designs and vice versa. Summing up, qualitative data analysis has the following characteristics: □ Often based on grounded theory practices □ Answers the 'why?' questions □ Looks further than numerical evidence □ Does not concern about generalizability □ Pays greater attention to personal cases When analyzing data (whether from questionnaires, interviews, focus groups, or whatever), always start from review of your research goals, i.e., the reason you undertook the research in the first place. This will help you organize your data and focus your analysis. Research methods necessitate in depth knowledge of those statistics needed to answer the research questions posed. *NCSS*, *SPSS* and others programs provide numerous tests to formally test for normality. If a variable fails a normality test, it is critical to look at the box plot and the normal probability plot to see if an outlier or a small subset of outliers has caused the non-normality. A pragmatic approach is to omit the outliers and rerun the tests to see if the variable now passes the normality tests. The most common statistical package are SPSS, but PSPP programs for statistical analysis that resembles much SPSS can do many of the statistics SPSS does.
Aim	The main goals of this module ~~is~~ are: (~~1~~) to get knowledge and skills in statistical techniques and a statistical program such as SPSS and (2) To apply knowledg~~skills relating to statistics to solve problems.~~
Learning Outcomes	At the end of this module learners will be able to: 1. Code~~ify~~ and prepare a quantitative data set 2. Describe the data needed for testing hypotheses. 3. Perform a hypothesis test using the different statistics (T and F tests). 4. Understand the basic purpose for analysis of variance and the general logic that underlies this statistical procedure. 5. Perform an analysis of variance to evaluate the data from a single-factor, independent-measures research study. 6. Describe the steps that are taken in conducting a test of statistical significance 7. Describe and justify the methods of analysis to be applied to the data in determining whether or not the hypotheses are true or false. 8. Acquire the skills of statistical analysis using SPSS program. 9. Describe how to interpret data and analyze results.
Units	Unit 6.1: Statistical analysis and Drawing conclusions. Unit 6.2. Comparison between two groups (parametric and non-parametric) One sample T test - Binomial~~..~~ using SPSS Paired Samples T Test - Two Related Samples Test (Wilcoxon Signed Ranks Test)…. using SPSS

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	Independent Samples Test - Mann Whitney…. using SPSS. Unit 6.3: Analysis of variance (Comparison between more than two groups) F teat - Kuruckal Wallace…. using SPSS. Unit 6.4: Types of experiments. Simple experiments … CRD - RCBD - LS… using SPSS. Factorial experiments … CRD - RCBD - LS… using SPSS. Split plot experiments using SPSS. Unit 6.5: Multivariate using SPSS.
Readings	https://www.coursera.org/browse/data-science/data-analysis https://www.predictiveanalyticstoday.com/data-analysis/ https://ori.hhs.gov/education/products/n_illinois_u/datamanagement/datopic.htmE http://www.businessdictionary.com/definition/data-analysis.html SPSS Instruction Manual [PDF] Online introductions and manuals. ☐ http://www.ats.ucla.edu/stat/spss/sk/default.htm ☐ Indiana University- Getting Started (useful instructions with screenshots
Activity	Overview Assignment 6.1 Look into the methodology sections of the dissertations listed in the link. https://lib.dr.iastate.edu/gpsa_etd/index.2.html and choose from the Sustai Agriculture Theses one example from each of the three research approaches. the sections referring to the research methodology. Discuss the methodology used for these studies. Explain whether you think th methodology used is an appropriate one. Identify possible problems with the me used. Discuss the operationalization of the statistical models used and the sources of data for the study. Organize a group discussion using the Blended Learning Environment to exchange your reflections on these issues. Assignment 6.2: Students are working in groups/individual. This assignment must be implemented as real-world problem. Student (s) are requested to: - specify data collection method suitable to obtain qualitative information on relevant issues with climate change adaptation (cropping systems, tolerant crops, water use practices, livestock management). -state the existence problem/research problem - chose the data collection method - check the suitability of the used method for the study purposed/problem encountered -examine the Economic and social characteristics of the respondents - apply how the methods was applied (population studies, number of participants) - Process of data analysis and report writing. Assignment 6.3 Start applying an example of research data provided by your instructor using SPSS package, Students work individually and in groups to analyse data using appropriate test (parametric or nonparametric) based on normality test data. Drawing data graphically and in tables. Present final conclusion of results to solve intended

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	problem in community.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√											√				

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course	Project	Prepare	Writing	Total
	8h	3h	6	12	activity 9		exam	exam	38

Key Concepts Overview	Association - Correlation - Regression - Measuring Strength of Association - Modelling Linear Trends When we look at scatterplot, we should be able to describe the association we see between the variables. A quick description of the association in a scatterplot should always include a description of the form, direction, and strength of the association, along with the presence of any outliers. Form: Is the association linear or nonlinear? Direction: Is the association positive or negative? Strength: Does the association appear to be strong, moderately strong, or weak? Outliers: Do there appear to be any data points that are unusually far away from the general pattern? It's also important to include the context of the two variables in the description of these features.
Aim	The overriding aim of the module is make explicit and understandable the meaning and function for correlation and regression, when and how to apply them as a statistical methods to deal with the formulation of mathematical model depicting relationship amongst variables which can be used for the purpose of prediction of the values of dependent variable, given the values of the independent variable (regression) or the strength and direction the relationship between the studied variables (correlation).
Learning Outcomes	At the end of this module students will be able to: • If given a scatterplot, classify the trend as being increasing, decreasing, or non-existent; • Understand the Pearson correlation as a descriptive statistic that measures and describes the relationship between two variables. • Compute the Pearson correlation using either the definitional or the computational formula for SP (the sum of products of deviations). • Understand the Spearman correlation and how it differs from the Pearson correlation in terms of data that it uses and the type of relationship that it measures. • Understand the concept of a linear equation including the slope and Y-intercept. • Students should understand the concept of a least-squared-error solutcon.

[49] ommented [NK6]: ?

	• Compute the linear regression equation for predicting Y values from the X values in a set of correlation data. • Determine if the association is strong or weak, and indicate its shape; • Interpret a scatterplot in context, interpreting trend, strength of association, and shape. • Recognize a linear trend from a scatterplot. • Know what each variable represents in a regression equation. • Use a given linear regression equation to predict a value of the output if given the input. • Interpret the slope of a regression line.
Units	Unit 7.1: Measuring Strength of Association with Correlation using SPSS Unit 7.2: Linear Regression using SPSS Unit 7.3: Coefficient of determination using SPSS. Unit 7.4: Multiple Linear Regression using SPSS.
Readings	Sustainable Agriculture Theses IOWA STATE UNIVERSITY DIGITAL REPOSITORY https://lib.dr.iastate.edu/gpsa_etd/index.2.html https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression http://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_multivariable/bs704_multivariable5.html https://www.graphpad.com/support/faq/what-is-the-difference-between-correlation-and-linear-regression/
Activity	Overview Assignment 7.1: Does the value of the correlation coefficient always show that the relationship is linear? Explain why. (The main idea in this exercise is to emphasize that *r* only after we have confirmed from the scatterplot that the relationship is linear, we are allowed to use the value of *r* strength and direction. In other words, *r* serves as a measure of direction and strength of a LINEAR relationship). Assignment 7.2: **Global warming** refers to the upward temperature trend across the entire Earth since the early 20th century - and most notably since the late 1970s - due to the increase in fossil-fuel emissions since the beginning of the Industrial Revolution. Though there are many different greenhouse gases, carbon dioxide, or CO2, is the one that has been on the rise during the last century. Since the beginning of the Industrial Revolution, the concentration of CO2 in the atmosphere has increased by 39 percent. Increasing the concentration of greenhouse gases causes the Earth greenhouse to overheat. Worldwide since 1880, the average Earth surface temperature has gone up by about 1.4 degrees Fahrenheit (0.8 degrees Celsius) relative to the mid-20th-century baseline (measured between 1951 and 1980)..

Field Code Changed

Field Code Changed

	Use the regression equation to predict the BMI of the heaviest man in the data set. Then find the residual for this man. Based on this, conclude if the prediction is an overestimate or an underestimate. Have students predict global temperature means for the subsequent year. Research this data on the Internet to compare. Assignment 7.3.: Using Global Climate Change data to recognize correlation between C02 increases and global temperature increase as well as natural fluctuates in annual temperature. What do you understand and interpret for this relation between C02 increases and global temperature increase? Assignment 7.4: Preparing a research proposal This assignment will be carried out in cooperation with the students' research supervisors and has three parts. In the first part, you work alone to put all the previous pieces of the assignments you have done and develop a research proposal. While developing your proposal consult the rubrics listed in the readings for self-assessment. In the second part, exchange your research proposal with another student and start to evaluate each one's research proposal following-up the rubrics. Write down an assessment report of 4-5 pages, justifying your evaluation, paying attention to the issues raised in the rubrics. In the third part, using the Blended Learning Environment, set-up an online session to discuss your evaluations. The deadline for this assignment will be discussed with the students' supervisors.

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10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√			√	√		√	√	√

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√											√				

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	5h		4	6	8				29

SUMMRY OF ECTS WORKLOAD

Learning Components	No	Time	Work load	Course Modules							
				1	2	3	4	5	6	7	Sum
Lectures (face-to-face)				6	6	3	6	6	8	5	40
Online							3	2	3		8
Lab work					2	3		4	6	4	19

Reading articles (3 pages per hour)				7	9	9	12	10	12	6	65
Reading book chapters (5 per/h)											
Preparing course activities				9	14	12	10	10	9	8	72
Project work											
Preparation for exam										3	3
Writing the exam										3	3
Total				22	31	27	31	32	38	29	210





General comments

Well-structured course.

Goals and Learning outcomes are well defined. The course covers the main techniques related to experimental planning and analysis.

COURSE SCHEDULE is developed with a good balance. However, I suggest to give more time for the statistical tests.

The topics in the course are well focused and are appropriate for a Master level. The only concern is that the in-depth analysis of the statistical techniques may require more time that what is allocated.

Review the SDGs as they should match the different modules and activities.



CCSAFS COURSE SYLLABUS

Environmental Governance

Developed by Prof. Dr. Esam A. Hussein, Botany and Microbiology Department, Faculty of Science, Al-Azhar University

Instructor Information

Instructor: Prof. Dr. Esam A. Hussein
Office Location: Al-Azhar University
Telephone: 01096770161
Office hours: Sunday-Wednesday 09.00 - 14.00
E-mail: husseine13@yahoo.com
Website:

Course Identification

Course Number:
Course Name: Environmental Governance
Course Location
Class Times:
Prerequisites:
Faculty Web Page:

Course Description/Overview

Governing our planet's rich and diverse natural resources is an increasingly complex challenge. In our globalized world of interconnected nations, economies and people, managing environmental threat, particularly those that cross political borders such as air pollution and biodiversity loss, will require new global, regional, national and local responses involving a wide range of stakeholders. This course provides an adequate understanding of the fundamentals of environmental governance, the limitation and challenges facing environmental governance, and applications of environmental governance; climate change and ecosystem degradation. This course is based on general performance-auditing practice, in line with the International Standards for Supreme Audit Institutions and guidance materials of International Organization of Supreme Audit Institutions Working Group on Environmental Auditing. Its aim is to prepare students to undertake subsequent environmental auditing. The course introduces the basic environmental management principles and auditing terminology used in environmental auditing.

Course Learning Objectives

1. Promote the availability of reliable environmental information

2. Promote students awareness and involvement.
3. Promote environmental assessments and avoid
4. Unintentional negative impacts in other policy sectors.

Commented [NK1]: Avoid what?

Commented [NK2]: What do you mean?

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

- understand basic environmental ~~management~~ governance principles
- understand the importance and complexity of the concept of sustainable development
- define the most common governance tools used in environmental ~~management~~governance
- determine the steps in an audit cycle
- determine common audit planning tool
- report and communicate of audit results

Course Resources

Video class, texts, book chapters, papers and reports, etc

Course Website(s)

Required Course Texts and Materials

Hand-out prepared by the instructor for the class

Optional course Texts and Materials

Lemos MC, Agrawal A. 2006. Environmental Governance. Annu. Rev. Environ. Resour. 31: 297-325. doi: 10.1146/annurev.energy.31.042605.135621

Armitage D, Loe R, Plummer R (2012). Environmental governance and its implications for conservation practice. Conservation Letters 5(4): 245-255. https://doi.org/10.1111/j.1755-263X.2012.00238.x

Ludwig K, Kok M. (2018). Exploring new dynamics in global environmental governance- literature review. PBL Netherlands Environmental Assessment Agency.

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Assignments	10
Class attendance/participation	10
Final Exams	60
Total Points	100

Commented [NK3]: This seems to be a bid percentage. Please reallocate grades also for the activities

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to ~~come~~ attend ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive ~~at~~to class on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and though about the assigned material before you come to class. I expect active class participation.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.
Important Dates to Remember

Course schedule

Week	Date	Topics, Reading, Assignments and Deadline (details on assignments and more bibliography are available in the course modules)
1		Course overview: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2		Introduction and Concepts of Environmental governance
3		Challenges and limitation of Environmental Governance
4		Environmental governance Tools
5		Environmental Governance and Sustainable Development
6-7		Environmental Audit
8-9		Applications of Environmental Governance: Climate Change
10-11		Applications of Environmental Governance: Ecosystem Degradation
12-13		New Dynamics in Environmental Governance
14		Reporting and seminar

SUMMRY OF THE 5 ECTS STUDENTS WORKLOAD

Learning Components	No	Time Factor	Work load	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)	14	1	14	4	4	4	2	-	14
Online	3	2	6	2	1	1	1	1	6
Lab work	8	2	16	3	4	3	3	3	16
Reading articles (3 pages per hour)	50	0,3	15	3	3	3	3	3	15
Reading book chapters (5 per/h)	50	0.2	10	2	2	2	2	2	10
Preparing course activities	2	10 (M)	20	4	4	4	4	4	20
Project work	1	10	10	-	2	-	2	6	10
Preparation for exam	1	50	50	-	10	-	20	20	50
Writing the exam	1	3	3	-	-	-	-	3	3
Total			144	18	30	17	37	42	144

Commented [NK4]: This corresponds to how many credits?

Course	Environmental Governance
Module 1	Concepts in Environmental ~~good~~ governance and Sustainable Development
Key Concepts	Concepts of environmental governance, sustainable development
Overview	This module describes the main ideas in environmental ~~good~~ governance and the tools that governments use to regulate the environmental behavior of both companies and citizens. Environmental good governance follows the principles of good governance, but the difference is that in the case of environmental good governance sustainability is advocated as the supreme consideration in managing all human activities - political, social and economic.
Aim	The overriding aim of this module is to familiarize the students with the governance system in their country with a good understanding of general environmental principles and tools that are accepted worldwide and to be familiar with sustainable development. Describing mechanisms and strategies of environmental governance.
Learning Outcomes	1. Demonstrate the principles of environmental governance locally and globally. 2. Describe the tools of environmental governance regulations. 3. Understand the application of environmental governance for sustainable development
Units	Unit 1.1: Introduction and Concepts of Environmental governance Unit 1.2: Fundamental principles of good environmental governance Unit 1.3: Environmental Governance Tools and models Unit 1.4: Sustainable Development
Readings	1. Lemos MC, Agrawal A. 2006. Environmental Governance. Annu. Rev. Environ. Resour. 31: 297-325. 2. Dryzek, J. (1997) The Politics of the Earth. Oxford, Oxford University Press.

Commented [NK5]: Follow same style in referencing

	3. The Global Environmental Governance Project: https://www.environmentalgovernance.org/ 4. Kutting, G. (2011). *Global Environmental Politics: Concepts, Theories and Case Studies*. Oxon: Routledge. 5. Biermann, F. & P. Pattberg (2012). *Global Environmental Governance Reconsidered*. Cambridge: MIT Press.
Activity	Assingment1a: Collective questions will be prepared to measure the students' basic knowledge Assignment 1b: Quiz

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
				√				√			√			√			

Module 2 Key Concepts	Environmental Audit Concepts of Natural Resources, Ecosystems, Environmental Problems
Overview	In this module, ~~trial to be done to give~~ students will learn ~~sufficient knowledge~~ about an auditor approach relevant issues with the appropriate resources. An understanding of the processes that take place in nature and of the relationships between different ecosystems is necessary in order to grasp the relevance and scale of environmental problems.
Aim	The overriding aim of this module is ~~turn student's able~~ to analyze major environmental problems, identify their root causes and describe what the situation might lead to if left unresolved.
Learning Outcomes	1. Identify environmental problems 2. Addressing future impacts of environmental problems. 3. Collect and analyze the problem data 4. Practices on solving the problems
Units	Unit 2.1: Environmental problems Unit 2.2: Technical, managerial, or behavioral dimensions Unit 2.3: Environmental audit Unit 2.4: Audit cycle
Readings	1. Armitage D, Loe R, Plummer R (2012). Environmental governance and its implications for conservation practice. Conservation Letters 5(4): 245-255. https://doi.org/10.1111/j.1755-263X.2012.00238.x 2. Bouteligier, S. (2013). Cities, Networks, and Global Environmental Governance: Spaces of Innovation, Places of Leadership. New York: Routledge.
Activity	Assignment 2a: Student will be requested to collect data about environmental problems, analyze the data, and suggest the solving of environmental problems. Assignment 2b: Quiz

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√			√		√		

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√		√								√		√	√	√		

Module 3 Applications of Environmental Governance; Climate Change and Ecosystem Degradation

Commented [NK6]: This is not an activity.

Suggested activity:

Ask students to browse the sites below:

□World Meteorological Organization (WMO) □United Nations (UN)
□United Nations Environment Programme (UNEP), (Geneva, Nairobi)
□United Nations Framework Convention on Climate Change (UNFCCC)
□United Nations and Climate Change
□Convention on Biological Diversity (CBD)
□Convention on Long-Range Transboundary Air Pollution □Global Environment Facility (GEF)
□Linkages by International Institute for Sustainable Development (IISD)
□IPCC Data Distribution Centre
□The Ozone Secretariat, UNEP
United Nations Convention to Combat Desertification

Commented [NK7]: Can you tell us where these SDGs are being addressed

Key Concepts	Concept of Climate Change, Ecosystems Degradation
Overview	This module will be focus on concepts relation to climate change and its impacts on environment. Also, ecosystem degradations will be discussed. The role of government to face the climate change and ecosystem degradation. Environmental policy.
Aim	The overriding aim of this module is turn student's aware to challenges facing the environment and government policy such as climate change and ecosystems degradation. Special interest also should be given to Energy flow in the ecosystem
Learning Outcomes	1. Understand and describe environmental governance in term of climate change and ecosystem. 2. Describe strategies for facing climate change problems. 3. Describe strategies for facing ecosystem degradation problems. 4. Understand succession and ecological balance
Units	Unit 3.1: Environmental Governance and Climate Change Unit 3.2: Environmental Governance and Ecosystem Degradation Unit 3.3: Succession, ecological balance and biodiversity.
Readings	1. Lemos MC, Agrawal A. 2006. Environmental Governance. Annu. Rev. Environ. Resour. 31: 297-325. 2. Boyce, Mark S. and Alan Haney, eds. Ecosystem Management: Applications for Sustainable Forest and Wildlife Resources. New Haven: Yale University Press, 1997. 3. Morin, J.F. & A. Orsini (2015). Essential Concepts of Global Environmental Governance. 4. Oxon: Earthscan. Speth, J. G. & P. Haas (2006). Global Environmental Governance. New York: Island Press.
Activity	Assignment 3a: Students will be asked for collecting and analyzing data as well as designing and structuring environmental policy to face environmental problems such as climate change and ecosystem degradation. Assignment 3b: Each student will be responsible for serving as a class discussion leader twice during the quarter.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	√

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		√					√	√			√			√	√		√

Module 4	Environmental Governance and sustainability
Key Concepts	Dynamics of Environmental Governance
Overview	In this module, students will have sufficient knowledge and understanding about development of environmental governance locally and internationally and its relation to sustainability.
Aim	Demonstrate the development and dynamics of environmental governance
Learning Outcomes	1. Explain differences between government and governance, and the various ideas and meanings attached to the goal of sustainable development. 2. Analyse policy-making processes in regard to sustainability issues.
Units	Unit 4.1: Dynamics of environmental governance Unit 4.2: The concept of sustainability

Commented [NK8]: Follow same style for references

Commented [NK9]: Same as module 1. Combine these two modules and check the suggested course schedule at the end of the document to add modules relevant to the course

	Unit 4.3: Environmental governance-sustainability interaction.																
Readings	1. Ludwig K, Kok M. (2018). Exploring new dynamics in global environmental governance- literature review. PBL Netherlands Environmental Assessment Agency. 2. Harris, P.G. (Ed.) (2014). Routledge Handbook of Global Environmental Politics. Oxon: Routledge. 3. O'Neill, K. (2009), The Environment and International Relations. Cambridge: Cambridge University Press.																
Activity	Assignment 4a: Students will read and report about environmental governance on the light of future prospects. Assignment 4b. Classroom discussion.																
10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	√
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√						√			√		√	√			√

I suggest the following Learning Objectives

By the end of the course, students will be familiar with:

- the process through which international environmental governance is made;
- the different actors in the environmental governance arena;
- the effective environmental regimes: obstacles to creating strong environmental regimes, and opportunities to improve compliance with global environmental conventional;
- the histories and strengths and weaknesses of environmental laws in Egypt and the entity primarily responsible for administering environmental statutes;
- the important players in both global as well as national environmental politics and policymaking;
- the scientific controversies related to estimating the human and environmental impacts of global biodiversity loss, ozone depletion, and climate change, the policy options available for addressing these impacts, and the political struggles surrounding both the estimates of potential damage and the proposed policy responses;
- the essential tools of environmental governance analysis, including the assessment of trade-offs, benefits, costs, cost-effectiveness, political feasibility, equity, and justice.

I propose the following course outline

Week 1: Global environmental governance and perspectives on environmental problems

- General introduction to the course
- Natural ecosystems and their services
- Environmental problems as social dilemmas
- Values associated with the environment

Week 2: Ecosystems and human well-being

- Key components of human well-being
- Linkages between ecosystem services and human well-being

Week 3: Human transformation of the Earth: drivers of change

- Demographic drivers (population size, age and gender structure, and spatial distribution)
- Economic drivers (national and per capita income, macroeconomic policies, international trade)
- Sociopolitical (democratization, roles of women and local communities, role of private sector)
- Scientific and technological (research and development, adoption of new technologies)
- Cultural and religious (choices individuals make about what and how to consume and what they value).

Week 4: Rise of environmental politics

- Stockholm, Rio Earth Summit
- International environmental management and policy instruments: voluntary, regulatory and socio-economic incentives

Week 5: Sustainable Development and environmental governance

- Strategies to ensure sustainability of both natural ecosystems and human well-being
- Integrating economic, environmental, social and cultural aspirations
- Integrating information from natural and social sciences
- Harmonizing the use of ecosystem services with human needs
- Facilitating integrated ecosystem management.

Week 6: Political, ethical, economic and legal perspectives

- Tragedy of the commons
- Public Goods
- Externalities
- Sustainability and intergenerational justice

Week 7: Importance of environmental policy-making

- Examples from Egypt and others from around the world

Week 9: Global Environmental issues on the policy agenda

- Major laws; players and politics

Biodiversity, ozone, climate change
Dealing with risk and uncertainty
Trade issues and international environmental politics

Week 10: Environmental development
Case study: climate change and the Kyoto Protocol (An Inconvenient Truth)

Other Case studies related to environmental development in Egypt

Week 11: The Sustainable Development Goals of the United Nations

Week 12: Students' presentations on different issues as discussed in class

 The community-based / service learning activity??

The community-based / service learning activity is not well-developed.

You may choose an environmental problem in Egypt (waste management, access to clean water, etc.) and work with the local communities to find out their needs and analyse the steps that the government has undertaken to solve this problem

 Include the SDG rubric at the end of the course- to summarize the SDGs in the different modules.

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				

14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS

Environmental Governance

Developed by Prof. Dr. Esam A. Hussein, Botany and Microbiology Department, Faculty of Science, Al-Azhar University

Instructor Information

Instructor: Prof. Dr. Esam A. Hussein
Office Location: Al-Azhar University
Telephone: 01096770161
Office hours: Sunday-Wednesday 09.00 - 14.00
E-mail: husseine13@yahoo.com
Website:

Course Identification

Course Number:
Course Name: Environmental Governance
Course Location
Class Times:
Prerequisites:
Faculty Web Page:

Course Description/Overview

Governing our planet's rich and diverse natural resources is an increasingly complex challenge. In our globalized world of interconnected nations, economies and people, managing environmental threat, particularly those that cross political borders such as air pollution and biodiversity loss, will require new global, regional, national and local responses involving a wide range of stakeholders. This course provides an adequate understanding of the fundamentals of environmental governance, the limitations and challenges facing environmental governance, and applications of environmental governance; climate change and ecosystem degradation. This course is based on general performance-auditing practice, in line with the International Standards for Supreme Audit Institutions and guidance materials of International Organization of Supreme Audit Institutions Working Group on Environmental Auditing. Its aim is to prepare students to undertake subsequent environmental auditing. The course introduces the basic environmental management principles and auditing terminology used in environmental auditing.

Course Learning Objectives

1. ~~Promote the availability of reliable environmental information~~

~~2. Promote students awareness and involvement.~~
~~3. Promote environmental assessments.~~

By the end of the course, students will be familiar with:

a- The process through which international environmental governance is made;
b- The different actors in the environmental governance arena;
c- The effective environmental regimes: obstacles to creating strong environmental regimes, and opportunities to improve compliance with global environmental conventional;
d- The histories and strengths and weaknesses of environmental laws in Egypt and the entity primarily responsible for administering environmental statutes;
e- The important players in both global as well as national environmental politics and policymaking;
f- The scientific controversies related to estimating the human and environmental impacts of global biodiversity loss, ozone depletion, and climate change, the policy options available for addressing these impacts, and the political struggles surrounding both the estimates of potential damage and the proposed policy responses;
g- The essential tools of environmental governance analysis, including the assessment of trade-offs, benefits, costs, cost-effectiveness, political feasibility, equity, and justice.

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

- Understand basic environmental governance principles
- Understand the importance and complexity of the concept of sustainable development
- Define the most common governance tools used in environmental governance
- Determine the steps in an audit cycle
- Determine common audit planning tool
- Report and communicate of audit results

Course Resources

Video class, texts, book chapters, papers and reports, etc

Course Website(s)

Required Course Texts and Materials

Hand-out prepared by the instructor for the class

Optional course Texts and Materials

Lemos MC, Agrawal A. (2006). Environmental Governance. Annu. Rev. Environ. Resour. 31: 297-325. doi: 10.1146/annurev.energy.31.042605.135621

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Ludwig K, Kok M. (2018). Exploring new dynamics in global environmental governance- literature review. PBL Netherlands Environmental Assessment Agency.

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Assignments	**20**
Class attendance/participation	**20**
Final Exams	**60**
Total Points	**100**

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to attend ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive to class on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and though about the assigned material before you come to class. I expect active class participation.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Important Dates to Remember

Course schedule

Week	Date	Topics, Reading, Assignments and Deadline (details on assignments and more

		bibliography are available in the course modules)
1		**Course overview:** Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2		Introduction and Concepts of Environmental governance
3		Challenges and limitations of Environmental Governance
4		Environmental governance Tools
5		Environmental Governance and Sustainable Development
6-7		Environmental Audit
8-9		Applications of Environmental Governance: Climate Change
10-11		Applications of Environmental Governance: Ecosystem Degradation
12-13		New Dynamics in Environmental Governance
14		Reporting and seminar

SUMMARY OF THE 5 ECTS STUDENTS WORKLOAD

Learning Components	No	Time Factor	Work load	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)	14	1	14	4	4	4	2	-	14
Online	3	2	6	2	1	1	1	1	6
Lab work	8	2	16	3	4	3	3	3	16
Reading articles (3 pages per hour)	50	0,3	15	3	3	3	3	3	15
Reading book chapters (5 per/h)	50	0.2	10	2	2	2	2	2	10
Preparing course activities	2	10 (M)	20	4	4	4	4	4	20
Project work	1	10	10	-	2	-	2	6	10
Preparation for exam	1	50	50	-	10	-	20	20	50
Writing the exam	1	3	3	-	-	-	-	3	3
Total			144	18	30	17	37	42	144

Course	Environmental Governance
Module 1	Global environmental governance and perspectives on environmental problems
Key Concepts	Concepts of environmental governance, sustainable development
Overview	This module describes the main ideas in environmental governance and the tools that governments use to regulate the environmental behavior of both companies and citizens. Environmental good governance follows the principles of good governance, but the difference is that in the case of environmental good governance, sustainability is advocated as the supreme consideration in managing all human activities - political, social and economic.
Aim	The overriding aim of this module is to familiarize the students with the governance system in ~~their country~~Egypt with a good understanding of general environmental principles and tools. ~~that are accepted worldwide and to be familiar with sustainable development. Describing mechanisms and strategies of environmental governance~~.
Learning Outcomes	1. Demonstrate the principles of environmental governance locally and globally. 2. Identify the important players in the national environmental politics and policymaking 3. Analyze the strengths and weaknesses of environmental laws in Egypt and the entity primarily responsible for administering environmental statutes ~~1.~~ ~~2. Describe the tools of environmental governance regulations.~~ 4. Understand the application of environmental governance for sustainable development in Egypt

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Units	Unit 1.1: Introduction and Concepts of Environmental governance Unit 1.2: Fundamental principles of good environmental governance Unit 1.3: Environmental problems as social dilemmas Unit 1.4: Natural ecosystems and their services
Readings	1. Environmental Governance. Annu. Lemos MC, Agrawal A. (2006). Rev. Environ. Resour. 31: 297-325. 2. The Politics of the Earth. Oxford, Oxford University Press Dryzek, J. (1997) . 3. The Global Environmental Governance Project: https://www.environmentalgovernance.org/ 4. Kutting, G. (2011). *Global Environmental Politics: Concepts, Theories and Case Studies*. Oxon: Routledge. 5. Biermann, F. & P. Pattberg (2012). *Global Environmental Governance Reconsidered.* Cambridge: MIT Press.
Activity	Assingment1a: Collective questions will be prepared to measure the students' basic knowledge Assignment 1b: Ask students to browse the sites below: World Meteorological Organization (WMO) United Nations (UN) United Nations Environment Programme (UNEP), (Geneva, Nairobi) United Nations Framework Convention on Climate Change (UNFCCC) United Nations and Climate Change Convention on Biological Diversity (CBD) Convention on Long-Range Transboundary Air Pollution Global Environment Facility (GEF) Linkages by International Institute for Sustainable Development (IISD) IPCC Data Distribution Centre The Ozone Secretariat, UNEP United Nations Convention to Combat Desertification

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	1	5	16	17
														4			
				√				√			√			√			

Module 2 Key Concepts	Environmental Audit Concepts of Natural Resources, Ecosystems, Environmental Problems
Overview	In this module, students will learn about an auditor approach relevant issues with the appropriate resources. An understanding of the processes that take place in nature and of the relationships between different ecosystems is necessary in order to grasp the relevance and scale of environmental problems.
Aim	The overriding aim of this module is to analyze major environmental problems,

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	identify their root causes and describe what the situation might lead to if left unresolved.
Learning Outcomes	1. Identify environmental problems 2. Addressing future impacts of environmental problems. 3. Collect and analyze the problem data 4. Practices on solving the problems 5. Apply the essential tools of environmental governance analysis, including the assessment of trade-offs, benefits, costs, cost-effectiveness, political feasibility, equity, and justice.
Units	Unit 2.1: Environmental problems Unit 2.2: Linkages between ecosystem services and human well-being Unit 2.3: Environmental audit ~~Unit 2.4. Audit cycle~~
Readings	1. Armitage D, Loe R, Plummer R (2012). Environmental governance and its implications for conservation practice. Conservation Letters 5(4): 245-255. https://doi.org/10.1111/j.1755-263X.2012.00238.x 2. Bäckstrand, K and Saward, M. (2005) Democratizing Global Governance: Stakeholder Democracy at the World Summit for Sustainable Development. A paper presented at the annual meeting of the American Political Science Association; Chicago. 3. Bouteligier, S. (2013). Cities, Networks, and Global Environmental Governance: Spaces of Innovation, Places of Leadership. New York. Routledge.
Activity	Assignment 2a: Student will be requested to collect data about environmental problems, analyze the data, and suggest the solving of environmental problems. Assignment 2b: Quiz

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√		√								√		√	√	√		

~~Module 3~~	~~Applications of Environmental Governance; Climate Change and~~ Ecosystem Degradation
Key Concepts Overview	~~Concept of Climate Change, Ecosystems Degradation~~ This module will focus on concepts related to climate change and its impacts on the environment. Also, ecosystem degradation will be discussed. The role of government to face climate change and ecosystem degradation. Environmental policy.
Aim	The overriding aim of this module is to turn student's aware of challenges facing the environment and government policy such as climate change and ecosystem degradation. Special interest also should be given to Energy flow in the ecosystem
Learning Outcomes	1. Understand and describe environmental governance in terms of climate change and ecosystem. ~~2. Analyze governance issues Describe strategies forin facing~~ climate change problems. 3. Analyze governance issues ~~Describe strategies for facing~~in ecosystem degradation

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	~~problems.~~ ~~3.~~4. Understand the scientific controversies related to estimating the human and environmental impacts of global biodiversity loss, ozone depletion, and climate change, the policy options available for addressing these impacts, and the political struggles surrounding both the estimates of potential damage and the proposed policy responses; ~~4.~~5. Understand succession and ecological balance
Units	Unit 3.1: Environmental Governance and Climate Change Unit 3.2: Environmental Governance and Ecosystem Degradation Unit 3.3: Succession, ecological balance and biodiversity. Unit 3.4: Key components of human well-being
Readings	1. Environmental Governance. Annu, Lemos MC, Agrawal A. 2006.. Rev. Environ. Resour. 31: 297-325. 2. Ecosystem Management: Applications for Sustainable Forest and Wildlife Resources, Boyce, Mar S. and Alan Haney, eds.. New Haven: Yale University Press, 1997. 3. Essential Concepts of Global Environmental Governance, Morin, J.F. & A. Orsini (2015).. 4. Global Environmental Governance. New York: Island Press, Oxon: Earthscan. Speth, J. G. & P. Haas (2006).
Activity	Assignment 3a: Students will be asked for collecting and analyzing data as well as designing and structuring environmental policy to face environmental problems such as climate change and ecosystem degradation. Assignment 3b: Each student will be responsible for serving as a class discussion leader twice during the quarter.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	√
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		√					√	√			√			√	√		√

Module 4	Global Environmental issues on the policy agenda
Key Concepts Overview	Major laws; players and politics In this module, students will have sufficient knowledge and understanding about ~~the development of~~ global environmental issues ~~on the policy agenda locally and internationally and its~~ in relation to sustainability development goals.
Aim Learning Outcomes	Demonstrate the development and dynamics of environmental governance 1. Explain differences between government and governance, and the various ideas and meanings attached to the goal of sustainable development. 2. Analyse policy-making processes in regard to sustainability issues. 3. Understand the process through which international environmental governance is made; 4. Identify the different actors in the environmental governance arena; ~~5. Analyze opportunities to improve compliance with global environmental~~ conventional; 6. Identify the important players in global environmental politics and

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	policymaking; ~~2.~~7.
Units	Unit 4.1: Biodiversity, ozone, climate change. Unit 4.2: Dealing with risk and uncertainty. Unit 4.3: Trade issues and international environmental politics.
Readings	1. Biodiversity and Ground-level Ozone. Emberson, L.D., [2]Fuhrer, J., [3]Ainsworth, L., [1]Ashmore, M.R. https://www.cbd.int/doc/emerging-issues/Emberson-et-al-Biodiversity-and-Ground-level-Ozone-2011-013-en.pdf 2. Dealing With Uncertainty About Risk in Risk Management. Chris G. Whipple https://www.ncbi.nlm.nih.gov/books/NBK217564/ 3. Environmental Effects of International Trade.Jeffrey Frankel Harpel Professor Harvard Kennedy School Harvard University https://sites.hks.harvard.edu/fs/jfrankel/Swenvirinlaga31proofs.pdf
Activity	Assignment 4a: Students will read and report about global environmental issues on the policy agenda. Assignment 4b. Classroom discussion.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	√

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
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The course developer needs to include the suggestions I sent earlier. The course schedule sent to me has four modules (though I included many themes to work on-see below in yellow). And, the four modules described here have much of overlap. There should be a stronger evidence that the course is structured at Master Level. In module 2, for instance, identifying environmental problems cannot be a learning outcome!!!

In the course, the disciplinary concepts related to globalisation, economic theory, management, climate change and sustainability should clearly come together through the class materials and lectures and brought together through the use of Case Studies that support problem solving. Disciplinary concepts should be blended in a meaningful and pedagogical clever manner. I would advise returning to the Learning Outcomes and grounding the modules in these outcomes. There will be surface learning in evidence in the current approach but there is an opportunity being missed for deeper learning that is based on critical thinking.

The course does show evidence of integration of disciplinary insights but these are still at a fairly basic level and need to be further developed. Perhaps it would be an opportunity to work with other members of the Department to develop a suite of modules that have a clear and focused intent in relation to the environment and governance. It is a key area. Also, go back to the Pillars of Sustainability to see how this can be mapped.

I proposed the following course outline

Week 1: Global environmental governance and perspectives on environmental problems

- General introduction to the course
- Natural ecosystems and their services
- Environmental problems as social dilemmas
- Values associated with the environment

Week 2: Ecosystems and human well-being

- Key components of human well-being
- Linkages between ecosystem services and human well-being

Week 3: Human transformation of the Earth: drivers of change

- Demographic drivers (population size, age and gender structure, and spatial distribution)
- Economic drivers (national and per capita income, macroeconomic policies, international trade)
- Sociopolitical (democratization, roles of women and local communities, role of private sector)
- Scientific and technological (research and development, adoption of new technologies)
- Cultural and religious (choices individuals make about what and how to consume and what they value).

Week 4: Rise of environmental politics

- Stockholm, Rio Earth Summit
- International environmental management and policy instruments: voluntary, regulatory and socio-economic incentives

Week 5: Sustainable Development and environmental governance

Strategies to ensure sustainability of both natural ecosystems and human well-being

- Integrating economic, environmental, social and cultural aspirations
- Integrating information from natural and social sciences
- Harmonizing the use of ecosystem services with human needs
- Facilitating integrated ecosystem management.

Week 6: Political, ethical, economic and legal perspectives

- Tragedy of the commons
- Public Goods
- Externalities
- Sustainability and intergenerational justice

Week 7: Importance of environmental policy-making

Examples from Egypt and others from around the world

Week 9: Global Environmental issues on the policy agenda
Major laws; players and politics
Biodiversity, ozone, climate change
Dealing with risk and uncertainty
Trade issues and international environmental politics

Week 10: Environmental development
Case study: climate change and the Kyoto Protocol (An Inconvenient Truth)

Other Case studies related to environmental development in Egypt

Week 11: The Sustainable Development Goals of the United Nations

Week 12: Students' presentations on different issues as discussed in class

The course includes only 4 modules. I think the materials should be richer for a Master level course.

The community-based / service learning activity??

You may choose an environmental problem in Egypt (waste management, access to clean water, etc.) and work with the local communities to find out their needs and analyse the steps that the government has undertaken to solve this problem

Include the SDG rubric at the end of the course- to summarize the SDGs in the different modules.

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				

12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS

Risk Analysis in the Food Chain

Developed by Prof. Dr. Khaled El-Khawas, Al-Azhar University,
Faculty of Agriculture

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Instructor Information:

Instructor 1	Prof. Dr. Khaled El-Khawass
Office Location	Al-Azhar University, Faculty of Agriculture, Plant Protection Department
Telephone	+201067704781
Office Hours	Monday - Tuesday 10.00 - 15.00
E-mail	khaledk5912@yahoo.com
Website	http://scib.alazhar.edu.eg/

Course Identification

Course Number:	
Course Name:	Risk Analysis in the Food Chain
Course Location:	Al-Azhar University
Class Times:	
Prerequisites:	Any prerequisite?
Faculty Web Page:	http://scib.alazhar.edu.eg/
~~Course Number:~~	

Course Description/Overview

Ensuring food safety to protect public health and promote economic development remains a significant challenge in both developing and developed countries. Considerable progress to strengthen food safety systems has been achieved in many countries, highlighting the opportunities to reduce and prevent food-borne disease. ~~So,~~ D~~d~~uring the last few decades, risk assessment, risk management and risk communication have been formalized and incorporated into a process known as risk analysis. This new approach enables ~~the~~ students to be familiar with information on hazards in food and food chain to be linked directly to data on ~~the~~ risks to human health. By providing a science-based approach to improve food safety decision-making processes, risk analysis contributes to a reduction in the incidence of foodborne disease and consequently ~~the~~ food security. This course has been developed to improve food safety regulators' understanding and use of risk analysis as the basic framework for a modern food safety and security system. It will provide students with essential background information and practical guidance on the application of food safety risk analysis for regulators and other officials responsible for managing and/or supervising food control activities. It presents a framework,

internationally agreed principles and examples to structure and guide the application of risk analysis, rather than a prescriptive formula to implement risk analysis. It will also contribute in the 21st century sustainable development goals (SDGs).

Course Learning Objectives

1. Develop~~ing~~ a basic understanding of risk assessment and its role within the risk management process in food safety and food chain.
2. Different~~eiating~~ between risk assessment,~~ and~~ risk management and risk communication.
3. Develop~~ing~~ a basic understanding of how to conduct and evaluate an uncertainty analysis for a risk assessment.
4. Know~~ing about~~ the ~~amount~~ level and distribution of hunger and malnutrition locally, nationally and globally, currently as well as historically.
5. ~~Ability to c~~Collaborate with others to encourage and ~~to~~ empower them to combat hunger and ~~to~~ promote sustainable agriculture and improved nutrition.
6. Work~~ing~~ as a team in problem-based activ~~it~~yies, workshops, research~~-~~ based tasks, case studies~~y~~, reflection papers and essays.

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Course Content Learning Outcomes

Students will be able to:

1. Describe the key elements of risk analysis.
2. Explain how risk analysis is applied in different parts of the food chain.
3. Undertake risk assessment activities, identify appropriate risk management options and develop suitable risk communication strategies.
4. Monitor the efficacy of measures and reviews of new information.
5. Carry out case study analyses to combat hunger, reduce food waste and promote sustainable agriculture.
6. Develop an enquiry-based project: “How risk communication of food security influence people’s healthcare?”

Course Resources:

1. Course Website(s)
2. Required Course Texts and Materials
3. Hands-out prepared by the instructor for the class

Course Website(s)

Required Course Texts and Materials

1. Risk Analysis at FDA: Food Safety https://www.fda.gov/Food/FoodScienceResearch/RiskSafetyAssessment/ucm243439.htm
2. Specializing in FDA Regulatory Matters *https://easconsultinggroup.com/services/foods/?gclid=EAIaIQobChMI6qPIwP3R4QIVAQvTCh3heqPrEAAYAiAAEgKna_D_BwE*

Optional Course Texts and Materials

1. Food Industry: PolySto Hygienic Wall Protection
   https://www.polysto.com/en/food-industry?gclid=EAIaIQobChMI6qPIwP3R4QIVAQvTCh3hegPrEAAYAyAAEgIpVfD_BwE
2. A metadatabase of tools and models for food safety professionals in industry, academia, and government
   http://foodrisk.org/

Assignments and Grading Scheme
Grading System
0 to 10 (where 5 is the least pass mark)

Grading Policy
Grades can be based on the following:

Assignments	20
Exams	60
Class attendance/participation	10
Practical exam	10
Total Points	100%

Course Policies
Late Assignments
It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol
This is a seminar type of course, which means that students are expected to come to all classes. Student cannot pass the class under any circumstances if he/she misses more than three classes. Students are expected to arrive on time and stay until the class period ends. If a student knows that he has to leave early, he should notify the instructor before class starts. All are expected to treat faculty and other students with respect. During class, students are asked not ~~obliged~~ to ~~not~~ disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and will be counted as absent. The student is expected to have read and thought about the assigned material before he comes to class. The instructor expects active class participation, which counts for ~~r~~ 210% of the grade.

Disability
Students who have disabilities should have a confidential appointment to discuss their needs for accommodation~~s~~. Establishing reasonable accommodation~~s~~ should be considered on a case-by-case basis.

Important Dates to Remember (Course Schedule)

Week	Teaching/class hours	Date	Topics, Reading, Assignments and Deadline (details on assignments and more bibliography are available in the course modules)
1+2	2+2		Principles of risk analysis and its structure
3	2		Risk analysis process and necessary ~~C~~conditions ~~necessary~~
4+5	2+2		Risk assessment of the following steps: 1. Hazard identification. 2. Hazard characterization. 3. Exposure assessment. 4. Risk characterization.
6	2		Risk management; selecting appropriate prevention and control options.
7	2		Risk management; the process, distinct from risk assessment, of weighing policy alternatives.
8	2		Risk communication.
9	2		Principles of risk communication.
10	2		Strategies for risk communication.
11	2		Risk management; selecting appropriate prevention and control options.
12	2		National Food Safety Control - Risk Analysis by Governments.
13	2		The Role of Risk Analysis in the Food Industry.
14	2		Chemical vs. Microbial Risk Analysis Methodology.

SUMMRY OF THE 5 ECTS STUDENTS WORKLOAD

Learning Components	No	Time Factor	Work load	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)	10	2	20	4	4	4	4	4	20
Online	3	2	6	2	1	1	1	1	6
Lab work	8	2	16	3	4	3	3	3	16
Reading articles (3 pages per hour)	50	0,3	15	3	3	3	3	3	15
Reading book chapters (5 per/h)	50	0.2	10	2	2	2	2	2	10
Preparing course activities	2	10 (M)	20	4	4	4	4	4	20
Project work	1	10	10	-	2	-	2	6	10
Preparation for exam	1	50	50	-	10	-	20	20	50
Writing the exam	1	3	3	-	-	-	-	3	3
Total			150	18	30	17	39	46	150

Course	Risk Analysis in the Food Chain
Module 1	Introduction to Risk Analysis
Key Concepts	Definition, components, practices, conditions and concepts
Overview	A risk analysis framework provides a process to systematically and transparently collect, analyse and evaluate relevant scientific and non-scientific information about a chemical, biological or physical hazard possibly associated with food in order to select the best option to manage that risk based on the various alternatives identified. This chapter provides a broad introduction to the food safety risk analysis process and the conditions necessary to ensure its successful implementation.
Aim assessment	The module will provide students with knowledge and understanding of key principles of risk analysis and its main applications. Students will learn the main steps of the risk assessment process, and gain the skills required to conduct qualitative risk assessments and to correctly identify data and key stochastic processes to use while performing quantitative risk assessments.
Learning Outcomes	At the end of this module, the students will be able to: 1. Outline and justify their understanding of the concepts of risk analysis. 2. Explain the principles of risk and risk management 3. Apply a structured approach comprising the three distinct components: risk assessment, risk management and risk communication. 4. Identify the operational risk and how to manage it. 5. Communicate effectively during the risk assessment process; present qualitative risk assessments to technical and non-technical audiences. 6. Interpret results of qualitative risk assessments to provide coherent and logical arguments in support of decision-making.
Units	Unit 1.1. Introduction to Risk Analysis in food chain Unit 1.2. The changing food safety environment Unit 1.3. Components of risk analysis Unit 1.4. Risk analysis at the international and national levels Unit 1.5. Essential characteristics of risk analysis
Readings	1. Assuring Food Safety and Quality http://www.fao.org/3/a-y8705e.pdf 2. Scientific Criteria to Ensure Safe Food (2003) https://www.nap.edu/catalog/10690/scientific-criteria-to-ensure-safe-food
Activity	Assignment 1a. Each student will be responsible for serving as a class discussion leader twice during the quarter. Assignment 1b. Practical visit for two agriculture companies with report requested from each student evaluate his knowledge from this course with practical visit. Assignment 1c. Each week there will be a quiz at the beginning of class. Material on quizzes will be from required readings for that week. Assignment 1d. Class leader responsibilities will occur during the first class session and the discussion will be of two parts: 1d.1. A brief opening oral presentation (4-7 slides) highlighting the most important two or three points of the chapters/articles under consideration.

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	1d.2. Development of two or three questions intended to stimulate class discussion after the brief opening oral presentation.																
10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TR A
	√	√	√	√	√	√	√	√	√	√		√	√		√		
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			√	√								√					
Module 2	Advanced Quantitative Risk Assessment																
Key Concepts	Definition, theories, practices and concepts																
Overview	This module enables students to develop an in-depth knowledge and understanding of advanced quantitative risk assessment methods used in food safety through a combination of theoretical and practical activities including real-world examples and critical review of published quantitative risk assessment. Both practical aspects on how to implement quantitative risk assessment and advanced risk assessment modelling methods will be covered.																
Aim	The aim of this module is to provide students with knowledge and understanding of advanced quantitative risk assessment methods. Students will gain the skills required for conducting scientifically robust quantitative risk assessment that also satisfy the international standards.																
Learning Outcomes	By the end of this module, students should be able to: 1. Demonstrate knowledge and understanding of: 1.1.Stochastic processes used in quantitative risk assessment in food safety. 1.2.Specialized food safety modeling methods. 1.3.The importance of documenting quantitative risk assessment models and the communication of the results to scientific audiences and risk managers 2. Identify the modeling methods and data to be used in quantitative risk assessment. 3. Design and implement quantitative risk assessment models of moderate complexity in food safety. 4. Apply and integrate the risk assessment modeling methods into real world food safety situations following the main steps of quantitative risk assessment. Interpret results of quantitative risk assessment to provide coherent and logical arguments in support of decision-making.																
Units	Unit 2.1: Principle of Risk Assessment. Unit 2.2: Items of risk assessment. Unit 2.3: The food safety risk assessment process. Unit 2.4: Chemical and microbial risk. Unit 2.5: Techniques used in food safety risk assessment.																
Readings	Unit 2.5: Characteristics of a good risk assessment. 1. Harvard Center for Risk Analysis. Risk in Perspective. http://www.hcra.harvard.edu/pdf/June2003.pdf 2. Sandman, P.M. 1994. Risk communication. In: Encyclopaedia of the Environment, Eblen, R.A. & Eblen, W.R. (eds.). 1994. Boston, MA: Houghton Mifflin, pp. 620-623. 3. Fischoff, B. 1995. Risk perception and communication unplugged: twenty years of process. Risk Analysis, 15: 137-145																
Activity	Assignment 2a: The module will comprise formal teaching (lectures), and directed learning sessions with individual and group exercises and case studies that will allow students to develop an understanding of the topics covered. Assignment 2b: After the face-to-face teaching and before the module examination,																

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	students will have a reading week for consolidation of their learning. Problem-based learning, where students will be given a problem or scenario that requires students to formulate questions, analyze evidence, connect evidence to pre-existing theories, derive conclusions, and reflect on their learning.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√	√	√									√		√		

Module 3	Risk Management
Key Concepts Overview	Definition, theories, practices and concepts Risk management has been defined as "the process, distinct from risk assessment, of weighing policy alternatives, in consultation with all interested parties, considering risk assessment and other factors relevant for the health protection of consumers and for the promotion of fair trade practices, and, if needed, selecting appropriate prevention and control options" (Codex). Risk management therefore plays a key role at the beginning of the risk analysis process in identifying food safety problems and considering the best ways to manage them. Risk management must be carried out in consultation with interested stakeholders and in synergy with risk communication activities.
Aim	1. Development of Codex specifically for food safety risk management. 2. Ensure the scientific integrity of the risk assessment process by maintaining the functional separation of risk management and risk assessment. 3. Clearly determine and establish the organization's risk assessment policy before the risk assessment is initiated. 4. Consider a full range of risk management options and arrive at a preferred option through a structured process that includes preliminary risk management activities 5. Monitor the efficacy of measures and review new information, as it becomes available, in order to assess whether the existing risk analysis needs to be reviewed.
Learning Outcomes	By the end of this module, students should be able to: 1. Inform about the strengths and weaknesses of the risk assessment including any limitations. 2. Describe ~~with~~ the risk assessment protocol ~~used to explain it in accurate but general terms to external stakeholders~~. 3. Understand the meaning and limitations of the absolute or relative risk estimates provided by the risk assessors. 4. Discuss the nature, source and extent of uncertainty and variability in the risk characterization 5. Consider all important assumptions made during the risk assessment and their impact on the risk characterization and risk assessment findings. 6. Implement ~~of~~ risk management decisions.
Units	Unit 3.1.: Identify the food safety problem. Unit 3.2: Develop a risk profile. Unit 3.3: Rank hazards for risk assessment and set priorities for risk management. Unit 3.4: Establish a risk assessment policy. Unit 3.5: Commission the risk assessment. Unit 3.6: Interpret the results of the risk assessment.
Readings	1. CAC. 2004. Report of the thirty-sixth session of the Codex Committee on Food

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<table>
<tr><td></td><td>Hygiene, Washington DC, 29 March to 3 April 2004. ALINORM 04/27/13 http://www.codexalimentarius.net/download/report/615/al04_13e.pdf
2. FAO/WHO. 1997. Risk management and food safety. FAO Food and Nutrition Paper No. 65. Report of a Joint FAO/WHO Consultation in Rome, Italy, 27-31 January 1997
http://www.fao.org/3/W4982E/w4982e00.htm
3. FAO/WHO. 2002. Principles and guidelines for incorporating microbiological risk assessment in the development of food safety standards, guidelines and related texts. Report of a Joint FAO/WHO Consultation. Kiel, Germany, 18-22 March 2002
ftp://ftp.fao.org/docrep/fao/006/y4302e/y4302e00.pdf</td></tr>
<tr><td>Activity</td><td>Assignment 3a: Student in groups will perform module about risks during food industry and how to manage these risks.
Assignment 3b: Power point Presentation from student group discusses different ways of food management.</td></tr>
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<tr><td>Module 4
Key Concepts Overview</td><td>Risk Communication
Definition, theories, practices and concepts

Risk communication is a powerful but often underutilized element of risk analysis. This module examines the role played by good risk communication in the application of the generic food safety. Critical steps within effective communication ~~is essential~~ are identified, and the specific communication processes required at each stage are described. Practical aspects of communication are discussed. This module does not explain “how to talk about risk analysis in food chain” but readers are referred to the reference materials at the end of the module for advice on how to communicate between all types of risk in the food chain.</td></tr>
<tr><td>Aim</td><td>Understand the interactive exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions, among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions.</td></tr>
<tr><td>Learning Outcomes</td><td>By the end of this module, students should be able to:
1. Manage the risk communication component of risk analysis.
2. Plan, design and implement the risk communication process as part of the risk analysis team.
3. Define and delineate the responsibilities for risk communication from the outset.
~~3.~~4. Evaluate and compare the sustainability of cities and community systems in meeting their needs particularly in the areas of food, energy, transport, water, safety, waste treatment, inclusion and accessibility, education, and integration of green spaces and disaster risk reduction as a learning objective of (SDG no. 11).</td></tr>
<tr><td>Units</td><td>Unit 4.1: Risk communication components
Unit 4.2: Developing a risk profile
Unit 4.3: Developing a risk assessment policy</td></tr>
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	Unit 4.4: Commissioning a risk assessment Unit 4.5: Risk Communication strategies
Readings	1. FAO/WHO. 1999. The application of risk communication to food standards and safety matters. Report of a Joint FAO/WHO Expert Consultation. Rome, Italy. 2-6 February 1998. FAO Food and Nutrition Paper No. 70 http://www.fao.org/DOCREP/005/X1271E/X1271E00.htm#TOC 2. Fischoff, B. 1995. Risk perception and communication unplugged: Twenty years of process. Risk Analysis, 15: 137-145. Joint Institute for Food Safety and Applied Nutrition. Web site of the Food Safety Risk Analysis Clearinghouse. https://www.cmu.edu/epp/people/faculty/research/Fischhoff-RAUnplugged-RA.pdf 3. A joint project between th e University of Maryland and the United States Food and Drug Administration. Collection of resources related to food safety risk communication http://foodrisk.org/risk_communication.cfm 4. National Research Council. 1989. Improving Risk Communication. Washington, DC: National Academy Press. https://www.nap.edu/catalog/1189/improving-risk-communication 5. National Research Council. 1996. Understanding Risk: Informing Decisions in a Democratic Society. Washington, DC: National Academy Press. https://www.nap.edu/catalog/5138/understanding-risk-informing-decisions-in-a-democratic-society
Activity	Assignment 4.a Give students problems about different risks in food industry by (Problem-based learning) to formulate questions, analyze evidence, connect evidence to pre-existing theories, derive conclusions, and reflect on their learning

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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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Module 5	Framework for strengthening surveillance of and response to foodborne diseas (SDG no. 3)
Key Concepts	Definition, theories, practices and concepts
Overview	Foodborne diseases comprise a wide spectrum of illnesses that result from ingestion of foodstuffs contaminated with microorganisms or chemicals. Food may become contaminated at any stage in the process from production to consumption, and contamination may be the result of environmental contamination, such as pollution of water, soil or air. Foodborne diseases are a growing public health problem throughout the world and cause a considerable burden of disability and mortality. The most common clinical presentation of foodborne disease is gastrointestinal symptoms. Other serious consequences include kidney and liver failure, brain and neurological disorders, reactive arthritis and cancer.
Aim	Evaluation and assessment with control all aspects of surveillance, rapid risk assessment, response, investigation, and multi sectorial collaboration related to food-borne hazards (microbial, chemical and radiological) that can affect human health.
Learning Outcomes	By the end of this module, students should be able to: 1. Describe the meaning of food-borne disease.

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	2. List examples of common causative agents of food-borne diseases. 3. Define different related terms such as outbreak and cluster. 4. Explain the goals of a food-borne disease outbreak investigation. 5. Discuss the desirable knowledge and skills required in the food-borne outbreak investigation team. 6. Understand the concept of health, hygiene and well-being as a learning objective of SDG no. 3.
Units	Unit 5.1: Pathogenesis and clinical features of some food-borne disease. Unit 5.2: Food borne infections. Unit 5.3: Food poisonings and intoxications. Unit 5.4: Diagnosis of food-borne diseases. Unit 5.5: General management approaches of food-borne diseases. Unit 5.6: Prevention and control of food-borne diseases. Unit 5.7: Investigation of outbreaks of food-borne diseases
Readings	1- Centers for Disease Control and Prevention (2001) Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. MMWR. 50 (No. RR-13) https://www.cdc.gov/mmwr/preview/mmwrhtml/%20rr5013a1.htm 2- EDES (2012) Role of competent authorities and food business operators. Handbook Brussels: https://www.google.com/search?client=firefox-b-d&q=edes.coleacp.org%2Ffiles%2Fdocuments%2Fedes%2Fpublications+%2FEDES_fascicule+1-7_EN_web 3- FAO (2006) Strengthening national food control systems: guidelines to assess capacity building needs. Rome: Food and Agriculture Organization of the United Nations ftp.fao.org/docrep/fao/009/a0601e/a0601e00.pdf 4- FAO (2008) Risk-based food inspection manual. Food and Nutrition Paper No. 89. Rome: Food and Agriculture Organization of the United Nations http://www.fao.org/docrep/010/i0096e/i0096e00.htm 5- FAO/WHO (2003) Assuring food safety and quality: guidelines for strengthening national food control systems. Food and Nutrition Paper No. 76. Rome: Food and Agriculture Organization of the United Nations https://www.google.com/search?client=firefox-b-d&q=2.%09http%3A%2F%2Fwww.fao.org%2FDOCREP%2F006%2FY8705E%2FY8705E00.HTM 6- FAO/WHO (2007) Principles and guidelines for the conduct of microbiological risk management (MRM). CAC/GL 63-2007. Rome: Food and Agriculture Organization of the United Nations http://www.fao.org/input/download/standards/10741/%20CXG_063e.pdf
Activity	Assignment 1a: Design project module how to evaluate risks from food born disease transported during food industry. Assignment 1b: CCCSAFS Community-Based / Service Learning Activity Development of three questions intended to stimulate class discussion after the brief opening oral presentation.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TR A
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS


Constructing knowledge
Critical thinking and problem solving
Communi-cation
Collabo-ration
Creativity and innovation
Connectivity and networking
Critical conscious-ness
Critical reflection
Cross/inter-cultural competence
Co-responsibility
ICTs as enabling tools for the 10Cs

General Comments

There is clear evidence in the course concepts and methods that the course is designed in a logical manner and it uses a good set of methodologies including case studies, discussions and readings in the field of risk analysis to progress the student understanding / learning. A good approach is to differentiate between risk analysis, risk management and risk communication.

I suggest that the course instructor develops more critical thinking in the students to approach this topic of risk analysis in the food chain from a more holistic perspective. What are the opportunities presented by this area? What are the possible threats? What is happening at a local level? Are there good examples from a global level of how food security can be managed? What are the main theories underpinning risk analysis, risk management and risk communication in this course?

I suggest including a module on risk perceptions. There is a wide literature on this topic and I believe it should be included in this course.

I would like to see greater evidence of more in-depth and reasoned debate as part of the risk analysis process, especially that this course is designed at the Master level. There are possibilities presented throughout the modules. However, this needs to be more closely linked to the Learning Outcomes and the Learning Outcomes need to reflect critical thinking, problem solving and deeper learning.

The Community-Based / Service Learning Activity needs to be more elaborate. Please take the following points into consideration to improve the Community-Based activity:

1) Define Activity Goals, Objectives and Outcomes. The activity should clearly define clearly the goals, the purpose of community or service learning component and the expected learning outcomes. Also, the connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.

2) Meet Actual Community Needs Collaboratively. The activity should meet an actual need in the community and is coordinated through collaboration with the community.

3) Merge Theory with Practice & Course Curriculum Connection. The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. It should be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course.

4) Enhance Active Student Reflection. The activity should be designed in a way to challenge students to make meaning of their community service experience,

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and should provide them with an opportunity to reflect upon their own learning and their role in society. It should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation.

5) Develop Learning to give and share. The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in community served.

6) Make a Difference in Community. The activity should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved.

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CCSAFS COURSE SYLLABUS

Sustainable Fisheries and Food Security

Developed by Prof. Dr. Mamdouh Omar
Faculty of Agriculture, Al-Azhar University

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Instructor Information

Instructor 1: Prof. Mamdouh Ahmed Omar
Office Location: Al-Azhar University, Faculty of Agriculture, Cairo
Telephone: +201063238728
Office hours: Tuesday-Wednesday 09.00 - 14.00
E-mail: mamdohomar2003@yahoo.com
~~Website:~~

Website: http://scib.alazhar.edu.eg/

Course Identification

Course Number:
Course Name: Sustainable Fisheries and Food Security
Course Location: Al-Azhar University
Class Times:
Prerequisites:
Faculty Web Page:

Course Description/Overview

The course provides a framework in which students will acquire insights and skills to bring stakeholders in the fisheries ~~system~~ sector and help them understand each other's perspectives, manage their conflicts and learn together. The ~~program~~ course is highly interactive and will allow students to practice a range of participatory methodologies in a real-life case. They will be challenged to apply the concepts learned to their own work situation.

Fisheries contribute to food security and nutrition and play a vital role in global, national and rural economies. Fish is highly nutritious and serves worldwide as a valuable supplement in diets lacking essential proteins, vitamins and minerals.

One of the primary tasks of the fisheries manager or governor is to balance the pressure on the fish stocks and the aquatic habitat. This requires innovative solutions which can be created when stakeholders are able to meet, share experiences, learn together and contribute to decision making processes. In this course~~,~~, students~~you~~ will learn about fisheries governance needed to ensure food, nutrition and livelihood security. The course~~It~~ provides ~~you with~~ insights on challenges faced by the~~that~~ fisheries sector ~~governance~~ faces and explores ways to strengthen its governance.

Fisheries and aquaculture represent the largest source of dietary protein and are pivotal in ~~current~~ food security. The science of sustainable management of ~~these precious resources~~fisheries is therefore critical in the global ~~grand~~ challenge of ~~sustainable future~~ food security. This course provides advanced level content in the biology and mathematics of fisheries and aquaculture, including fish reproductive biology and dispersal, mathematical modelling and stock assessment, fish nutrition, health and genetics in aquaculture and fisheries. The course provides ~~Students will produce~~ a cohesive, evidence-based scientific discourse on the potential placement of fish and fisheries, both capture and aquaculture, in the future global food security and poverty alleviation. ~~For this they~~The course ~~,~~ will draw extensively on the relevant biological sciences and mathematics and will show adaptability and application in a changing economic and ecological framework. ~~Excellent s~~Students will~~should~~ be able to demonstrate substantial ~~unexpected extension in their~~ critical analysis~~ and thinking and in how they~~when applying their in-depth knowledge to~~and~~ communicate ~~it to~~with a broader scientifically literate audience.

Course Learning Objectives

1. Farming and fishing in response to seasonal and inter-annual variations.
2. In fish availability individual and household occupational strategies are diverse.
3. Land and sea tenure are integrated conceptually and in practice.
4. Fishing in inland lagoons limited to when bad weather prevents fishing in the open sea.
5. Flexible redistribution of fishing rights among neighboring municipalities, according to needs and surpluses.
6. Access, in times of local scarcity, to neighboring community-controlled fishing grounds in exchange for part of the catch.
7. Fishers are able to mobilize cheap or unpaid assistance within the fishing enterprise in times of need the Role of Risk Analysis in the Food Industry.

Course Content Learning Outcomes

~~On~~ After completion of this course participants should be able to:

1. Undertake activities and develop plans for the establishment of small-scale fishing projects.
2. Develop strategies to solve fishing problems during drought.
3. Design and implement mathematical modeling and stock assessment in fish reproductive biology, dispersal, fish nutrition, health and genetics in aquaculture and fisheries.
4. Explain the role of fisheries in food security and nutrition in global, national and rural economies.
5. Consider that fish is highly nutritious and serves worldwide as a valuable and reachable supplement in diets lacking essential proteins, vitamins and minerals.

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https://my.uq.edu.au/programs-courses/course.html?course_code=BIOL3340

Commented [NK2]: You will be teaching students how to farm or fish??

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Example:
1) Study farming and fishing in response to seasonal….
2) Understand….
3) Examine……
4) Assess….
5) Apply…..

Make sure the learning objectives match the learning outcomes.

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Course Resources

Course Website(s)

Required Course Texts and Materials

Hand-out prepared by the instructor for the class
No textbook! It is preferable to have a textbook for students' reference.

Optional course Texts and Materials

1. https://my.uq.edu.au/programs-courses/course.html?course_code=BIOL3340
2. https://www.google.com/search?client=firefox-b-d&q=2.%09https%3A%2F%2Fwww.shortcoursesportal.com%2Fstudies%2F121006%2Ffisheries-governance-for-food-security.html
3. You should put the reference as in the comment https://www.sciencedirect.com/science/article/pii/S0308597X01000239
4. http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge__Smallholder_s_agenda_Final.pdf
5. https://www.nri.org/images/documents/news2011/11-570-sr25-future-for-small-scale-farming.pdf

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Allison, E.H. and Ellis, F. (2001). The livelihoods approach and management of small-scale fisheries. *Marine Policy*. 25(5).pp. 377-388. Available at URL: https://www.sciencedirect.com/science/article/pii/S0308597X01000239

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Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Assignments	20
Class attendance/participation	20
Final Exams	60
Total Points	100

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive at on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Important Dates to Remember (Course schedule)

week	Teaching/class hours	date	Topics, Reading, Assignments and Deadlines (details on assignments and more bibliography are available in the course modules)
1	2		Course overview: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2	2		Introduction and concepts of sustainable fisheries and food security
3-4	2		Farming and fishing in response to seasonal and inter-annual variations.
5-6	2		Farming and fishing in response to climate change.
7-8	2		Fishing in inland lagoons
9-10	2		Full-time migrant fishers
10-11	2		Global ocean governance and the fisheries crisis
12-13	2		Fisheries Statistics
14-15	2		The dynamics of fisheries ~~development~~ expansion in developing countries

SUMMARY OF 7 ECTS STUDENTS WORKLOAD

Learning Components	No	Time Factor	Workload	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)	15	1	15	4	4	3	-	4	15
Online	3	2	6	2	-	2	-	2	6
Lab work	4	2	8	2	2	-	2	2	8
Reading articles (3 pages per hour)	110	0,3	33	6	6	8	7	6	33
Reading book chapters (5 per/h)	130	0.2	26	5	5	5	5	6	26
Preparing course activities	4	10 (M)	40	8	8	8	8	8	40
Project work	2	10	20	-	5	-	5	10	20
Preparation for exam	1	50	50	-	10	-	20	20	50
Writing the exam	1	3	3	-	-	-	-	3	3
Total			201	27	40	26	47	61	201

Course	Sustainable Fisheries and Food Security
Module 1	Sustainable Fisheries and Seasonal Variations
Key Concepts	Concepts of sustainable fisheries and food security
Overview	It is essential for students to develop a fundamental understanding of sustainable fisheries and food security concepts. Questions to be addressed in this module include the following: What is the nature of fisheries? Why are sustainable fisheries important to food security? What are the current applications of fisheries? How to deal with seasonal variations ~~as~~ in regard to sustainable fisheries?
Aim	The overriding aim of this module is to increase~~ing~~ students's ~~a~~gricultural literacy with particular attention to seasonal variations and sustainability and food systems.
Learning Outcomes	By the end of this module, the students will be able to: 1. Demonstrate an ability to discuss the principles and practices of sustainable fisheries 2. Describe the primary fishery production systems 3. Understand the response of sustainable fisheries to the seasonal variations.
Units	Unit 1.1. Introduction and concepts of sustainable fisheries Unit 1.2. Impact of seasonal variations on sustainable fisheries Unit 1.3. Challenges to food security
Readings	1. https://my.uq.edu.au/programs-courses/course.html?course_code=BIOL3340 2. http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Coping_with_food_and_agriculture_challenge_Smallholder_s_agenda_Final.pdf 3. Fisheries and Aquaculture (BIOL3340) of the University of Queensland. https://my.uq.edu.au/programs-courses/course.html?course_code=BIOL3340
Activity	By using a model for how fishing affects marine life populations, students will construct explanations for one of the reasons why fish populations are declining. They will ~~then~~ work to design solutions for ways of making fisheries more sustainable for the animals and the people who depend on them as follows: Assignment 1a: Make a model to explore how fishing affects the ocean animal populations. Assignment 1b: Construct explanations and design solutions for impacts of fisheries on healthy oceans using brainstorming. Assignment 1c (Community-based learning project): Identify ways individuals can influence impacts of the fishing industry and food sources as discussion in a group.

10Cs/6 LEARNING GOALS	1 √	2 √	3 √	4 √	5 √	6 √	7 √	8 √	9 √	10 √	LG √	BE √	KN √	LT	DO √	GS √	TRA
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17

Key	Climate changes and its~~their~~ impact on sustainable fisheries

Commented [NK9]: through discussions? Debates?

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Concepts	
Overview	In this module, students will have sufficient knowledge about the current and potential climate changes withas regards to the sustainable fisheries and food security.
Aim	The overriding aim of this module is turn student's able to manage the current and potential effects of climate changes on the fisheries.
Learning Outcomes	By the end of this module the students will be able to: 1. Identify resources available to help establish a sustainable fisheries. 2. Describe the primary effects of climate changes on sustainable fisheries. 3. Describe basic retail sustainable fisheries.
Units	Unit 2.1. Basics of Climate Changes. Unit 2.2. Sustainable Fisheries in response to Climate Change. Unit 2.3. Sustainable Fisheries and Food Security Challenges.
Readings	1. https://www.google.com/search?client=firefox-b-d&q=1.%09https%3A%2F%2Fwww.shortcoursesportal.com%2Fstudies%2F121006%2Ffisheries-governance-for-food-security.html 2. FAO (2007) Building adaptive capacity to climate change. Policies to sustain livelihoods and fisheries https://www.google.com/search?client=firefox-b-d&ei=gtW0XKbHH7CclwSz5oyQDg&q=2.%09FAO+%282007%29+Building+adaptive+capacity+to+climate+change.+Policies+to+sustain+livelihoods+and+fisheries&oq=2.%09FAO+%282007%29+Building+adaptive+capacity+to+climate+change.+Policies+to+sustain+livelihoods+and+fisheries&gs_l=psy-ab.3...6800.6800..7780...0.0..0.0.0 ..... 0 ..2j1..gws-wiz.GHiklo1J2ik
Activity Module 2	Students will be requested to prepare and discuss the mutual impact of climate changes, sustainable fisheries and food security by: Assignment 2.1. Student-centred learning, where the diverse learning needs of students, rather than the need to push through content, are at the centre of the learning process. Assignment 2.2. Problem-based learning, where students are given a problem or scenario that requires students to formulate questions, analyse evidence, connect evidence to pre-existing theories, derive conclusions, and reflect on their learning. Assignment 2.3. Experiential learning, where students learn by engaging in authentic learning activities, that is, ones that replicate situations or problems they might encounter in real life or in a work situation.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√	√		√		√		
	√		√										√	√	√		

Key Concepts Overview	Fisheries dynamics, fisheries development In this module, students will have sufficient knowledge and understanding about local and universal dynamics of fisheries. They will be able to analyze and apply action research local fisheries be able to develop local fisheries.
Aim	The aim of this module is turn student's able to analyse contemporary food and

Commented [NK11]: Suggested aim:

The overriding aim of this module is to examine sustainable fisheries and food security in response to climate change.

Commented [NK12]: What you have here is not a good aim. Students will manage the effects of climate change on fisheries! No.

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Please check all your links.

Commented [NK15]: What is the activity??

You are not supposed to tell it is student-centred learning, problem-based and experiential… you need to explain the activity itself and its aims

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	agricultural issues and trends as well as developing fishery strategies for overcoming challenges in correspondence with SDG no. 2
Learning Outcomes	At the end of this module the students will be able to: 1. Apply a system approach to analyzing and interpreting fisheries dynamics, opportunities, threats, and trends. 2. Describe strategies for overcoming basic challenges in developing fisheries. 3. Implement the most suitable statistical analysis program for the dynamics of fisheries development.
Units	Unit 3.1. Dynamics of fisheries overview Unit 3.2. Developing research applications in fishery dynamics
Readings	1. Platteau, J.P (1989). The Dynamics of Fisheries Development in Developing Countries: A General Overview. *Development and change. Volume 20. Pp.565-597.* Available online at URL: ~~1.~~ https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-7660.1989.tb00358.x ~~2.~~1. https://www.google.com/search?client=firefox-b-d&ei=Dda0XN7oBZKVlwTBw6HYDg&q=3.%09Charles+A.T.%2C+%282001%29%2C+Sustainable+fishery+systems%2C+Oxford%2C+Blackwell+Science+Ltd.&oq=3.%09Charles+A.T.%2C+%282001%29%2C+Sustainable+fishery+systems%2C+Oxford%2C+Blackwell+Science+Ltd.&gs_l=psy-ab.3...204226.204226..205632...0.0..0.166.166.0j1 ... 0 .. 2j1..gws-wiz.ntCMSbp3vXE
Activity	Assignment 3a. Students will do fileld visits for local fisheries. They will be asked ~~for~~ to collect~~ing~~ data from fisheries, highlighting problems related to……., and recommending solutions. This data will be presented ~~as~~in a ~~practical~~ report ~~from~~ by each student with ~~dissection this~~ analysis of results and recommendation of a~~predict the~~ solutions for any problem during the~~ir~~ field visit ~~survey~~. Student report should cover data from Commercial Fisheries, place and gear employed by fishermen. Assignment 3b. Research is needed to understand the motivations of harvesters to enable accurate interpretation of the fishery-dependent data, including the determinants of catch in commercial, recreational, and subsistence fisheries.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

~~Key Concepts~~	~~Fish production and marketing~~
Overview	In this module, students will have sufficient knowledge and understanding about fish production. In addition to increase their awareness about sustainable fisheries and food security
Aim	Demonstrate an ability to discuss the principles and practices of sustainable fisheries and food security as mentioned in SDGs no. 1 and 2.
~~Learning Outcomes~~	~~By the end of this module the students will be able to:~~ 1. Identify basic elements for producing and marketing high value fish. 2. Understand the sustainable fish production and successful marketing.
~~Units~~	~~Unit 4.1. High Value Fish Production~~ ~~Unit 4.2. Season Extension Techniques for High Value Fish.~~ Unit4.3. Principles and Practices of Sustainable Fisheries and Food Security
Readings	1. Put the complete reference with author, title, journal as commented before.

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Commented [NK19]: The concept of marketing does not show in the course schedule, not in the learning objectives and not in the learning outcomes

Please make sure that the course schedule, learning objectives and learning outcomes and the modules should match…

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	1.2.https://www.sciencedirect.com/science/article/pii/S0308597X12002503 2.3.llison, E.H.,(-2005). The fisheries sector, livelihoods and poverty reduction in Eastern and Southern Africa, In: Ellis F., Freeman, A. (Eds.), Rural livelihoods and poverty reduction policies, Routledge, London, pp. 256- 273 http://s.zlsite.com/?ie=UTF-8&ac=pc&t=&wd=1.%09Allison%2C+E.H.%2C+2005 3.4. Kura, Y., Revenga, C., Hoshino, E., Mock, G., (2004). Fishing for answers: making sense of the global fish crisis. World Resources Institute, Washington DC. http://s.zlsite.com/?ie=UTF-8&ac=pc&t=&wd=2.%09Kura%2C+Y.%2C+Revenga%2C+C.%2C+Hoshino%2C+E.%2C+Mock%2C+G.%2C+2004.+ 4.5. United Nations Economic and Social Council Statistical Commission, (2010). Global Strategy to Improve Agricultural and Rural Statistics: Report of the Friends of the Chair on Agricultural Statistics. Forty-first Session, February 23-26 http://s.zlsite.com/?ie=UTF-8&ac=pc&t=&wd=United+Nations+Economic+and+Social+Council+Statistical+Commission%2C+2010
Activity	1. The student will write a proposal or economic study about fish production. Also, they will be asked to report the practices of high value fisheries by Training on Rice-fish Farming. 2. Th~~r~~ey will quantitatively define the risk at a whole-of-fishery level.
10Cs/6 LEARNING GOALS	1 √ | 2 √ | 3 √ | 4 √ | 5 √ | 6 √ | 7 √ | 8 √ | 9 √ | 10 √ | LG √ | BE √ | KN √ | LT | DO √ | GS √ | TRA √
SDGs	1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 5 | 16 | 17
Key	Fish Nutrition, Formulation and Feeding
Concepts Overview	Fish nutrition constitutes an ever-increasing area of research and interest due to the fact that it is a fundamental for the success and sustainability of the aquaculture industry. Poor nutrition would lead to stress, diseases, poor fish growth and environmental pollution and thus a thorough understanding of the requirements of the fish's nutrition together with how such requirements are met is essential in conformance with SDGs no. 1, 2, 3 and 6.
Aim	The aim of this module is to ~~P~~provide~~s~~ an in depth analysis of how to determine the requirements of different aquatic species for the different nutrients. Also, Iit ~~will then proceed to~~ discusses how such requirements are met and the major differences between the nutrition of aquatic species at different stages of their life. In addition, ~~The unit~~the module will ~~also~~ discuss the different feeds used by aquaculture and ~~what are~~ the needs for alternatives ~~to be found~~. Thus the learner will get a good understanding of the way aquaculture provides the best nutrition for the species being cultured and how essential this is in the way of enterprise economics.
Learning Outcomes	At the end of this module the students will be able to: 1. Understand how energetics and metabolism determine the nutrition requirements of aquatic species 2. Compare and contrast different feeds used in the aquaculture industry 3. Comprehend the general principles of larval and juvenile nutrition, formulation

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Commented [NK21]: A totally new concept also does not exist in schedule, objectives and outcomes.

	and feeding 4. Comprehend the general principles of grow-out and brood stock fish nutrition, formulation and feeding 4.5. What about enterprise economics??
Units	Unit 5.1. Fish Nutrition, Formulation and Feeding Unit 5.2. Aquaculture, Management and Policy Unit 5.3. International Fisheries Management
Readings	1. https://www.researchgate.net/publication/263807993_Fish_Nutrition_and_Current_Issues_in_Aquaculture_The_Balance_in_Providing_Safe_and_Nutritious_Seafood_in_an_Environmentally_Sustainable_Manner 2. https://www.slu.se/en/departments/aquatic-resources1/education/?gclid=EAIaIQobChMIrIvlpZHS4QIV2IjVCh0ccwkWEAAYAiAAEgKv9_D_BwE
Activity	CC~~C~~SAFS Community-Based / Service Learning Activity Student project design for scaling up Aquaculture Production project supports development of the aquaculture sector to increase fish production and consumption as well as the incomes of small-scale farmers. You need to elaborate on the Community-Based / Service Learning Activity. See comments at the end of the document

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√						√			√		√		√		

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Commented [NK22]: Colombo, S. (2014). Fish Nutrition and Current Issues in Aquaculture: The Balance in Providing Safe and Nutritious Seafood, in an Environmentally Sustainable Manner. *Journal of Aquaculture Research and Development* 03(03) · pp
Available at URL…..

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Comments on the overall course

- The course description includes reference to a range of concepts: from fisheries/ food security/ nutrition / global, national and rural economies/ sustainable management of fisheries / biology and mathematics of fisheries and aquaculture / fish reproductive biology and dispersal / mathematical modelling and stock assessment / fish nutrition / health and genetics in aquaculture and fisheries. However, when it comes to the course objectives, learning outcomes, course schedule and modules, all these concepts in the course description are presented in a disjointed / unbalanced fashion. It is clear that the discipline of fisheries and food security in relation to climate change is the key in this course and this should form the background and theoretical foundation for the aspects of sustainable fisheries and food security. Ignoring this has lead the course developer to unclear set of aims and objectives, learning outcomes and modules.

- The course objectives are not well-written. You need to use action verbs and be consistent in your course objectives and learning outcomes throughout all modules.

- While the main concepts are stated in the course description, they are only touched on in the actual modules. I would advise returning to the Learning

Outcomes and grounding the modules in these outcomes. More work on the methodologies used and the assessment procedures would support learning.

- The course outcomes are not fully described in the learning objectives. It is important that learning objectives are consistent with the outcomes and the subsequent course schedule and module. Even the titles of the units in the modules are not matching with the above descriptions in the course syllabus.

- The course does show evidence of integration of disciplinary insights but these are still at a very basic level and need to be further developed for better course implementation. Perhaps, it would be an opportunity to work with other members of the Department to develop modules that have a clear and focused intent in relation to fisheries, climate change and food security. Go back to the Pillars of Sustainability to see how this can be mapped. In the description, for instance, you indicate: "The course will draw extensively on the relevant biological sciences and mathematics and will show adaptability and application in a changing economic and ecological framework". I struggled to find this in the course modules / activities…. But I did not find.

- References should be rechecked. Many of the links are broken or take the reader to google. Also, writing the reference should follow the APA style- even when it comes to an online source. I have given you examples in the comments above.

- Please suggest a textbook on fisheries for reference.

ECTS Integration in Course Curriculum

Please make sure to adjust the ECTS table when you will change the modules. It is very critical to weight each component in line with the learning objectives and outcomes, in total and separately for each course module. It should be clear how you allocate the workload based on the course objectives, learning outcomes, modules, and activities.

CCSAFS Community-Based / Service Learning Activity

There are several activities described in the course, but they do not really address the community-based / service learning perspective. The activities should be linked to the activity goals and learning outcomes. The activity in module 5 is the community-based activity you intend to do. But, it is very broad and not well-focused. What is the main objective and what methodology you will follow to do it?

You indicate: "Student project design for scaling up Aquaculture Production project supports development of the aquaculture sector to increase fish production and consumption as well as the incomes of small-scale farmers".

This is not clear. Are you doing a marketing analysis, feasibility analysis, project management or the student will focus on the expansion of the aquaculture based on

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the reproductive biology and stock??… it is not clear what the student is supposed to do.

Please keep in mind the following:

a) The activity should meet an actual need in the community.
b) The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
c) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society.
d) The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The activity should provide students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

Please try to redesign the activity to show the connections between academic achievement, civic engagement, and personal growth

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CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

~~Course Syllabus~~

Course Number: ……

Precision Farming

Aswan University, Faculty of Agriculture and natural Resources

Semester:

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Instructor Information

Instructor: Dr. Wagdi Saber Soliman
Office Location: Aswan University, Sahari Campus
Telephone: office - +20 973 480 245
Office hours: Sunday-Wednesday 09.00 - 14.00
E-mail" wagdi79@agr.aswu.edu.eg
Website:

Course Identification

Course Number:
Course Name: Precision Farming
Course Location: Aswan University
Class Times:
Prerequisites:
Faculty Web Page: http://agr.aswu.edu.eg

Course Description/Overview

Precision agriculture is high technological farming where the aim is to adapt as much as possible management actions to local, detailed growing conditions, with the aid of GNSS (Global Navigation Satellite System) positioning or on-the-go crop monitoring with visual and non-visual sensors. This course provides principles and applications of technologies supporting precision farming and natural resource data management planning, as well as Global Navigation Satellite System (GNSS), geographic information system (GIS), variable rate technologies (VRT), data layering of independent variables, field sensors and computer software for precision farming.



Course Learning Objectives

- This course covers information and technologies that are used for precision farming and their applications.
- Maximize the efficiency and efficacy of applied resources to optimize yield with a minimum impact on the environment
- Assess current and future perspectives of precision farming
- Develop appropriate skills in scientific and community communication
- Develop cognitive, psychological, and social skills among students such as life-learning and transferable skills, promotion of students' active participation in the community, competence as responsible citizens, etc.

This is not an objective. You need to put it in another form. :Commented [NK1]

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

1. ~~address the outcome of becoming~~ be familiar with terms and definitions typical of precision agriculture
2. discuss the magnitude and causes of production variability
3. describe the current objectives and emerging applications of precision agriculture
4. be familiar with global positioning systems and geographic information systems, and their application in precision agriculture
5. identify current remote sensing and other variability measuring technologies supported by image processing techniques and describe their applications in precision agriculture
6. know~~ledge of~~ field guidance systems for exploitation of controlled traffic or variable rate technology approaches
7. utilize become familiar with GIS (Geographic Information Systems) software ~~and be able to utilize it~~
8. explore principles and applications of variable rate technologies
9. identify sensing technology for precision agriculture
10. apply precision agriculture to a real situation.
11. explain the economic and environmental benefits of precision agriculture, and quantify some aspects of the economic impact of precision controlled traffic farming.

Course Resources

Course Website(s)

Required Course Texts and Materials

- Hand-out prepared by the instructor for the class
- Bolstad P., (2012). GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapters 3&4.
- Chang K., (2013). Introduction to Geographic Information Systems, 7th edition-Chapter 10.



Optional course Texts and Materials

Banu S. (2015). Precision agriculture: tomorrow's technology for today's farmer. J Food Process Technol 6(8): 468. doi:10.4172/2157-7110.1000468.

Burrough, P. A., McDonnell, R. A. and Lloyd, C. D. (2015) Principles of Geographical Information Systems, 3rd ed., Oxford University Press, 352 pp.

Precision Agriculture for Grain Production Systems, by Brett Whelan and James Taylor, CSIRO Publishing, 2013.

Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 .

Precision agriculture for sustainability and environmental protection, edited by Margaret A. Oliver, Thomas F. A. Bishop and Ben P. Marchant, Routledge, 2013.

Follow same format- APA style. Author at the beginning… :Commented [NK2]

Same comment :Commented [NK3]

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading policy

Grades can be based on the following:

Oral Exam	10
Semester assignments	10
Practical Exam	20
Final Exams	60
Total Points	100

Course policies

Late Assignment

It is important that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive at on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and though about the assigned material before you come to class. I expect active class participation.



Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Important Dates to Remember

Course schedule

Week	Date	Topics, Reading, Assignments and Deadline (details on assignments and more bibliography are available in the course modules)
1		Course overview: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection
2		Introduction to Precision Agriculture
3		Technology related to precision agriculture
4		Global Navigation Satellite System (GNSS)
5		Applications of Geographic Information System (GIS)
6		Soil sensors and soil variability
7		Appropriate data layers for precision agriculture
8		Phenotyping (the measurement of crop characteristics with digital image analysis)
9		Technical and environmental aspects of site-specific management
10-11		Applications for precision agriculture
12-13		Agricultural case studies
14		Economic/Environment aspects of precision agriculture



The CCSAFS Course Modules

Course	Precision Farming
Module 1	Introduction to Precision Agriculture
Key Concepts	Definition, theories, and concepts
Overview	It is essential for students to develop a fundamental understanding of precision farming theory and concepts. Questions to be addressed in this module include the following: What is the nature of precision farming? Why is it important to study precision farming? What are the current objectives and applications of precision agriculture?
Aim	The overriding aim of this module is to turn students able to discourse on precision farming theories, concepts as well as current applications
Learning Outcomes	- discuss the magnitude and causes of production variability - describe the current objectives and emerging applications of precision agriculture
Units	- Definition of Precision Farming - Theories and Concepts of Precision Farming
Readings	-Precision Agriculture for Grain Production Systems, by Brett Whelan and James Taylor, CSIRO Publishing, 2013 . - Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 . - Precision agriculture for sustainability and environmental protection, edited by Margaret A. Oliver, Thomas F. A. Bishop and Ben P. Marchant, Routledge, 2013.
Activity	- Two theoretical lectures will be given by the instructor. - Interactive learning: instructor and students will discuss benefits of precision farming ~~using~~ and the problems with adopting this technology. Students will apply what they learned about precision farming to develop a list of specific benefits of precision farming - - Student presentation: Some of the students will be asked to prepare multimedia files on the use and benefits of precision farming with examples that can be adopted in the Arab region.
SDGs	SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture: this is clear ~~from on~~ the outcomes and readings
~~Module 2~~	~~Precision Agriculture Technology~~
~~Key Concepts~~	~~GNSS, GIS, remote sensing, satellites equipped with multispectral cameras,~~
Overview	It is essential for students to be familiar with technological application in precision farming. These applications include remote sensing, image processing, Global Navigation Satellite System (GNSS), and geographic information systems (GIS), Satellite providing multispectral information (such as Copernicus, Planet or World ~~w~~View satellites)

FOLLOW apa STYLE :Commented [NK4]

This should be in objectives and learning outcomes at the beginning of the syllabus :Commented [NK5]

Aim	The overriding aim of this module is to turn students familiar with GNSS and GIS, and their application in precision agriculture
Learning Outcomes	- identify current remote sensing and other variability measuring technologies supported by image processing techniques and describe their applications in precision agriculture - know~~ledge of~~ field guidance systems for exploitation of controlled traffic or variable rate technology approaches - become familiar with GIS (Geographic Information Systems) software and be able to utilize it - explore principles and applications of variable rate technologies - identify sensing technology for precision agriculture
Units	- Global Navigation Satellite System (GNSS) - Geographic Information System (GIS) - Soil sensors and soil variability - homogeneous zones
Readings	- Banu S. (2015). Precision agriculture: tomorrow's technology for today's farmer. J Food Process Technol 6(8): 468. doi:10.4172/2157-7110.1000468. - Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 . - Bolstad P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapters 3&4. - Chang K., 2013. Introduction to Geographic Information Systems, 7th edition-Chapter 10. - Burrough, P. A., McDonnell, R. A. and Lloyd, C. D. 2015 Principles of Geographical Information Systems, 3rd ed., Oxford University Press, 352 pp
Activity	- Four theoretical lectures will be given by the instructor. - Practical sessions and student activities: each group of students will be asked to prepare a project that is based on a real case for an agricultural area in Aswan region. The students will be divided into groups, they will do field visits and communicate with farmers to define a real problems, then will join group discussion to know how to apply the precision agriculture technology for solving the problems.
SDGs	SDG number 7- Ensure access to affordable, reliable, sustainable, and modern energy for all
Module 3	Data Analysis for Precision Agriculture
Key Concepts	Satellites equipped with multispectral cameras, Digital image analysis
Overview	It is essential for students to use and apply the technological application of precision farming such as digital image analysis for measuring crop properties.
Aim	The overriding aim of this module is to turn students able to measure crop characteristics with digital image analysis techniques
Learning Outcomes	- apply the image processing techniques - analyz~~esis~~ the data of image processing in precision farming

APA :Commented [NK6]



Units	- ….. USE A VERB Phenotyping .
Readings	- Banu S. 2015. Precision agriculture: tomorrow's technology for today's farmer. J Food Process Technol 6(8): 468. doi:10.4172/2157-7110.1000468. - Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 .
Activity	- Two theoretical lectures given by the instructor, supported by handouts and short manuals for carrying out digital image processing functions that area relevant to precision farming. - The students will be asked to apply their knowledge in precision agriculture by collecting image data and analysis it to determine crop characteristics - Student assignment and presentation on a case study where remote sensing is implemented for precision farming. Multimedia files and presentations are encouraged and prioritized.
SDGs	SDG number 12- Ensure sustainable consumption and production patterns ~~SDG number~~ 13- ~~Take urgent action to combat climate change and its impacts~~
~~Module 4~~	~~Applications for Precision Agriculture~~
Key Concepts	Technical and environmental aspects of precision agriculture, vegetation indices
~~Overview~~	~~It is essential for students to be aware~~~~ness~~ ~~of precision agriculture applications~~
Aim	The overriding aim of this module is to turn students able to apply the applications to develop precision agriculture management
Learning Outcomes	~~- identify the applications of precision agriculture~~ - select the suitable application for precision agriculture purposes
Units	- Technical and environmental aspects of site-specific management
Readings	- Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 . - Precision agriculture for sustainability and environmental protection, edited by Margaret A. Oliver, Thomas F. A. Bishop and Ben P. Marchant, Routledge, 2013.
Activity	- Three theoretical lectures and practical lessons will be given by the instructor. - Student assignments and presentations on case studies where hyperspectral is used in precision farming. All presentations shall include multimedia files and demos.
SDGs	SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture: this is clear on the outcomes and readings SDG number 7- Ensure access to affordable, reliable, sustainable, and modern energy for all
Module 5	Agricultural case studies
~~Key Concepts~~	~~Case study, vegetation indices, precision agriculture differences in case of big companies or small farms~~
~~Overview~~	~~It is essential for students to be simulate and evaluate the precision agriculture through field visits~~

APA :Commented [NK7]

This should be in objectives and learning outcomes at the beginning of the syllabus :Commented [NK8]

This aspecst should be highlighted in the objectives / outcomes earlier :Commented [NK9]

APA :Commented [NK10]

Aim	The overriding aim of this module is to mingle connect students with the farmers to see the applications of precision agriculture and their negative and positive impacts
Learning Outcomes	- improve the communication skills, leadership, and team wok - discuss ~~the~~ agricultural problems -select the appropriate solutions for farmers
Units	- apply precision agriculture to a real situation.
Readings	-Precision Agriculture for Grain Production Systems, by Brett Whelan and James Taylor, CSIRO Publishing, 2013 . - Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 . - Precision agriculture for sustainability and environmental protection, edited by Margaret A. Oliver, Thomas F. A. Bishop and Ben P. Marchant, Routledge, 2013.
Activity	- Two theoretical lectures and practical lessons will be given by the instructor. - Field trip - Data collection and discussion groups - Practical field activities carried out with applications available for smartphones (such as for collection of GPS/Glonass/Galileo GNSS coordinates) - analyzing the collected data from the field and reporting the recommended solution - inviting the farmers for final presentation to declare the results
SDGs	SDG number 2- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture: this is clear ~~on~~ from the outcomes and readings
~~Module 6~~ Key Concepts	~~Economical & Environmental Precision Agriculture~~ Economic and environmental aspects of precision agriculture, weather
Overview	It is essential for students to be awareness with economic and environmental benefits of precision agriculture
Aim	The overriding aim of this module is to ~~turn student able to~~ compare precision agriculture with other agricultures techniques, not only economically but also environmentally
Learning Outcomes	- explain the economic and environmental benefits of precision agriculture~~, and~~ - quantify some aspects of the economic impact of precision controlled traffic farming.
Units	- Economic Aspects of Precision Agriculture - ~~Environmental Aspects of Precision Agriculture~~
Readings	- Precision Agriculture for Grain Production Systems, by Brett Whelan and James Taylor, CSIRO Publishing, 2013 . - Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and results, edited by Hermann J. Heege, Springer, 2013 . - Precision agriculture for sustainability and environmental protection, edited

Should be reflected in the course learning outcomes. :Commented [NK11]

There should be some parallelism between the learning outcomes of the course and the modules learning outcomes

APA :Commented [NK12]

	by Margaret A. Oliver, Thomas F. A. Bishop and Ben P. Marchant, Routledge, 2013.
Activity	- One theoretical lecture will be given by the instructor. - The student will be asked to write report about economic and environmental benefits of precision agriculture.
SDGs	SDG number 9- built resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation

APA :Commented [NK13]

~~5~~ ~~ECTS Workload allocations~~

Learning components	No	Time Factor	Workload	Course modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	10	3	30	6	9	3	3	6	3	30
Online	4	3	12	--	3	3	--	6	--	12
Lab work	2	5	10	--	8	--	2	--	--	10
Reading articles (3 pages/hr)	15	0.3	5	--	3	2	--	--	--	5
Reading book chapters (5 pages/hr)	150	0.2	30	5	7	3	5	5	5	30
Preparing course activities	4	5	20	5	--	5	10	--	--	20
Project work	1	30	30	--	5	5	5	10	5	30
Preparation for exam	1	20	20	--	--	--	--	6	14	20
Writing the exam	1	3	3	--	--	--	--	--	3	3
Total			160	16	35	21	25	33	30	160



SDGs		CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				1, 4, 5
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				2, 4
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				6
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				3
13	Take urgent action to combat climate change and its impacts				3
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive in				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

General comments:

1) The community-based activity goals, purpose and expected learning outcomes are clearly identified. The connections between academic achievement, civic engagement, and personal growth are obvious in the activity that is structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to

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the whole course. Also, it is evident that students can actively reflect on their learning experiences that can eventually lead to personal and societal transformation. There is clear evidence that the activity helps solve a real-life problem, meet a need or address an issue in the community.

But, please include the activity in the syllabus (it is now in another word document). They should be in one document (syllabus and activity at the end of the modules.

2) The readings assigned in the course should follow the same style in referencing. Also, the readings should reflect how disciplinary concepts can be blended in a meaningful way.

3) I suggest that the course learning outcomes be improved in a way to match those in the modules. This will improve connecting the course modules in a more significant way.

4) The economic aspect (in module 6) needs to be more emphasized and the interrelatedness of social, ecomomic and technical dimensions should be clearly identified.

5) Please be careful to address the issues of: climate change, food security, and sustainable agriculture. They are not highlighted in a clear way in the course, and I believe that they could be better revealed. in a way that can contribute to the awareness-raising of students concerning the importance of climate change, as well as promote environmental assessment principles and integrate systematic environmental and socio-economic evaluation into precision farming.

6) All course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc. In the designed course, only 5 SDGs were addressed as checked in the table (sometimes in the modules themselves), but there is no clear balance. What about the other SDGs? I believe you can target more SDGs when you address my comments (numbers 4 and 5).



CCSAFS COMMUNITY-BASED/SERVICE LEARNING ACTIVITY

Name of the course: Precision Farming

During the course from the 1st module ending to the 5th module, the students will be engaged together in a community-based learning activity to stimulate and evaluate the precision agriculture through field visits. The objective of the community-cation based learning activity is to engage students with the farmers to define their agricultural problems, recommend the suitable application of precision agriculture to solve these problems, and evaluate its negative and positive impacts.

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The recommended number of students in the course is 25 students. The students will be divided into groups (each group consists of 5 students). The groups will be distributed in 5 different agricultural areas near to Aswan city, Egypt.

- All students (25 students) under the supervisionor of the course Staff will be engaged into group discussions in the first week of the semester to define the work plan, select each group members and the tutor for each group, and select the target areas.
- Each group will be responsible to collect data about the real agricultural problems facing the farmers.
- All students will be engaged again to discuss these problems and determine ONE PROBLEM to be addressed solve by all the groups.
- After defining the problem, each group will collect the related data to the problem such as distance from the river Nile river, distance from main road, injured areas, damaged ???, plant growth characterizations, ….etc.
- Then, each group members together will analyze do the data analysis, and discuss the results within their groups group discussionin order to identifyreport the reasons of problem and

how to solve it using precision agriculture technologies such as GPS, GNSS, Satalite providing multispectral information, …etc.

- The students will be engaged in practical field activities in the target area carrying out with applications of precision agriculture.
- Students will ~~E~~evaluate and stimulate the precision agriculture technology.
- The staff member, with the assistan~~t~~ce of the students, will prepare and achieve training and workshops for the target farmers to transfer knowledge and technology of precision agriculture
- Finally, each group will ~~do~~ write a final report. One of each group will ~~join to~~ present the ~~final~~ report and activities of the ~~communication~~ community- based learning activity in a final conference inviting the staff members, tutors, farmers and all students.

For student assessments, each group will submit the collected data, data analysis repot, and field visits reports. Also, the tutor of each group will submit report about each group member to assess ~~about~~ his efficiency and cooperation with the team to the Staff member for final ~~assessment~~evaluation by the instructor.

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~~The CCSAFS Course Modules Template~~



CCSAFS COURSE SYLLABUS TEMPLATE

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Course Syllabus

Course Number:

Sustainable Management of Soil and Water (10 ECTS)

University of Suez Canal, Faculty of Agriculture, Department of Soil and Water,
……. Semester, 2017 -2018

Instructor Information

Instructor: Dr. Samy Abd El-Malik Mohamed Abd El-Azeem
Office Location: Soil and Water Department
Telephone: +201146559578
Office Hours: ……..
E-mail: sazeem18@gmail.com, samy_abdelmalik@agr.suez.edu.eg
Website:

Course Identification
Course Number:
Course Name: Sustainable Management of Soil and Water
Course Location: University Campus
Class Times: ……
Prerequisites:
Faculty Web Page: http://scuegypt.edu.eg

Course Description/Overview

Soil and water are key resources for agriculture that determine levels of food production and thus food security on a local, national and global scale. In general, effective management of soil and water is essential for society, but critical for agriculture. Management of water is also of key importance as water is likely to become an increasingly limited resource in a world subject to climatic and environmental change.

Sustainable management of agricultural soils and water is fundamental to global food security, especially in the face of climate change and increasingly erratic weather. Using innovative technologies, we develop sustainable soil and water management practices that contribute to increasing global agricultural production and food security while conserving natural resources. This course seeks to evaluate the sustainability of existing and proposed systems for managing soil and water in the agricultural environment. Evaluation of farming systems (organic, integrated, conventional),

proposed protection strategies and risk posed by climate change. The course is divided into six sections. The first section addresses the terms used in water management for sustainable agriculture and water sustainability issues. The second section discusses the centrality of water, its global dimensions, and the impacts of climate change on water resources. The third section focuses on the integrated water resource management and water rights and pricing. The fourth section concentrates on management of Soil Fertility. In this section, we focused on the impacts of climate change on soil gas emission and carbon sequestration in the soil. The fifth section shows the management of soil erosion (water and wind erosion). Finally, the sixth section discusses the management of soil threats such as soil pollution, salinization and sodicity and loss of soil biodiversity.

Course Learning Objectives

This course aims to develop knowledge and skills relating to the sustainable management of soil and water resources. The objectives of this course are: a) to provide students with a fundamental understanding of key hydrological processes in the context of the present status of agronomic productivity and the availability of the water resources: b) to gain and understanding the relationship between climate change and global water cycle and by association the natural and human systems: c) to understand present-day challenges to the governance and management of water resources: d) to evaluate the soil fertility, which nutrients are needed for the growth of plants, and brief the processes that cause a loss of soil fertility and the effects of that:
e) to present best management practices for managing erosion on agricultural soils for preventing and resolving wind or water erosion: f) and finally investigate the management of salt and sodic problems and soil pollution as well as investigate the technolgies for resolution loss of soil biodiversity.

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Examine and critically appraise the application of the fundamentals of pedology and hydrology in sustainable resource management.
2. Evaluate the sustainability of systems for managing the soil resource.
3. Evaluate water resource use within the environment.
4. Manage and measure salinity and sodicity in irrigated agricultural systems.
5. Manage and remediate polluted soil.
6. Investigate the primary causes of a wide range of soil degradation problems, including soil acidity and alkalinity, erosion, salinity and sodicity, and nutrient loss.
7. Evaluate the impact of soil management on soil organic matter, soil structural stability, water quality and other important soil properties.
8. Learn how to work effectively in small groups in the lab and in the field.
9. define biodiversity and describe problems associated with biodiversity loss, as well as progress in protecting biodiversity.

Course Resources

Course Website(s)

Required Course Texts and Materials

Hands-out prepared by the instructor for the class

Students should be familiar with the content of at least one of the following:

- Lal, R. and Stewart, B.A. (2013) (Eds.). *Principles of Sustainable Soil Management in Agroecosystems*. CRC Press, Taylor and Francis Group
- Cook, H.F. and Lee, H.C. (1995). (Eds.). *Soil Management in Sustainable Agriculture*. Wye College Press.
- FAO (2017). Voluntary Guidelines for Sustainable Soil Management. Food and Agriculture Organization of the United Nations Rome, Italy.
- Magdoff, F.R. and Weil, R.R. (2004). *Soil Organic Matter in Sustainable Agriculture*. CRC Press.
- Tejada-Guibert, J.A., Setegn, S.G., Stoa, R.B., 2015. Sustainable Development and Integrated Water Resources Management. In: Setegn, S.G., Donoso, M.C. (Eds.), Sustainability of Integrated Water Resources Management: Water Governance, Climate and Ecohydrology. Springer International Publishing, Cham, pp. 197-214.
- Edwin, G.A., Poyyamoli, G., 2012. Climate Change and Sustainable Management of Water Resources. In: Leal Filho, W. (Ed.), Climate Change and the Sustainable Use of Water Resources. Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 431-447.
- Water resources management, from Wikipedia https://en.wikipedia.org/wiki/Water_resource_management
- Mirsal, I.A. (2008). *Soil pollution: origin, monitoring and remediation*. Second edition Springer-Verlag Berlin Heidelberg.
- Mace, J.E. and C. Amrhein. 2001. Leaching and reclamation of a soil irrigated with moderate SAR waters. Soil Sci. Soc. Am. J. 65: 199-204
- Paul, E. A., A. Kravchenko, A. S. Grandy, and S. Morris. (2015). Soil organic matter dynamics: Controls and management for sustainable ecosystem functioning. Pages 104-134 in S. K. Hamilton, J. E. Doll, and G. P. Robertson, editors. The Ecology of Agricultural Landscapes: Long-Term Research on the Path to Sustainability. Oxford University Press, New York, New York, USA.

Krishna K. R. (2013). Precision Farming: Soil Fertility and Productivity Aspects. 1st Edition, Apple Academic Press.

- Gupta, S.K. (2011). *Modern Hydrology and Sustainable Water Development*. Wiley-Blackwell.

Recommended Journals

- Journal of Sustainable Agriculture

Soil Use and Management

- Agriculture, Ecosystems and Environment

Soil and Tillage Research

- Land Degradation and Development
- Journal of Environmental Management

Agronomy Journal

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Optional Course Texts and Materials

Assignments and Grading Scheme
Grading System

Grading Policy

Grades will be based on the following: (For example)

Oral Examination	5%
Mid-Term Examination	5%
Class attendance/participation	5%
Practical Examination	15%
Final Exams	70%
Total Points	100

Course Policies

Late Assignments
It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol
This is a seminar type of course, which means that students are expected to come to ALL classes.

Disability
Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by case basis.

Important Dates to Remember

Course Schedule

Commented [NK1]: It is better to have the topics/ readings align with the module titles so the student can follow better

Week	Date	Topics, Reading, Assignments and Deadlines (Details on assignments and more bibliography are available in the course modules)
1		Course Overview Discussion of syllabus and assignments, course requirements.
2		Overview of water sustainability approaches and it is challenges Basics of the hydrologic cycle
3		Climate change concepts and it is impacts on water resources
4		Integrated water resource management, water rights and pricing
5		Water, food, and the global trade of virtual water
6		Production and decomposition of organic matter
7		Organic matter and management of soil fertility
8		Processes of soil erosion and how to manage
9		Tillage management and factors affecting soil erosion
10		Soil pollution and remediation

11		Soil salinization and sodicity
12		Loss of soil biodiversity and how to manage
13		Soil biodiversity and ecosystem services
14		Soil-Water management relationships
15		Final exam

APENDIX II: The CCSAFS Course Modules ~~Template Example~~



Course	Sustainable Management of Soil and Water
Module 1	The Science of Sustainable Water Management
Key Concepts	Overview of water sustainability issues & Water resources management
Overview	Water is life. Growing pressure on water resources - from population and economic growth, climate change, pollution, and other challenges - has major impacts on our social, economic, and environmental well-being. The management and sustainability of water resources is a critical issue facing society over the coming decades. Water resources are affected by changes of climate change, human populations, economic growth, technological change, and other socioeconomic factors. Additionally, they serve a dual purpose; Water resources are critical to both human society and natural ecosystems. Severe weather events ravage some parts of the world with floods, while devastating others with droughts. Water resources are finite, unequally distributed among diverse regions, fragile and prone to loss by soil misuse and soil mismanagement, and vulnerable to extreme events related to the abrupt climate change. The implementation of integrated water resources management at all levels has now been accepted.
Aim	The objective of this module is to provide students with a fundamental understanding of key hydrological processes in the context of the present status of agronomic productivity and the availability of the water resources. Students will then use this understanding to explore various sustainable strategies for integrated water resources management. Students are expected to understand the key components of the water cycle and their relevance for water resource sustainability, including precipitation, evapotranspiration, groundwater, and surface water. Students are also expected to become familiar with the fundamental principle of water conservation, as it is a basic concept needed to manage water resources sustainably. Finally, the students will understand the importance of managing water as natural resources.
Learning Outcomes	At the end of this module students will be able to: • Explain~~s~~ the basic concepts of sustainable management of water • able to identify about the connections between environmental inputs (i.e. natural resources) and outputs (i.e. energy), and their effects on the natural environment. • Comprehend the fundamental principle of water conservation, as it is a basic concept needed to manage water resources sustainably. • Address~~es~~ the concerns of food security as a result of a steadily increasing global population • Outline~~s~~ technological options for water sustainability
Units	Unit 1.1. Overview of water sustainability issues Unit 1.2. Definition of sustainable water management. Unit 1.3. Challenges for achieving sustainable water management. Unit 1.4. Overview of different water management and Sustainability approaches. Unit 1.5. Basics of the hydrologic cycle
Readings	• Russo, T., Alfredo, K. and Fisher, J. (2014). Sustainable Water Management in Urban, Agricultural, and Natural Systems. Water, 6: 3934-3956; doi:10.3390/w6123934.

	• Water resources management, from Wikipedia https://en.wikipedia.org/wiki/Water_resource_management • Brauman, K. A., Daily, G. C., Duarte T. K. and Mooney, H. A. (2007). The Nature and Value of Ecosystem Services: An Overview Highlighting Hydrologic Services. Annu. Rev. Environ. Resour., 32:6.1-6.32. • Edalat, F. D. and Abdi, M. R. (2018). *Adaptive Water Management Concepts, Principles and Applications for Sustainable Development*. International Series in Operations Research & Management. Science Springer International Publishing AG 2018
Activity	Work Load for all activities in this module 21 hours An overview (1 hours) Ask the students to describe the responsibilities of a store manager. Ask them what would happen if the manger did not do these tasks. Most likely the business would fail. The same is true with our environmental resources such as water. We are the water managers and we have certain responsibilities that we must do. Assignment 1.1 Pre-work homework activity (7 hours) • Prior to the classroom portion of the module, students should read all of "Management of water resources" including the three subsections " Definition of sustainable water management, and "Overview of water sustainability issues?" This should take approximately 1 hour. To increase comprehension and help them relate the reading to this module, have students answer the questions. You can write your own description or use the following, *Sustainability of water here can be defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This means sustainable water are not fixed to any one system, but essentially considers all available systems.* URL: https://en.wikipedia.org/wiki/Water_resource_management *Water* 2014, *6*, 3934-3956; doi:10.3390/w6123934 Assignment 1.2 Post-Activity Homework (4 hours) The students should have spent time in this module learning about basic of hydrology and the hydrologic cycle. Now it is time to use what you have learned to educate others. To provide her with useful advice, please follow these steps: 1. Read the topic in titled "hydrology basics and the hydrologic cycle" and read the "glossary" in this file. The file contains 9 pages (3 pages/hour), so the reading this article equal 3 hours, the file is available in URL: https://ext.vt.edu/content/dam/ext_vt_edu/topics/agriculture/water/documents/Hydrology-Basics-and-the-Hydrologic-Cycle.pdf 2. Briefly summarize the component of hydrological cycle using your own words so that the students will understand your summaries, and be sure to define any technical terms used. Your summary limit from 3 to 5 sentences. 3. Provide a closing paragraph informing the reader how component of hydrological cycle such as runoff or evapotranspiration affect soil fertility and plant growth and its potential impacts on agriculture. 4. All technical terms should be defined correctly and should be conveyed in such a manner that a lay-person could understand them (since they are your audience). 5. Make sure that your document is well organized, easy to read, and free of grammar and Spelling errors. Assignment 1.3 Tutorial session activity (3 hours) In this module, we also using tutorial session activity in which quizzes will be held, each

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	followed by 1-hour tutorial session for feedback on quiz. Lectures include the opportunity for open discussion, questions and problem solving activities with support materials provided online. The students should access link https://pmm.nasa.gov/education/videos/tour-water-cycle A tour of the water cycle. All students should be write a paragraph from this video, but this paragraph must show the importance of heat on water cycle. The students should be shared the report about this video by emails. Assignment 1.4 (6 hours) The student should be reading the book chapter in title "Adaptive Water Quantity Management: Designing for Sustainability and Resiliency in Water Scarce Regions. https://link.springer.com/content/pdf/10.1007%2F978-0-387-84891-4_12.pdf

SD Pillars	Environment √	Economy √	Social √	Culture √
21st ESD	Learning to know √	Learning to be √	Learning to do √	Learning to live together √	Learning to transform oneself and society √	Learning to give and share √

SDGs Sub goals	1	2 √	3	4	5	6 √	7	8	9	10	11	12 √	13	14	15	16	17

Egypt Vision 2030	This module will lead to ensure and evident that the strategy vision for the environment until 2030 aims at identifying the mechanisms for encouraging investment in natural resources such as water and ecological systems to support the economy and provide new job opportunities (Ninth Pillar: Environment).

ECTS Work Load	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6 h			15					21

Module 2	Climate Change and Water Resources
Key Concepts	Climate change concepts and impacts on water resources
Overview	Many challenges, including climate change, face the Nation's water managers. The Intergovernmental Panel on Climate Change (IPCC) has provided estimates of how climate may change, but more understanding of the processes driving the changes, the sequences of the changes, and the manifestation of these global changes at different scales could be beneficial. Since the changes will likely affect fundamental drivers of the hydrological cycle, climate change may have a large impact on water resources and water resources managers. The weakness of water resources under a changing climate has received increasing awareness amongst policy makers, planning and environmental agencies, stakeholders and beyond; driven by exciting developments in climate science and bolstered by a surge in media coverage. An important driver of water resource availability is the interaction between the hydrologic cycle and the climate system. Assessing the effects of climate change on water use efficiency is critical for policymaking and adaptation. The impacts of climate change on the water cycle are of key relevance to the sustainable management of water resources. The interaction between water and climate plays an integral role on the coupling between natural, economic and human systems.
Aim	This module will cover the information to understand the main features of the global water/hydrologic cycle, the link between science of water and climate. This module will also cover the effect of climate change on water cycle and by association the natural and human systems.
Learning Outcomes	At the end of this module students will be able to: • Understand the water/hydrological cycle and its connection to climate. • Understand how variability and changes in climate affect/will affect water supply/availability on land. • Understand how water impacts ecosystems. • Learn how to critically evaluate a scientific article and write a review. • Diagnose the cause of a climate-related water problem and develop solutions to address it.

Units	Unit 2.1. Water resources and climate: an overview Unit 2.2. Connections between climate and water Unit 2.3. The impact of climate change on the water cycle Unit 2.4. The coupling of hydroclimate variability with human systems
Readings	• Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., (2008). Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp. • Gleick, P.K, et al. (2000). Water: The Potential consequences of climate variability and change for the water resources of the United States. • De Loë R.C and Kreutzwiser R.D. (2000). Climate variability, climate change and water resource management in the Great Lakes. Climatic Change 45 : 163-179. • Brekke, L. D., Kiang, J. E., Olsen, J. R., Pulwarty, R. S., Raff, D. A., Turnipseed, D. P., Webb, R. S. and White, K. D. (2009). Climate Change and Water Resources Management: A Federal Perspective. U.S. Geological Survey, Reston, Virginia.
Activity	Work Load for all activities in this module 23 hours Assignment 2.1 (3 hours) The student should watch the web video related the topic "How climate change impact water resources"? *that available in the following link:* http://blogs.ei.columbia.edu/2017/06/06/how-will-climate-change-impact-water-resources/ The instructor will ask all students to brief this video and write one page. This activity will increase the knowledge of students to understand the effect of climate change on water resources Assignment 2.2 Written evaluation activity (13 hours) Read and written assignments will be requested for 2 book chapters (38 pages) discussed in class. The chapters 3 and 4 in Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., (2008). Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva. For all students, these written critiques are due *via* Coursework/Canvas at noon of the day of class. Each critique must include: • A short essay giving an overview of the reading (not less than 200 and no more than 300 words) • Two strengths and two weaknesses of the investigation/reading • Two critical questions that can be used as a part of the class discussion The critique should discuss the readings in terms of the topics covered, the strengths and weaknesses of the articles, and critical aspects of the research presented. We have included the following list to act as a guideline for preparing your critique. Not all points need to be included in every critique. • Provide a general overview • Explain the main ideas • Explain important numbers/facts • Incorporate original thought • Tie the paper into the overarching theme of the module The Submission of written critiques are due before NOON on the day of class. Please let us know of any extenuating circumstances that may prevent you from meeting this deadline as soon as possible. Critiques received after noon will be subject to deductions. Later than day after class maximum grade possible will be decreased and feedback from the instructor will not be guaranteed. Assignment 2.3 (5 hours) Students will use case studies and review scientific literature to critically evaluate real-world water security issues and develop sustainable solutions to address them. Example: Case study on Nile delta region, Egypt Briefly, Low-lying land in the Nile delta region is especially at risk from the effects of any sea level rise resulting from global warming. In particular, the cities of Alexandria, Rosetta and Port Said, which are major industrial and economic centers, are expected to experience serious

	environmental impacts, if no action is taken. Students should read the covered topic that available in link below and summarized it, and discussed with instructor and other students in class. http://www.ess.co.at/GAIA/CASES/EGY/impact.html Assignment 2.4 (2 hours) Using GIS for predict the effect of climate change on water resources activity In this activity, the students will use ArcGIS to analyze the new lakes that have formed in the Toshka Depression, Egypt as a result of overflow from Lake Nasser and use their analyses to evaluate the wisdom of the plan to bypass the Toshka Lakes in developing the New Valley Project for irrigation in the Western Desert of Egypt. In this exercise, students download and prepare their own SRTM DEMs (Shuttle Radar Topography Mission and degree digital elevation model) and learn how to determine areas and volumes using ArcGIS. They can then ask questions and use ArcGIS to determine the answers. How much water is in the Toshka Lakes? What happens if Lake Nasser rises and more water flows down the canal? Will more lakes form, or will the lakes that are there just get bigger? How much water might be evaporating from the lake surfaces? How much water must flow down the canal to keep the lakes at a particular level? What might happen as the annual Nile flood fluctuates from year to year?

Commented [NK3]: Will this be taken in another pre-required course?

| | | |

	created by governments and implemented by organizations. You will also gain experience in crafting solutions to these challenges, integrating the needs of multiple stakeholders, and analyzing water resources from a multi-sectoral perspective.
Learning Outcomes	When student complete this module, you will have gained experience in: - Interdisciplinary research related to water, linking together information from various disciples and sources - Clear and succinct communication of ideas and findings - Debating water-governance issues at the local, national, and international levels.
Units	3.1. Module Overview and Expectations 3.2. The Centrality of Water and its Global Dimensions 3.3. Water, Food, and the Global Trade of Virtual Water 3.4. Integrated Water Resources Management: Past, Present, and Future 3.5. Water Governance in Practice
Readings	- Read the definition of water governance at: http://www.watergovernance.org/whatiswatergovernance - Conca K (2006). *Governing Water: Contentious Transnational Politics and Global Institution Building.* MIT Press. - Lall U., T. Heikkila, C. Brown and T. Siegfried (2008), Water in the 21st century: Defining the elements of global crises and potential solutions, Journal of International Affairs, 61(2), 1-17) - Vörösmarty, C. J., P. McIntyre, M. O. Gessner, D. Dudgeon, A. Prusevich, P. Green, S. Glidden, S. E. Bunn, C. A. Sullivan, and C. R. Liermann (2011). Global threats to human water security and river biodiversity, Nature, 467(7315): 555-561. - Visit the website http://www.waterfootprint.org and explore their efforts to understand the links between water use and food production.
Activity	Work Load for all activities in this module 31 hours Overview Assignment 3.1 (7 hours) Just in Time Teaching (JiTT) Warm Up activity What is water governance? What are the four dimensions of water governance? What are the opportunities and challenge? Article that students may be assigned to read for this set of questions include (but are not limited to): - Water governance literature assessment by Charles Batchelor. Report contributing to the scoping exercise managed by IIED - Visit web site http://watergovernance.org/governance/what-is-water-governance/ Evaluation student responses: There are several choices to make in assigning credit for the students responses to JiTT questions based on the number of students in the classroom. Therefore, the instructor supposed different ways to evaluate the students as follows: - How much will JiTT responses "count" toward course grades? - Will you grade all of the JiTT exercises, or a random selection? - How will you assign points? Will you grade for correctness or for effort? Assignment 3.2 Effective discussion activity (11 hours) Discussion is an excellent way to engage students in thinking and analyzing or in defending one side of an issue, rather than listening to lecture. Students must also respond to one another, rather than interacting intellectually only with the instructor. To do this the students should follow the next step: Part I: preparation before class Before class on Tuesday, read the following: Water for food: The global virtual water trade network. *Water Resources Research, vol. 47, W05520, 2011*: *in this paper* you show the applied novel conceptual and methodological framework to the study of global virtual water trade. The paper is *available in*: http://onlinelibrary.wiley.com/doi/10.1029/2010WR010307/epdf or

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https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2010WR010307

To prepare for discussion, prepare written responses to the following:

1. Building the global virtual water trade network
2. Network analysis
3. Briefly outline the scope and purpose of the conceptual and methodological framework outlined in article.

Bring two copies of your written answers to class. I will collect one copy at the beginning of class.

Part II: discussion during class

In class:

1. Consider the following statements:
   - Quantifying the global structure is important for the understanding and management of any system, which here is the linked water and food trade.
   - Highlighted how individual nations fit into the global structure, which enables national policy makers to determine the relationship of their country to the international community.
   - Applying the analytical tools of complex network theory to virtual water trade provides important insights into its global architecture.
2. In student's small group, discuss the implications of these statements for exploitation of water for food. Make a list of groups most important points to prepare for class discussion.

Part III: written work after class

Follow-up writing assignment:

The students must pull together everything that have learned about water for food.

Assignment 3.3

Discussion Lead and Summary activity (5 hours)

Topic for discussion is covered some units in this module such as "The Centrality of Water Regime Formation for Water Security in West Africa: An Analysis of the Volta Basin"

URL: https://link.springer.com/chapter/10.1007/978-3-540-68488-6_52

The students will divide into small group (2-3) and their students will be responsible for leading the group discussion during this module. The goal is to facilitate the flow of comments among the students. Each group should prepare a 1-page (maximum) summary of the class discussions and submit it by the following session (i.e. one week later). This summary will be graded based on its clarity in summarizes the discussions and will count for half of your 'Discussion lead and summary' grade. The other half of this grade will be based on how well you facilitate the discussions. The students should be shared the information about this activity by email.

Assignment 3.4 (8 hours)

The student should be reading the article "virtual water in food production and global trade review of methodological issues and preliminary results" and each group (1-2 students) prepare the ppt presentation and discussed with other students and instructor.

SD Pillars	Environment	√	Economy	√	Social	√	Culture	√									
21st ESD	Learning to know √		Learning to be √		Learning to do √		Learning to live together √		Learning to transform oneself and society √		Learning to give and share √						
SDGs Sub goals	1	2 √	3	4	5	6 √	7	8	9	10	11	12 √	13	14	15	16	17
Egypt Vision 2030	Based on fifth Pillar: Social Justice "By 2030, Egypt is a fair interdependent society characterized by equal economic, social, and political rights and opportunities, realizing social inclusion. A society that supports citizens' rights to participate based on efficiency and according to law, encouraging social mobility based on skills. A society that provides protection, and support to marginalized and vulnerable groups and protects the neediest". This module will lead to																

	understand the political water rights, integrated water resource management, water rights and pricing.

ECTS Work Load	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6 h		2	14	10				32

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Module 4	Management of Soil Fertility
~~Key Concepts~~	~~Dynamics of organic matter and soil quality~~
Overview	Soil organic matter is the fundamental source of fertility in organic systems. It is important for producers to understand the basics of organic matter cycling in the soil. Soil organic matter is that portion of the soil that consists of biological residues from plants, animals, and microorganisms. Soils with high organic matter content contain a greater abundance of water-stable aggregates and have a greater exchange capacity for nutrients. Soils with good tilth have better structure, water-holding and nutrient absorption capacities. Larger aggregates also slow organic matter degradation; producing a slowly mineralizing pool of nutrients. A good management of soil fertility is a key to creating healthy soils for growing healthy crops and environmental safety. This module will teach students what determines soil fertility that nutrients are needed for the growth of plants and summarize the processes that cause a loss of soil fertility and the effects of that. You will learn about the role of soil organic matter in nutrient dynamics, soil water holding capacity and climate change mitigation, as well as the threats to soil organic matter. Organic wastes can be effectively and safely recycled to compost during composting process to meet the nutritional requirement of crops. These findings will reduce the application rates of chemical fertilizers and pesticides, subsequently reduce ~~environmental pollution and reduce import cost of fertilizers.~~
Aim	This module will teach you what determines soil fertility, which nutrients are needed for the ~~growth of plants, and brief the processes that cause a loss of soil fertility and the effects of that.~~
Learning Outcomes	At the end of this module, the students will be able to: • To identify basic soil fertility processes • Describe the natural factors influencing soil organic matter decomposition and accumulation rate. • Explain the relationship between climate change and carbon sequestration. • identify the different processes leading to the stabilization of soil organic matter. • Understand SOM decomposition. • ~~Explain why soil organic matter is important for plant nutrition.~~
Units	Unit 4.1. What is soil organic matter? Unit 4.2. Production and decomposition of organic matter. Unit 4.3. Role of soil organic matter on nutrients dynamics. Unit 4.4. Effect of soil management on soil organic matter. ~~Unit 4.5. Climate change and carbon sequestration.~~
Readings	• Coleman, D. C., Oades, J. M., Uehara, G. (Eds.) (1989). Dynamics of Soil Organic Matter in Tropical Ecosystems. Univ of Hawaii Pr Publisher • Paul, E. A., A. Kravchenko, A. S. Grandy, and S. Morris. (2015). Soil organic matter dynamics: Controls and management for sustainable ecosystem functioning. Pages 104-134 in S. K. Hamilton, J. E. Doll, and G. P. Robertson, editors. The Ecology of Agricultural Landscapes: Long-Term Research on the Path to Sustainability. Oxford University Press, New York, New York, USA. • Krishna K. R. (2013). Precision Farming: Soil Fertility and Productivity Aspects. 1st Edition, Apple Academic Press
Activity	Work Load for all activities in this module 30 hours Assignment 4.1 (2 hours) Training of students on how to determine soil organic matter (OM) in the lab. In this section, the students will divide into groups (2-3 students) to determine soil OM using Walkley and Black method. Assignment 4.2 (2 hours) Training the students on how to calculate soil organic carbon content and conversion organic carbon to organic matter in soil. *Note*, you can find this method and the calculations in chapter 34 "Total carbon, organic

	carbon, and organic matter". In Sparks, D.L. et al., (Eds) (1996) *Methods of soil analysis*. Madison, Wisconsin: ASA and SSSA. Assignment 4.3 (10 hours) During this module each students group (5-6 students) will start the pot experiment for 4-5 weeks and observe the effect of soil nutrients on plant growth. Assignment 4.4. (16 hours) Reading and Guided discussion (possible topics): • Soil fertility and plant nutrition. In: Neal Van Alfen, editor-in-chief. Encyclopedia of Agriculture and Food Systems, Vol. 5, San Diego: Elsevier; 2014. pp. 166-184. (5 hours) • Root morphology and nutrient uptake kinetic by Australian Ceder clones. Rev. Caatinga, Mossoró, 29(1): 153-162, 2016. (3 hours) • Farmer decisions about adopting environmentally beneficial practices. in S. K. Hamilton, J. E. Doll, and G. P. Robertson, editors. The Ecology of Agricultural Landscapes: Long-Term Research on the Path to Sustainability. Oxford University Press, New York, New York, USA, pages 340-359. (5 hours) • Carbon sequestration in agricultural lands of the United States doi:10.2489/jswc.65.1.6A (3 hours)

SD Pillars	Environment	√	Economy	√	Social	√	Culture	√

21st ESD	Learning to know √	Learning to be √	Learning to do √	Learning to live together √	Learning to transform oneself and 3society √	Learning to give and share √

SDGs Sub goals	1	2 √	3	4	5	6	7	8	9	10	11	12 √	13	14	15 √	16	17

Egypt Vision 2030	This module is focused on Tenth Pillar: Urban Development that explain the balance spatial development management of land and resources to accommodate population and improve the quality of their lives.

ECTS Work Load	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6 h		10	11	12				39

Module 5	Managing for Soil Erosion
Key Concepts	Wind and water erosion
Overview	Erosion is a natural process that has sculpted landscapes for millions of years. However, climate change, human alterations of land use and cover have caused erosion rates to increase for many areas of the world, resulting in considerable land and environmental degradation. Soil erosion over decades can have detrimental effects on productivity and soil quality because most of soil nutrients and soil organic matter are stored in the topsoil, the soil layer most affected by erosion. Soil erosion is a widespread problem in agriculture in the developing countries. The problem has far-reaching economic, political, social and environmental implications due to both on-site and off-site damages. Runoff can carry fine sediments, nutrients and other pollutants to water sources, possibly degrading water quality. Soil erosion is the physical movement of soil particles from one location to another, primarily due to forces of water or wind. The three main phases of soil erosion are detachment, transport and deposition. Additionally, soil tillage often leads to an improvement in soil structure because of reduced mechanical disturbance and an increase in soil organic matter content and aggregation. During this module, the students will investigate the types and causes of wind and water erosion and learn how to prevent or manage of erosion.
Aim	The aim of this module is to present best management practices for managing erosion on agricultural soils for preventing and resolving wind or water erosion. For achieving this aim, we will explain the processes involved in wind and water erosion, the causes of wind and water erosion and its effects on soil functions.
Learning	After reading this module, the students should be able to:

Outcomes	• Differentiate among the different types of wind and water erosion • List physical factors which affect the rate of erosion • Recognize how conservation practices impact water erosion and environmental quality • Describe how residue management practices and cropping systems affect soil productivity • Know how to estimate percent residue
Units	Unit 5.1. Processes of soil erosion Unit 5.2. Factors affecting wind and water erosion Unit 5.3. Estimating and measuring soil erosion Unit 5.4. Sustainable management for erosion control (Tillage and vegetation) Unit 5.5. Modeling water and wind erosion
Readings	• Blanco, H. and Lal, R. (2008). Principles of Soil Conservation and Management. Springer Dordrecht Heidelberg London New York. • Soil Science Society of America. 2001. Glossary of soil science terms; accessed 12/12/17. https://www.soils.org/publications/soils-glossary/
Activity	Work Load for all activities in this module 26 hours Overview Activity 5.1. Reading and group discussion (3 hours) The instructor should spend time at the end discussing with the whole class their answers to question (Do you think the compacted soil is more vulnerable or less vulnerable to soil erosion by runoff?). Start by asking them their answers and encourage them to debate until they agree on the correct answers. Some students may believe that compacted soil is less vulnerable to erosion by runoff; however, the opposite is true. If rainfall cannot infiltrate (percolate down into) the soil, there will be more water flowing on the surface wearing away the soil. After students have shared their answers and this discussion has occurred. Ask the students to look carefully and interpret what they see. Then point out how the compacted field equipment track (traffic lane) is wetter than the adjoining planted areas. The planted areas themselves are likely more compacted due to tillage than are soils from natural areas surrounding this field. A brief discussion of soil compaction should follow. Ask the students to summarize what they have learned about soil compaction in the context of this lesson (compacted soil has lower porosity and is more erosive than uncompacted soil). Next, if possible, show students at least the first few minutes of this YouTube video that demonstrates the benefits to soil of one of the sustainable soil management practices your students will be addressing in their post-activity homework. Link videos show the differences in tilled and no till soils related to soil erosion. The students should be shared the information about this activity by email. https://www.youtube.com/watch?v=q1aR5OLgcc0&feature=player_embedded#at=274 https://youtu.be/-Pa8iJskSZg https://www.youtube.com/watch?v=-Pa8iJskSZg&feature=youtu.be Activity 5.2. Warm-up: 'brain dump' activity (1 hours) In this warm-up exercise, students will recall information they have learned in Units 1-5 in order to prepare them for the summative assessment. Instructors will give the students time to write down everything they can remember about the topic of soil erosion without using their notes. Students will then compare lists with a partner and add any missed items to their own list. If conflicts arise, students should also note these. They will then compare their new list with a second partner and again add any missed items to their own list and attempt to resolve any conflicts. Finally, the instructor should ask for items from the whole class, one student at a time, and record them on the board. (Online) Activity 5.3. (8 hours) Investigating the rainfall erosivity (GIS mapping and analysis) (27 pages) An exercise to use a simple image analysis program of Egyptian territory (e.g. Eastern

Field Code Changed

Field Code Changed

	desert) and use soil erosion models (e.g. the revised universal soil loss equation, RUSLE) to use arithmetical expressions to explore relationships among various processes occurring in the terrain. In this activity the students will use an approach to integrate RUSLE model and geographic information system (GIS) to detect erosion vulnerability and determine the soil erosion risk in the study area. The study area is situated in the eastern desert, Egypt. Ground truth data were examined to represent two regions: Luxor-Suhag and Suhag- ElMinya. More details about this activity the students should be reading the article in titled, *Estimating the rainfall erosivity for management planning in the Eastern Desert, Egypt*. This article in available in following website: *https://www.researchgate.net/profile/Reinhard_Zoelitz/publication/284195550_Estimating_the_Rainfall_Erosivity_for_Management_Planning_in_the_Eastern_Desert_Egypt/links/57f3f54708ae8da3ce537d09/Estimating-the-Rainfall-Erosivity-for-Management-Planning-in-the-Eastern-Desert-Egypt.pdf* Activity 5.4. (6 hours) Preliminary activity for service learning: The student should read the book chapter related to next activity to give more details and information about how to control erosion using plant. The students will read the chapter in title " Soil-Erosion and Runoff Prevention by Plant Covers: A Review" in E. Lichtfouse et al. (eds.), Sustainable Agriculture, DOI 10.1007/978-90-481-2666-8_48. Activity 5.5. Community/Service learning activity (8 hours) Activity: Erosion Control by vegetation The goals of erosion control are to reduce erosion of disturbed areas, meet or exceed stormwater quality requirements and minimize life cycle costs by creating long-term soil health, establishing the most appropriate vegetation and achieving permanent soil stabilization. The sustainability triangle, soil, water and vegetation, must be considered to achieve successful, self-sufficient erosion control at a project site. With helping the course instructor, the students will select two small area in eroded site, one is cultivated with vegetation and the other not cultivated. This activity will be helping the community to increase our environmental awareness for sustainable erosion control. In this activity the students will work based on the community needs and they work cooperatively with the community to ensure effectively manage of soil and water resources. Additionally, this collaboration led to ~~an~~ engag~~es~~ing community members and ensures the result responds to actual community needs. This activity is linked with the module 5 (managing for soil erosion) and the unit 5.4. that in titled Sustainable management for erosion control (Tillage and vegetation). The theoretical approach of sustainable erosion control in this unit and the whole course will provide the students with an opportunity to apply their knowledge and skills in their actual life. The students will work cooperatively with the community to help community to find the suitable solution for erosion control. The student will be shared in this activity to give their reflection and capabilities necessary for future work and learning in this activity. The student will apply their academic and vocational skills and knowledge to address real life/work situation and led to an improve this activity. It involves students applying knowledge and skills to make a difference in their communities. This developing students' ability to give and take effective feedback. The students will share their experience with others. The students not only learned how to share their knowledge but also communicate it in different ways based on their audience. The student will compare between the pre- and pot-application of sustainable erosion control on the community served. These findings will answer the question; Can service-learning change the community behaviours for sustainable erosion control?

SD Pillars	Environment	√	Economy	√	Social	√	Culture	√
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself		Learning to give and	

	√			√		√			√			and society √				share √	
SDGs Sub goals	1	2 √	3	4	5	6	7	8	9	10	11	12 √	13	14	15 √	16	17
Egypt Vision 2030	This will lead to encourage investment in natural resources and hazard ecological systems to support the economy, sustainable agriculture and provide new job opportunities (Ninth Pillar: Environment).																
ECTS Work Load	Lecture	Online	Lab	Community learning activity	Prepare Course activity	Project work	Reading	Prepare exam	Writing exam	Total							
	6 h	2		6	10	5	14	8		51							
Module 6	Management of Soil Threats																
Key Concepts	Soil pollution, salinization and biodiversity																
Overview	Soil threats, soil pollution, desertification, salinization and sodicity and loss of soil biodiversity, haves increasingly been recognised as a serious problems. Soil pollution is the occurrence of contaminants in soil above a certain level causing deterioration or loss of one or more soil functions. This module will explain the main sources of soil pollution and how different pollutants behave in the soil and why it is important to know about the natural background levels of heavy metals in soils. How soil properties affect pollutants? and also will explain the concept and importance of bioavailability of heavy metals in soil. We also provide an overview of some soil remediation techniques and explain the concept of phytoremediation. Additionally, saline and sodic (alkali) soils can significantly reduce the value and productivity of affected soil. Soil salinity and related problems generally occur in arid or semiarid climates where rainfall is insufficient to leach soluble salts from the soil or where surface or internal soil drainage is restricted. This module includes on the process of salinization, the causes of salinization and the effects on soil functions. How to calculate some parameters such as Leaching and Gypsum Requirement for managing soil salinization. Measures and strategies to prevent and resolve salinization will be considered in this module. Finally, this module will explain the relation between soil biodiversity and soil functions and summarize the processes that cause a loss of soil biodiversity and their effects. We will also explain the measures and strategies to prevent and resolve the loss of soil biodiversity.																
Aim	This module will examine current interdisciplinary topics on soil contamination and remediation as well as soil salinization, sodicity and loss of biodiversity. Topics include environmental contaminants and their sources in the environment, pathways to contaminate soils, impacts on the environment, fates in soils, and remediation. We also investigate the management of salt and sodic problems because it is important for many agricultural producers, consultants and soil managers. This module will investigate the technolgies for resolution loss of biodiversity.																
Learning Outcomes	In this module, the students will learn: • Learn the various sources of heavy metals causing soil pollution. • Identify the prevention and control measures of metal contaminated soil • Understand how salt-affected soils develop • Recognize properties of saline, sodic and saline-sodic soils • Determine the relative difference of plant tolerances to salts • Describe suitable management plans to prevent and reclaim salt-affected soils • Define biodiversity and describe how protect soil biodiversity																
Units	Unit 6.1. Soil Pollution 6.1.1. Major Types of Soil Pollutants 6.1.2. Sources of Soil Pollution 6.1.3. Soil Remediation Unit 6.2. Saline, sodic and saline-sodic soils (Development of Salt-Affected Soils) Unit 6.3. Soil reclamation Unit 6.4. loss of soil biodiversity																
Readings	• Mirsal, I.A. (2008). *Soil pollution: origin, monitoring and remediation*. Second edition Springer-Verlag Berlin Heidelberg. • Mace, J.E. and C. Amrhein. 2001. Leaching and reclamation of a soil irrigated with moderate SAR waters. Soil Sci. Soc. Am. J. 65: 199-204																

	• Lamond, R.E. and D.A. Whitney. 1992. *Management of saline and sodic soils*. MF-1022. Cooperative Extension Service, Kansas State University. Manhattan, Kansas. 4 p. • Richards, L. A. (1954). *Diagnosis and Improvement of saline and alkali soils*. United States Salinity Laboratory Staff Agriculture Handbook No. 60. *Available in website:* https://www.ars.usda.gov/ARSUserFiles/20360500/hb60_pdf/hb60complete.pdf • Soil biodiversity and soil community composition determine ecosystem multifunctionality. *Available in website:* http://www.pnas.org/content/111/14/5266 • Soil biodiversity. *Available in website:* https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/soil-biodiversity
Activity	Work Load for all activities in this module 28 hours Activity 6.1 (12 hours) Pre-work homework activity The students should read the topics: • Management of soil threats that including the three subsections "Sources of soil pollution and it is nature," "Soil salinity and sodicity," and "Loss of soil biodiversity?" • The students should evaluate the effects of climate change in terms of agricultural productivity, land suitability, and contamination risks. • The discussion should be done between instructor and students and the feedback of students can be sharing by email. Online Activity 6.2 "think/pair/share" activity (2 hours) • Start with a pre-activity "think/pair/share" exercise to make the students think about what they know about soil treats (learn more about think-pair-share). Instruct students to think about what they learned about management of soil threats under climate change scenarios in the pre-activity homework, then ask them to divide into pairs, and have each pair write a description of soil threats in fewer than 35 words. Have your own description ready that includes reference to soil pollution, salinity and sodicity, and loss of soil biodiversity. online Activity 6.3 Practical Work: (6 hours) • Training the students to conduct a pot experiment to discover the influence of Specific ions and levels of concentration of salt on soils and plants. • Measuring of soil microbial activity and Enzyme activities. Activity 6.4 Group discussion (1 hour) The students should read the article about theoretical gypsum requirement (TGR) Models, available in http://www.caslab.com/News/theoretical-gypsum-requirement-tgr-models.html Activity 6.5 (7 hours) Just-in-Time Teaching (JiTT) Warm Up Activity Warm Up Questions: 1. What degree of change in the direct and/or the indirect effects of climate change on microbe-microbe or plant-microbial interactions are relevant for ecosystem functioning? 2. Are the indirect effects of climate change on communities as important as the direct effects for ecosystem process rates and carbon feedbacks? References and Notes: Articles that students may be assigned to read for this set of questions include (but are not limited to): Direct and indirect effects of climate change on soil microbial and soil microbial-plant interactions: What lies ahead? Available in website: http://onlinelibrary.wiley.com/doi/10.1890/ES15-00217.1/full The instructor should create an incentive for students to answer the Just-in-Time Teaching warm-up questions. The students are encouraged to do the readings and think about the

	questions before responding. Evaluation Marrs et al. (2003) reports a JiTT scoring rubric adapted from de Caprariis et al., 2001: 1. Student says he / she does not know how to answer the WarmUp question. 2. Student tries to answer the WarmUp question but does not show evidence of any previous knowledge to assist in answering. Student may reveal misconceptions about concepts. Student does not use any information from the text or lecture notes to answer the question. (Incorrect answer) 3. Student shows some prior knowledge and may use terminology to answer the WarmUp question. Student does not use appropriate information from the text or lecture notes to answer the question. (May be partially correct but still incomplete). 4. Student answers the WarmUp question correctly and completely. Student incorporates information from the text or class notes into the answer. Student may look for answer outside the class (web, etc).
	Reference de Caprariis et al., 2001 . "Monitoring the Benefits of Active Learning Exercises in Introductory Survey Courses in Science: An Attempt to Improve the Education of Prospective Public School Teachers." The Journal of Scholarship of Teaching and Learning, v. 1, n. 1, p. 13-23. Marrs, K.A., Blake, R.E., and Gavrin, D. (2003). "Web-Based Warm Up Exercises in Just-in-Time Teaching." Journal of College Science Teaching, v. 33, n. 1, p. 42-47.

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SD Pillars	Environment	√	Economy	√	Social	√	Culture	√								
21st ESD	Learning to know √		Learning to be √		Learning to do √		Learning to live together √		Learning to transform oneself and society √			Learning to give and share √				
SDGs Sub-goals	1	2 √	3 √	4	5	6	7	8	9	10	11	12 √	13	14	15 √	16	17
Egypt Vision 2030	This module will lead to create a system of positive cultural values respecting diversity and differences for soil threats (Eighth Pillar: Culture). Based on the remediation project and reduced soil pollution, Egyptians should enjoy a healthy, safe, and secure life (Sixth Pillar: Health).															
ECTS Work Load	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total							

ECTS Student Workload Rubric for Assessing ECTS Integration in CCSAFS Course Curriculum should be integrated in 1 table

Table 1: 10 ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)										
Online										
Lab work										
Reading articles (3 pages per hour)										
Reading book chapters (5 per/h)										
Preparing course activities										
Project work										

Preparation for exam										
Writing the exam										
Total										

A well designed course. The main topics are clearly developed. There is strong evidence that the course is structured at the Master Level. It covers most important topics regarding sustainable management of soil and water resources.

I am concerned about the length of the topics. In the GIS activity, for instance, are students already familiar with GIS? Did they take a pre-requisite course?

The course outcomes are clear and well structured. However, it is better to adjust the module titles so as to fit the weekly schedule - that would help the student follow.
I have a concern on the schedule (15 weeks) to focus and effectively understand all these topics. Perhaps the work requested to be done outside class time is huge- especially if GIS and remote sensing activities are to be designed and implemented as suggested in the syllabus.

Overall the course is well developed and with clear objectives. From the syllabus, the course design, reading materials, course delivery and assessments show that the instructor has deep expertise of the topic and he is able to bring about interesting activities.

It was recommended by Padova University to include some lectures on water-soil relationship at the end of the course. I haven't seen this change. Maybe, I missed it, Showing the linkages between the two main areas of the course (soil management and water management) would be important to bring together all different modules; thus showing the learner the complexity of the natural resource systems, especially with climate change.

Some collaboration should be done with other course instructors to cover the effects of agricultural practices on both soil and water. The integration of various disciplinary insights should lead to innovative insights revolving around the human-environment interactions. I am not particularly seeing a module linking the interdisciplinary concepts (climate change, agriculture, and food altogether)

Connection of course activities and 17 SDGs with the 3 key domains of the CCSAFS MSc.

	SDGs	CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	√	√	√	Module 4
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all	√	√	√	Module 2 Module 3
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				

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8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss	√	√	√	Module 4 Module 5 Module 6
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

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Heliopolis University
Faculty of Business & Economics
Management & Human Development Department

CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

~~Course Syllabus~~

Course Code: CSAF890

Social Entrepreneurship in the Organic Food Industry
(7 ECTS - Around 210 study hours)

~~Heliopolis University, Faculty of Business & Economics, Management & Human Development Department,~~

Spring Semester 2019-2020, -

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Instructor Information

Instructor: Associate Prof. Dr. Omar Ramzy
Office Location:
Telephone:
Office Hours:
E-mail: omar.ramzy@hu.edu.eg
Website: www.hu.edu.eg

Course Identification

Course Number: CSAF890
Course Name: Social Entrepreneurship in the Organic Food Industry
Course Location:
Class Times:

Prerequisites:
Faculty Web Page:

Course Description/Overview
This course inspires entrepreneurial innovation and creativity through interactive lectures, workshops, and case studies in contemporary issues to include energy, life sciences, healthcare, and technology. Students will gain awareness of entrepreneurial innovation sources, structures and dynamics. Students will develop individual and group skills for generating innovative ideas and find ways to apply these ideas to address current issues and problems in different industries and agricultural settings. Course topics include the history of entrepreneurship, the role of entrepreneurs, entrepreneurs in the 21st century global economy, and the identification of entrepreneurial opportunities. The elements of creative problem-solving, the development of a business concept/model, the examination of feasibility studies, and the social/moral/ethical implications of entrepreneurship will be incorporated. This course is designed to put the idea of teaching social entrepreneurship in the food industry and its direct relation with sustainable agriculture and climate change to its ultimate test—with the objective of incubating a series of food ventures through the course of the semester that have the potential to be viable businesses and positively impact public health outcomes.

Course Learning Objectives
Every course, lecture, interaction with a student plays a role in executing the strategy set for achieving the vision of Education for Sustainable Development. The role of this course in strategy execution is as follows:

a) To visualise the process of starting, managing and scaling a sustainable business in the realm of food sovereignty.
b) To recognize the challenges facing the organic food industry in Egypt and ~~to be able~~ to understand the market situation for the organic food.
c) To empower students to visualise themselves as potential solution providers to pressing sustainability challenges, either through entrepreneurship or entrepreneurship.
d) To provide students already predisposed toward entrepreneurship with the concepts, frameworks and models to systematically incubate innovative food businesses that are both sustainable and public health-driven.
e) To provide access to domain-specific resources including key industry participants, industry experts and research partners, in order to identify need-gaps and create working products and solutions.

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Course Content Learning Outcomes
Upon successful completion of this course, students will be able to:

- Recognize a need in the market that relate to food sovereignty and capitalize on it
Explain or discuss the food industry needs
- Internalize the idea of making a social contribution when creating a business
Create a model for risk assessment when it comes to food sovereignty projects
Create a viability plan for the project or product

Course Resources

Course Website(s)

Required Course Texts and Materials

Hands-out prepared by the instructor for the class

Optional Course Texts and Materials

Wei-Skillern, J., Austin, J., Leonard, H., & Stevenson, H. (2007). Entrepreneurship in the Social Sector (ESS). Sage Publication

Olusegun, G., & Odularu, A. (2015). Food Sovereignty and Food Security : Where does Africa Stand ?, (May). https://doi.org/10.13140/RG.2.1.3542.9284

Course Reader.

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Social Entrepreneurship : The Art of Mission-Based Venture Development, by Peter C. Brinckerhoff. 3. REDF, SROI Collection 2000. Available for free download at www.redf.org/publicationssroi.htm

Raising the Bar : Integrity and Passion in Life and Business: The Story of Clif Bar, Inc., By Gary Erickson.

Bornstein, David. How to Change the World: Social Entrepreneurs and the Power of New Ideas (Oxford University Press, 2004.

Social Entrepreneurship: What Everyone Needs to Know, David Bornstein and Susan Davis. New York: Oxford UP, 2010.

How to Change the World: Social Entrepreneurs and the Power of New Ideas, David Bornstein. Oxford: Oxford UP, 2004.

Book Title: *How to Change the World*
Author: David Bornstein
Publisher: Oxford University Press
ISBN # : 978-0-19-533476-0 (pbk)

Book Title: *The Entrepreneur*
Author: Mark Casson
Publisher: Elgar Press
ISBN # : 1 84542 193 0 (paperback) 1 85898 910 8 (hardback)

Book Title: *Social Entrepreneurship - New Models of Sustainable Social Change*
Author: Nicholls, Alex, ed.
Publisher: Oxford University Press
ISBN # : 0-19-928387-7

Book Title: *The Power of Unreasonable People: How Social Entrepreneurs Create Markets That Change the World*
Author: Elkington, J. and Hartigan, P.
Publisher: Harvard Business Press ISBN
978-1-4221-0406-4

Book Title: *Banker to the Poor: Micro-Lending and the Battle Against World Poverty*
Author: Yunus, Muhammad
Publisher: PublicAffairs
ISBN-13: 978-1-58648-198-8
ISBN - 10: 1-58648-198-3

Book Title: *What's Wrong with Microfinance?*
Author: Dichter, Thomas and Harper, Malcom, ed.Publisher: Practical Action
ISBN-10: 1853396672; ISBN-13: 978-185339667

Assignments and Grading Scheme

Grading System

0 to 100 (where 60 is the least pass mark)

Grading Policy

Grades can be based on the following: (Example)

Assignments	10%
Midterm Exam	20%
Final Exam	20%
Class attendance/participation	10%
Group Project	40%
Total Points	100

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come to ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought

about the assigned material before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by- case basis.

Important Dates to Remember

Course Schedule

Lecture	Context	Content
1: Orientation	Co-creating classroom rules (Punctuality, side talks, project and team conduct…etc)	A. Setting expectations. B. Student Discussion 1: An Introduction to Entrepreneurship. C. Student Discussion 2: Differentiating between Entrepreneurship, Sustainable Entrepreneurship and Non-Profit organizations.
2: Creative Problem Solving	Lecture Guest: Inviting an Example of a previous student projects as lecture guests.	A. Community Problem solving Exercise B. Project Overview. C. Student Discussion
3: Vision and Mission Statements	Application: form their personal vision and mission as well as developing their own business vision and mission statements	A. What is a vision statement B. What is a mission statement C. Why should organizations have vision and mission statements
4: Market Validation	Teamwork/ Project Management workshop during the practice hour to prepare the teams for working in teams Industry Structure Analysis Overview	□ BCG Model applied to entrepreneurs □ What to Eat □ In Defense of Food □ Select readings based on the domain and problem your team identifies.
5: Operational Model (1).	1st Project follow up + practicing business pitch.	A. Presenting their assignments. B. Key partners: Stakeholder analysis and engagement. C. Meetings with industry players, suppliers, consumers and experts in sub-segment D. Readings: Select readings based

		on the domain and problem your team identifies
6: Operational Model (2).	Lecture Guest: Inviting an Example of a growing startup that started as a student project.	A. Value Chain: Key resources and Key Activities B. Meetings with industry players, suppliers, consumers and experts in sub-segment C. Readings: □ The Blue Ocean Strategy □ Select readings based on the domain and problem your team identifies
Lecture 7: Midterm Exam		
Lecture 8: Cost Structure	3rd Project follow up + practicing business pitch.	A. Presenting their assignments. B. Cost structure lecture. C. Application: Breaking down cost structure according to their business model canvas
Lecture 9: Revenue Streams		A. Revenue Streams lecture. B. Developing their revenue streams - Sales forecasting and Pricing - Breakeven point
Lecture 10: Marketing Mix	Presentation skills workshop during the practice hour.	A. Marketing Mix (Customer relation, Customer segments and value proposition) B. Discussion: how an entrepreneur can innovate through each of the 4 P's?
Lecture 11: Revision	Final Project follow up + practising practicing business pitch.	A. Presenting their assignments. B. Recap on previous material
Lecture 12	Final presentations	
Lecture 13	Final presentations	

The CCSAFS Course Modules Template



Course	*Social Entrepreneurship in the Organic Food Industry*
Module 1	Social Entrepreneurship, Philanthropy, CSR
Key Concepts	Social Entrepreneurship, Philanthropy, CSR
Overview	Social Entrepreneurship is more than a set of tools and techniques for starting and growing a business. It's a mindset, a way of looking at things that is problem/opportunity focused and creative. It's about passion -- doing what you love. It's about creating wealth in all its forms: economic value, social innovation and sustainability, and making a difference in the communities we serve. While numerous different definitions of social entrepreneurship exist, there appears to be broad consensus about two issues: 1. Social entrepreneurship involves the creativity, imagination and innovation often associated with entrepreneurship; and 2. The outcomes of social entrepreneurship are focused on addressing persistent social problems particularly to those who are marginalized or poor. There is often great confusion between philanthropy and social businesses. Main differences are being addressed as well as giving various examples to distinguish between the two terms. Finally, CSR is one of the marketing tools used by many companies where they associate their brand with society improvement in the mind of their customers. However, this doesn't make the company social business by nature.
Aim	To change the idea of Entrepreneurship from a sources of gaining money to a source of helping the society and positively impact the community members.
Learning Outcomes	At the end of this module learners will be able to: Identify and discuss the difference between entrepreneurship and social entrepreneurship Differentiate between social business and CSR ~~ability to u~~Use the basic concepts in addressing different social challenges by a social business idea. Apply the knowledge gained in their projects and in the market afterwards.
Units	1.1 What is a Social Entrepreneur? 1.2 Defining Social Entrepreneurship 1.3 Seeing Social Entrepreneurship Theory Put Into Practice

Readings	Explainer: What's Social Entrepreneurship, Hilde Scwab and Katherine Milligan, 2015 https://www.theguardian.com/social-enterprise-network/2014/may/22/social-enterprises-disrupting-food-system https://www.theguardian.com/sustainable-business/tackling-food-waste-social-enterprise-model The Meaning of Social Entrepreneurship", J. Gregory Dees. • "Social entrepreneurship: What Are We Talking About? A Framework for Future Research", Mair and Marti. • "The Change Masters" in Fast Company Magazine, by Cheryl Dahle. • "Misery Loves Company: Rethinking Social Initiatives by Business", Margolis and Walsh in Administrative Science Quarterly. "Social entrepreneurship: Leadership that facilitates societal transformation— An exploratory study" by Alvord, Brown, and Letts. • "The Competitive Advantage of Corporate Philanthropy," Porter and Kramer. • "The Citizen Sector: Becoming as Entrepreneurial and Competitive as Business", Drayton Assigned Videos: - "What is a Social Entrepreneur?" Schwab Foundation television clip - "Key Traits of Social Entrepreneurs", interview of John Elkington. - "Nothing More Powerful" by Bill Drayton.
Activity	Watch the following videos and prepare a paper about the meaning of Social Entrepreneurship mentioning 3 examples of social Entrepreneurship in the organic food industry? Professor Jon Isham, Faculty Director at the MCSE, on *Social Entrepreneurship in the Liberal Arts* TED: Ernesto Sirolli, *Want To Help Someone? Shut Up and Listen* TED: Dan Pallota, *The Way We Think About Charity is Dead Wrong* *Class Activity (Energizer):* An activity for improving communication between students Line up according to your birthday. The instructor asks a simple question: "If you know the month of your birthday, raise your hand." This seemingly strange question is followed by a task: "Without talking, and with no questions asked, in 30 seconds, line up according to the month of your birthday." After lining up, the participants are allowed to talk and mention loudly, one by one, the month of their birthday. After the students get time to speak to each other and get to introduce themselves and find some similarities or common characteristics between them. The instructor after that starts to discuss this and ask them if they could find 3 common interests or characteristics between each other. By the end of the session most of the students would have talked to each other and got to know some brief idea about those who have common qualities and would be a potential to cooperate with within the group project.

SD Pillars	environment				economy			social				culture				
21st ESD	Learning to know		Learning to be		Learning to do		Learning to live together				Learning to transform oneself and society				Learning to give and share	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	6		4				10		10		5						35
Vision 2030	Decent work and green jobs initiatives that are inaugurated by UN represented by the International Labor Organization (ILO) are matching what Egypt launched in 2015 as Egypt vision for Sustainable development. Social entrepreneurship is the main umbrella for such initiatives and endeavors.																

Module 2	Organic Food Industry in Egypt
Key Concepts	Social and environmental challenges, organic food industry in Egypt
Overview	There are many challenges facing the community nowadays. Students should be aware of their community problems. They should also be able to discuss possible solutions to some of these problems from an entrepreneurial perspective. With special focus on the organic food industry in Egypt. Where the student will get a detailed description about this industry and get the experience from successful entrepreneurs in this field.
Aim	- Introduce the main challenges facing organic food industry in Egypt. Being able to fully understand the market situation for the organic food. This would be done through various learning methodology such as case studies, guest, speakers field visits. etc.
Learning Outcomes	Recognize the current community social and environmental challenges Realize the organic food industry in Egypt and its challenges
Units	Social and environment challenges Organic food industry
Readings	What are the main challenges facing Egypt in the organic food industry? SEKEM case study. Social Conditions in Egypt According to the Millennium Development Goals Presented by Lowell Lewis on to the European League http://ucanr.edu/sites/uc_and_the_mediterraean_/files/110120.pdf The SEKEM Story (Egyptian Case Study), by: Nicholas Parrott & Terry Marsden Department of City and Regional Planning, Cardiff University
Activity	- Guest speakers who has success stories as entrepreneurs in the field of organic agriculture. (Mr. Helmy Abouleish Sekem CEO) - Field visits to SEKEM farm where they can meet key persons in marketing/sales or research departments who can tell them more about the real-life situation in this market and if there is any market gap. Young entrepreneurs in this field will be invited too to present their business ideas and challenges so it can be useful knowledge that they can use when they apply on their final projects. Students are going to develop a concept map that summarizes their understanding and experience for SEKEM. They are going to share this concept map via forum discussion in Moodle

SD Pillars	environment				economy			social				culture					
21st ESD	Learning to know		Learning to be		Learning to do		Learning to live together			Learning to transform oneself and society		Learning to give and share					
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total	
	9		4				15		7								35	
Vision 2030	One main pillar of the Egyptian vision 2030 is to ensure food sovereignty within the next 15 years from launching the vision 2015. Main focus in the vision was emphasized on the future of the organic agriculture and organic food industry in Egypt																	

Module 3	Creative Problem Solving
Key Concepts	Problem solving, Social and environmental challenges, organic food industry in Egypt
overview	This module will examine when, why, and how we can be creative. It examines the cues that trigger us to consider being creative. It provides a road map of the creative process - the process of changing our perspectives - and the kinds of outcomes that result from creativity. It examines how we can go through the creative process more efficiently and more effectively by examining what is changing about our thinking and how we can make those changes. The end result is more flexible thinking that can be used to recognize and develop new opportunities. Students will be introduced to a variety of creative problem-solving techniques and approaches to use as 'tools' for re-interpreting problems, finding solutions and generating ideas. Practical demonstrations, exercises and task simulations will enable you to gain a deeper knowledge and understanding of these creative tools and the capacity to re-apply them or facilitate their use to generate concepts and ideas
Aim	The module been designed for the purpose of promoting and developing creative thinking and problem solving (CTPS) skills and addresses the need for individuals and teams who can 'think outside the box', and apply fresh thinking to practical, 'real world' problems. And To be able to further develop your knowledge and understanding of the theories and principles underpinning creative thinking.
Learning outcomes	Demonstrate a broad yet highly developed understanding of creativity (theory and practice) together with the principles of idea generation. ~~Ability to a~~Address problems from social creative perspective Ddevelop your practical creative problem-solving skills. Appl~~yication of~~ reflective learning.
Units	2.1 Problem Solving Techniques

Readings	"the source of innovation and Creativity" by Karlyn Adams http://www.fpspi.org/pdf/InnovCreativity.pdf
Activity	As students met earlier young entrepreneurs from the field speaking of the main challenges that they faced in their business initiation. We will invite 2 of them again to speak of 4 challenges that they faced in the process of starting their business or during the operation. They describe the challenges in details and all the related matters. Students will be divided into 4 groups each group will be assigned one of the challenges and they will be asked to find a creative solution to come over the challenge. Each group of students will exchange their ideas for peer reviewing. After peer reviewing, students will collaboratively develop a Wiki providing a comprehensive overview of the challenges that face startups in general. The wikis developed will be presented and discussed in class during the second week. After they finish, a discussion will be held with the entrepreneurs and they start assessing the effectiveness of the proposed solution and finally revealing the way that they followed to overcome the challenges. This activity will take 45 minutes and will be done within class.

SD Pillars	environment				economy				social				culture				
21st ESD	Learning to know		Learning to be		Learning to do		Learning to live together		Learning to transform oneself and society				Learning to give and share				
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	6		4				10		10								30
Vision 2030	Fighting corruption and being among the countries that approach innovation in research and industry are main targets of the Egyptian vision 2030, this requires innovative entrepreneurs and creative problem solvers																

Module 4	Business Model Canvas
Key Concepts	Vision, Mission, Business model
Overview	A business model describes the rationale of how an organization creates, delivers, and captures value. The business model canvas is a tool that can be used to translate a business model into nine building blocks that show the logic of how a company intends to make money. The main purpose of a business model canvass is to foster understanding, encourage discussion, creativity and analysis. In order to start the business, it has to have a vVision, mission and values. Students will learn how to utilize the business model canvas in their group projects, a. As well as developing their own vision and mission for the projects.
Aim	1. Ability to substantially ideate, describe, evaluate and discuss a business model using the Business Model Canvas 2. Hands-on understanding of how to user personas and problem scenarios to articulate the Offer's key drivers 3. Hands-on understanding of how to use the AIDA(OR) framework and storyboards to evaluate the effectiveness of Customer Relationships and Channels 4. Understanding of business type and how to evaluate Key Activities, Resources, and Partnerships in this context
Learning Outcomes	- Express Understanding the key elements of a business model - Recognize the special characteristics of different business models - Show Understanding the Business model generation process - Appreciate how technology can enhance and modify business models - Apply the concepts to develop different business models - Examine developments in market competition and technology development through Business Model opportunity analysis.
Units	3.1 Business Model Canvas
Readings	□ Note on Business Model Analysis for the Entrepreneur □ Creating Successful Business Models, Lessons from Social Entrepreneurship Business Model You: A One-Page Method For Reinventing Your Career Book by Alexander Osterwalder, Tim Clark, and Yves Pigneur
Project	□ Students will be required to apply the business model canvas on their own project ideas. (their final projects will be presented in the last 3 lectures) □ Students will develop their own personal vision and mission statements Lecture Guest: Inviting an Example of a growing startup in the field of organic agriculture that started as a student project. Assignment will be done as group work outside the classroom and its due date would be the following lectures. Virtual communication is a must among the groups' members of the project

SD Pillars	environment				economy			social				culture				
21st ESD	Learning to know		Learning to be		Learning to do		Learning to live together				Learning to transform oneself and society				Learning to give and share	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	6		4				10				10		5				35
Vision 2030	The Egyptian economy to be capable of achieving sustainable inclusive growth and maximizing value added, generating decent and productive jobs. This part of the vision is matching the idea of developing new startups that are based on solid research and valid models such as Business model Canvas																

Model 5	Micro Financing Methodologies and Challenges
Key concepts	Micro finance, financial institutions
Overview	This module is all about raising startup financing. We will discuss both the reasons why startups typically need outside cash, and the appropriate sources and uses of startup financing. We will discuss how entrepreneurs can reach out to and negotiate with angel investors and venture capital firms. We will also discuss crowd funding options for startups. Finally, we will examine the micro financing from the initial idea developed by Muhammad Yunus, to the methodologies and products developed over the last decades, and the scale of replication which has taken place. Contributions by major developers in the field will be discussed. They will also examine the current status of the microfinance movement, consider critical opinions regarding the nature of the microfinance movement, and appraise current and future challenges to microfinance as Egypt is recently directing towards more encouragement for micro financing. This module is all about raising startup ~~financing. We will discuss both the reasons why startups typically need outside cash, and the appropriate sources and uses of startup financing. We will discuss how entrepreneurs can reach out to and negotiate with angel investors and venture capital firms. We will also discuss crowd funding options for startups. Finally, we will examine the micro financing from the initial idea developed by Muhammad Yunus, to the methodologies and products developed over the last decades, and the scale of~~ ~~replication which has taken place. Contributions by major developers in the field will be discussed. They will also examine the current status of the microfinance movement, consider critical opinions regarding the nature of the microfinance movement, and appraise current and future challenges to microfinance as Egypt is recently directing towards more encouragement for microfinancing.~~
Aim	Students will learn ways to finance their ideas. As the most important aspect of the entrepreneurial projects is to be able to fund the idea.
Learning Outcomes	• Describe a variety of approaches and methods for measuring the impact of social entrepreneurial organizations • Analyze and evaluate microfinance, a systems-changing example of social entrepreneurship. • Assess social entrepreneurial opportunities (through case studies)
Units	4.1 Introduction to financial management concepts 4.2 Microfinance Methodologies and Challenges.
Reading	- Book: What's Wrong ~~A~~with Microfinance? by Thomas Dichter and Malcom Harper, editors. - Book: Banker to the Poor: Micro-Lending and the Battle Against World Poverty by Muhammad Yunus Assigned Videos: - Nobel Media depiction of the work of Yunus in Bangladesh and beyond - Speech of Muhammad Yunus at the 2006 Nobel Peace Prize Ceremony
Project	Apply on your project. Find the cheapest financing for your idea.

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SD Pillars	environment				economy				social				culture			
21st ESD	Learning to know				Learning to be				Learning to do				Learning to live together			
	Learning to transform oneself and society				Learning to give and share											
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	9		6				10		5		10						40

Vision 2030

~~By 2030 real GDP per capita in Egypt reaching high middle income countries level.~~ This was stated in the vision 2030 and it has to be demonstrated in this module how to finance the small and medium enterprises and focus on the financial mechanisms

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Module 6	Final Projects Presentations
Key words	Presentation skills, idea Pitching,
Overview	As part of the course applications, students are asked to develop their own business ideas applying all the knowledge they gained from the course. The class will be divided into groups of 4-5 members according to the class capacity. A well-developed business model canvas will be presented along with a complete project idea in the field of organic food industry. The students will be given a workshop on presentation skills and how to be able to pitch their business ideas within minutes to convince investors with their ideas
Aim	This module mainly aims to increase the entrepreneurial skills of the students where they can have the basic ability to understand business and market conditions. As well as making sure that all theoretical concepts given in the course was understood and able to be transformed into practical work.
Learning outcomes	- Apply~~ing~~ the concepts to develop different business models - Examine developments in market competition and technology development through Business Model opportunity analysis. - Acquire needed business presentation skills - Apply micro financing techniques. - Utiliz~~eing~~ the information gained from the guest speakers along the course.
Units	
Readings	Small Business Can: A website run by business people for business people http://www.smallbusinesscan.com
Activity	- Presenting their final projects. Students will take part in the evaluation process as they will be handed an evaluation sheets with certain criteria where they will evaluate other teams. Questions, active discussions and suggestions would be very much encouraged. - It is recommended that students organize an off-line (in class) and an online conference session to present and discuss ~~your~~ their results.

Community Based-Learning Activity	The students will be engaged together in a Community Based-Learning Activity represented by taking students from start to finish through a business model. Give them a specific type of business to focus on, delving into the ins and outs of making this business work. For instance, if you were to focus on the chocolate industry, you could start with "www.hersheys.com", and then compare it to a European chocolatier, then to a local small business. Show students the differences and similarities while providing them with invaluable details about starting and maintaining a successful business. And then the instructor should create a sense of responsibility by giving each student a job and add a twist. First assign jobs such as white board cleaner, agenda and date manager, art director, and so forth. Assigning more important names to jobs works really well with older students. Then listen to complaints and allow them to switch out jobs for a couple of week. Ultimately ask a series of questions to get them thinking: Would you be happy doing this when you're out of school? How could you turn one of these skills learned into a business of your own? Or, do you prefer working for someone else? What are the benefits? What are the drawbacks? All of this will help them understand responsibility and decide what route works best for them.

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SD Pillars	environment			economy			social			culture						
21st ESD	Learning to know		Learning to be		Learning to do		Learning to live together		Learning to transform oneself and society		Learning to give and share					
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total								
	6			15		10	5		36								

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Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	14	3	45	6	9	6	6	9	6	42
Online	12	2	24	4	4	4	4	6		24
Lab work										
Reading articles (3 pages per hour)	120	0.3	40	5	10	5	5	5	10	40
Reading book	150	0.5	30	5	5	5	5	5	5	150

chapters (5 per/h)										
Preparing course activities	6	5	32	10	7	10		5		32
Project work	5	7	35	5			10	10	10	35
Preparation for exam	5	3	15				5	5	5	15
Writing the exam										
Total			211	35	35	30	35	40	36	211

SDGs RUBRIC

Commented [NK4]: It is suggested to add this rubric and mark in the table the corresponding info- to be consistent with all other syllabi submitted

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

~~Course Syllabus~~

Course Number:

Consumer behavior, Food Security, and Marketing
(5 ECTs - Around 150 Study hours)

Heliopolis University for Sustainable Development, Faculty of Business and Economics,

~~2017~~2019/~~2018~~2020

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Instructor Information

Instructor: **Assoc. Prof. Omar Ramzy**

Office Location: Heliopolis University for Sustainable Development

Telephone:

Office Hours:

E-mail: **omar.ramzy@hu.edu.eg**

Website:

Course Identification

Course Number:
Course Name:
Course Location:
Class Times:

Prerequisites:

Faculty Web Page: http://www.hu.edu.eg

Course Description/Overview

Buyers of all types go through complex decision-making processes at some time before they commit themselves to a purchase. This course focuses on the buyer decision-making processes and the internal and external influences on the purchasing and consumption process in the context of Sustainable development. Considering that solving environmental problems will require behavioral changes, it is important that marketers as well as producers fully understand consumer behavior and ways to influence it. As such, the course dives into the behavioral, psychological, and sociological aspects of consumers and their relation to Food security, sustainability, and social responsibility that in turn affects the overall buying decision making process. Understanding how buyers and consumers behave is an integral part of correctly identifying their real needs not wants and how it fits with sustainable consumption and production as one of the SDGs. Through this course, students will be taught how the seller and the buyer can link up effectively, and also to investigate about consumers' concerns about the issue of food security and its impacts and consumers' willingness to adopt different behaviors in consumption.

Course Learning Objectives

The overarching goals of this course are: a) Describe the relevance of consumer behavior to the entire marketing process, the nature and stages of consumers' decision making and the factors influencing consumers' choice; b) Explain and analyze the major stages which consumers usually go through when making a consumption-related decision; c) To understand the social and environmental responsibility and ethical issues associated with consumer behavior in light of Transformative Consumer Research; d) Apply the concepts and theories covered in the course to devise effective solutions in enhancing business performance in the context of consumer behavior.

Course Content Learning Outcomes

On successful completion of this course, you will be able to:

1. Identify and explain factors which influence consumer behavior.
2. Demonstrate how knowledge of consumer behavior can be applied to marketing.
3. Display critical thinking and problem solving skills.
4. Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience.
5. In a team, work effectively to prepare a professional, logical and coherent report on consumer behavior issues within a specific context.
6. Deliver an oral presentation in a professional and engaging manner.
7. Demonstrate awareness and ability to discourse on ethical issues.
8. Analyze the competitive advantages and risks associated with green consumption.

Course Resources

Course Website(s)

Required Course Texts and Materials

Hands-out prepared by the instructor for the class

Optional Course Texts and Materials

- Hawkins, Del I. (year) Consumer behavior: building marketing strategy / Del I. Hawkins, David L. Mothersbaugh.—11th ed.
- Schiffman, L, Bednall, D, O'Cass, A, Paladino, A, D'Alessandro, S & Kanuk, L (2010), Consumer Behaviour (5th ed), New South Wales, Pearson Australia.
- Hoyer, W. and Maclnnis, D. (2010), Consumer Behavior, Fifth Edition, South - Western Cengage Learning
- Lantos, G. (2012). Consumer Behavior in Action. Sharpe: US
- Blackwell, R. et al (2001), Consumer Behaviour, Harcourt College Pub, NY.
- YOUNG, W., HWANG, K., MCDONALD, S. and OATES, C. J., 2010. Sustainable consumption: green consumer behaviour when purchasing products. Available from OpenAIR@RGU. [online]. Available from: http://openair.rgu.ac.uk
- Gary Akehurst, Carolina Afonso, Helena Martins Gonçalves, (2012) "Re-examining green purchase behaviour and the green consumer profile: new evidences", Management Decision, Vol. 50 Issue: 5, pp.972-988, https://doi.org/10.1108/00251741211227726
- do Paço, A., Alves, H., Shiel, C. and Filho, W. L. (2013), Development of a green consumer behaviour model. International Journal of Consumer Studies, 37: 414-421. doi:10.1111/ijcs.12009
- Dr. Pierre Sonigo, J. B. (2012). Policies to encourage sustainable consumption.
- Terlau, W., & Hirsch, D. (2015). Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon - Causes and Measurements towards a Sustainable Development, 6(3), 159-174.

Assignments and Grading Scheme

Grading System

0 to 100 (where 60 is the least pass mark)

Grading Policy

Grades are based on the following:

Assignments	10%
Class attendance/participation	10%
Group Project	40%
Midterm Exam	20%
Final Exam	20%
Total Points	**100**

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to come to ALL classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and/or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assigned material before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by- case basis.

Important Dates to Remember

Course Schedule

Week	Topics to be covered
1	Course Overview: Discussion of syllabus and assignments, course requirements and prerequisites; Criteria for student selection
2	Cross-Cultural Consumer Behavior
3	Consumer Perception
4	Consumer Learning
5	Green Consumption
6	Consumer Motivation, Personality, and Emotion
7	Midterm Exam
8	Consumer Attitude
9	Consumer Influences
10	Consumer Decision Making Process
11	Consumer Decision Making Process
12	Projects Presentations
13	Revision



Course	Food security and consumer Behavior
Module 1	Introduction to Consumer Behavior
Key Concepts	Cross-Cultural Consumer Behavior, Consumer Perception, Consumer learning
Overview	Students will be introduced to consumers and the meaning of consumption. They will learn about the concept of culture and how does culture set boundaries for individual behavior which affects the consumer behavior in different ways. Moreover, they will get exposed to the nature of perception and how marketers use their knowledge of perception to enhance strategies. Questions to be addressed in this module include the following: who are the consumers? What is meant by the term culture? What is a norm? From what are norms derived? What is information processing? How does it differ from perception? What is learning? What is memory? All in relation to green and ecofriendly products.
Aim	The overriding aim of this module is to introduce students to the basics of consumer behavior.
Learning Outcomes	At the end of this module learners will be able to: • Identify and explain factors which influence consumer behavior. • In a team, work effectively to prepare a professional, logical and coherent report on consumer behavior issues within a specific context.
Units	1. Cross-Cultural Consumer Behavior 2. Consumer Perception 3. Consumer Learning
Readings	Hawkins, Del I. Consumer behavior: building marketing strategy / Del I. Hawkins, David L. Mothersbaugh.—11th ed.

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<table>
<tr><td>Activity</td><td>1. Class Activity 1: Starbucks Keeps It Brewing in Asia Case

Students have to communicate via Moodle in a forum discussion to elaborate on this case

2. Assignment 2: Select a green product that you feel has a good product position and another one that has a weak position. Justify your selection. Describe an ad or package for each product and indicate how it affects the product's position. This assignment is a collaborative assignment as 3 groups have to communicate virtually to achieve it

3. Project Phase 1: Project Focus
This project is to apply the consumer behavior tools and concepts to the development of a real-world marketing strategy that fits the consumer behavior for a high involvement green and ecofriendly product. Students should integrate all the concepts discussed in the course. This phase will require
a. Selecting a company
b. Industry overview and business environment analysis
c. Product category identification</td></tr>
<tr><td>SD Pillars</td><td>environment</td><td>economy</td><td>social</td><td>culture</td></tr>
<tr><td>21st ESD</td><td>Learning to know
</td><td>Learning to be
</td><td>Learning to do
</td><td>Learning to live together
</td><td>Learning to transform oneself and society
</td><td>Learning to give and share
</td></tr>
<tr><td>SDGs</td><td>1
</td><td>2
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</td><td>14</td><td>15</td><td>16</td><td>17</td></tr>
<tr><td>ECTs Workload</td><td>Lecture
3</td><td>Online
2</td><td>Lab</td><td>Reading
5</td><td>Course activity
5</td><td>Project
10</td><td>Prepare exam</td><td>Writing exam</td><td>Total
25</td></tr>
<tr><td>Vision 2030</td><td colspan="9">Directing consumer behavior towards green products aid the 2030 vision by decreasing the consumption of products that consume natural resources, water and non-renewable energy. Therefore, this module supports the SDGs 1, 2, 3, 7, 13, and particular Goal 12 that address sustainable consumption and production.</td></tr>
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Module 2	Green Consumption and Consumer behavior
Key Concepts	Green Consumption, Consumer Motivation, Personality, and Emotions
Overview	Developing more environmentally sustainable consumption and production systems depends upon consumers' willingness to engage in greener consumption behaviors. Green consumption is a form of consumption that cope with the modern actions to protect the environment and the over consumption of natural resources. The change in consumer behavior toward green products is a long process that depends on several variables such as, personality, emotions, and motivations. Consumer motivations are energizing forces that activate behavior and provide purpose and direction to that behavior. There are numerous motivation theories. Maslow's need hierarchy states that basic motives must be minimally satisfied before more advanced motives are activated. The personality of a consumer guides and directs the behavior chosen to accomplish goals in different situations. Brands, like individuals, have personalities, and consumers tend to prefer products with brand personalities that are pleasing to them. Consumers also prefer advertising messages that portray their own or a desired personality. Emotions are strong, relatively uncontrollable feelings that affect our behavior. They affect consumers' thoughts and behaviors. Questions to be addressed in this module include the following: What is green consumption? How can Motivation, Personality, and Emotions grab consumer attention toward green products? What is a motive? What is the relationship between involvement and motivation? What is personality? What is an emotion?
Aim	The aim of this module is to emphasize the concept of Green Consumption and to link consumer motivation, personality, and emotions toward buying green products.
Learning Outcomes	Demonstrate how knowledge of consumer behavior can be applied to green marketing. Demonstrate awareness and ability to discourse on ethical issues in using social media and social networking tools in green marketing. Analyze the competitive advantages and risks associated with green consumption.
Units	4. Green Consumption 5. Consumer Motivation, Personality, and Emotion
Readings	1. Hawkins, Del I. Consumer behavior: building marketing strategy / Del I. Hawkins, David L. Mothersbaugh.—11th ed. 2. João Pedro Pereira Luzio, Fred Lemke, (2013) "Exploring green consumers' product demands and consumption processes: The case of Portuguese green consumers", European Business Review, Vol. 25 Issue: 3, pp.281-300, https://doi.org/10.1108/09555341311314825

	3. do Paço, A., Alves, H., Shiel, C. and Filho, W. L. (2013), Development of a green consumer behaviour model. International Journal of Consumer Studies, 37: 414-421. doi:10.1111/ijcs.12009
Activity	Assignment 1: Develop an advertisement for one of the following items in based on relevant motives from McGuire's set. • ISIS Organic Products (one of the eco-friendly products) • Sekem Herbs Sharing this advertisement on Moodle is one of the requirements to the assignment and each student select one advertisement and give a comment in a forum discussion via Moodle. Project Phase 2: Consumer Behavior Analysis a. Consumer perception b. Consumer Learning c. Green consumption d. Consumer Motivation, Personality, and Emotions

SD Pillars	environment	economy	social	culture

21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6	2		10	5	3			26

Vision 2030	The consumer perception, motivation, personality, and emotions plays a key role in coping with environmental issues and climate change and will greatly aid the accomplishment of Vision 2030 by changing the mentality of the consumer and increasing his consciousness about the risks caused by consuming some conservative products rather than green products.

Module 3	Consumer attitudes and Influences			
Key Concepts	Attitudes and influences			
Overview	Attitudes can be defined as the way people think, feel, and act toward some aspect of their environment. Attitudes influence, as well as reflect, the lifestyle individuals pursue. Its change strategies can focus on affect, behavior, cognition, or some combination. Attempts to change affect generally rely on classical conditioning Change strategies focusing on behavior rely more on operant conditioning. Attitudes differ from situations, as that a situation is a set of factors outside of and removed from stable characteristics of the individual consumer and focal stimulus. Four categories of situations are communications, purchase, usage, and disposition situations. Situational influences may have direct influences, but they also interact with product and individual characteristics to influence behavior. In some cases, the situation will have no influence whatsoever, because the individual's characteristics or choices are so intense that they override everything else. But the situation is always potentially important and therefore of concern to marketing managers. Questions to be addressed in this module include the following: What is an attitude? What are the components of an attitude? What is meant by the term situation? Why is it important for a marketing manager to understand situational influences on purchasing behavior? Describe a process for developing a situation-based marketing strategy.			
Aim	The aim of this module is to express the consumer attitudes and what influences these attitudes.			
Learning Outcomes	Identify and explain factors which influence consumer behavior. Demonstrate how knowledge of consumer behavior can be applied to marketing. Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. Demonstrate awareness and ability to discourse on ethical issues.			
Units	6. Consumer Attitudes 7. Consumer Influences			
Readings	1. Hawkins, Del I. Consumer behavior: building marketing strategy / Del I. Hawkins, David L. Mothersbaugh.—11th ed.			
Activity	Assignment 1: Find and copy two magazine or newspaper advertisements, one based on the affective component and the other on the cognitive component. Discuss the approach of each ad in terms of its copy and illustration and what effect it creates in terms of attitude. Also discuss why the marketer might have taken that approach in each advertisement. Project Phase 3: Recommended Marketing Strategy that fits the following: a. Consumer attitude b. Consumer influences			
SD Pillars	environment	economy	social	culture

21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6			5	5	5	4		25

Vision 2030	Attitudes influence the lifestyle individuals pursue. Its change strategies can focus on affect, behavior, cognition, or some combination. Consumer attitudes are based on the environment and culture they were raised on. Also the surrounding consumer influences has a great impact on the consumer purchase decision. Therefore, it must aid the sustainable development aspects. the purpose of this module is to change the consumer attitude and to raise their conciseness about the misleading influences that they face in their daily life .

Module 4	Consumer decision making process
Key Concepts	Consumer decisions, process of problem recognition
Overview	Consumer decision making becomes more extensive and complex as purchase involvement increases. It starts from problem recognition, Problem recognition involves the existence of a discrepancy between the consumer's desired state (what the consumer would like) and the actual state (what the consumer perceives as already existing). Before marketing managers can respond to problem recognition generated by outside factors, they must be able to identify consumer problems. Surveys and focus groups using activity, product, or problem analysis are commonly used. Human factors research approaches the same task from an observational perspective. Emotion research focuses on the role of emotions in problem recognition and resolution. Managers may attempt to minimize or suppress problem recognition by current users of their brands.
process	The aim of this module is to experience the different stages of the decision making Aim and to get familiar with the problem recognition process.
Learning Outcomes	Identify and explain factors which influence consumer behavior. Demonstrate how knowledge of consumer behavior can be applied to marketing. Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. In a team, work effectively to prepare a professional, logical and coherent report on consumer behavior issues within a specific context. Deliver an oral presentation in a professional and engaging manner. Demonstrate awareness and ability to discourse on ethical issues.
Units	8. Consumer decision making process
Readings	1. Hawkins, Del I. Consumer behavior: building marketing strategy / Del I. Hawkins, David L. Mothersbaugh.—11th ed.
Activity	Assignment 1: Interview three students and identify five products that each buys using a nominal decision process. Identify those that are based on brand loyalty and those that are merely repeated purchases. What characteristics, if any, distinguish the brand loyal products from the repeat products? Each student will do PPT presentation that summarize the interviews to be introduced via adobe connect. Project Phase 3: Recommended Marketing Strategy that fits the following: a. Consumer decision making process. b. Final Submission & Presentation.

SD Pillars	environment			economy		social				culture							
21st ESD	Learning to know		Learning to be		Learning to do	Learning to live together				Learning to transform oneself and society						Learning to give and share	
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	3	6		5	5	5	3		27

Vision 2030	This module has a great effect in achieving vision 2030 goals. Problem recognition is the base of decision making. If the consumer can recognize the problem of the climate change, his decision will change regarding the products he consumes. Therefore, consumer can shift to consume green and environmental friendly products and services that will aid vision 2030

Module 5	Sustainable Consumption Behaviors
Key Concepts	Sustainable consumption Behaviors and motivations toward sustainable consumptions
Overview	Sustainable consumer behavior is consumers' behaviors that enhance social and environmental performance as well as meeting their needs. During the last decades, sustainable production has grabbed the attention of researchers and policy makers under the assumption that the growing green values of consumers will cause a growing sustainable consumption behavior. On the other side, the main barriers for consumer toward consuming sustainable products are the price and availability in the market. Consumers are motivated to consume sustainably. Their motivations are mostly driven by their inborn psychological need to be part of the society and care for other members of that society. The importance of sustainable consumption as a way to raise common links has practical influences for policy makers and firms toward promoting consumers to embrace sustainable consumption practices.
Aim	The aim of this module to explore the sustainable consumption behaviors, how consumers started adopting this consumption treats, how the sustainable consumption patterns are increasing worldwide, and why and how consumers are motivated towards such consumption.
Learning Outcomes	□ Identify and explain factors which influence sustainable consumer behavior. □ Demonstrate how policy makers and firms coping with sustainable consumer behavior. □ Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. □ Deliver an oral presentation in a professional and engaging manner. □ Demonstrate awareness and ability to discourse on ethical issues.
Units	9. Sustainable Consumer Behavior 10 Motivations towards sustainable consumption
Readings	Dr. Pierre Sonigo, J. B. (2012). *Policies to encourage sustainable consumption*. Terlau, W., & Hirsch, D. (2015). Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon - Causes and Measurements towards a Sustainable Development, *6*(3), 159-174.

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Activity	□ Activity 1: There's not one universally accepted definition of "sustainable consumption." Based on what you've learned, how would you define the term? □ Activity 2: In your opinion, what procedures shall your country's government take to promote and motivate sustainable consumption?

SD Pillars	environment	economy	social	culture

21st ESD	Learning to know □	Learning to be □	Learning to do □	Learning to live together □	Learning to transform oneself and society □	Learning to give and share □

SDGs Sub goals	1 □	2 □	3 □	4	5	6 □	7 □	8	9	10	11	12 □	13	14	15	16	17

ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6	2		5	5	5	2		25

Vision 2030	This module addresses ~~tow~~the strategic dimensions of Egypt's Vision 2030. The first dimension is the environmental pillar. By promoting sustainable consumption, ~~C~~consumer~~s~~ would consume green, organic, and environmental friendly products which by its turn will preserve natural resources. The second dimension is the economic pillar. Environment is related to all economic sectors, therefore, sustainable consumption would shift demand patterns toward environmental friendly products which will increase the competition between manufacturers in the industries that will lead to producing better quality products that will return on Egypt with a clean, safe and healthy environment leading to diversified production resources and economic activities, supporting competitiveness, and providing new jobs.

Module 6	Sustainable Consumption & Production Success Stories
Key Concepts	Actual success stories in promoting and applying sustainable consumption and production
Overview	An introduction to the most succeeding and influencing stories. These success stories will demonstrate the practical work of the course. It will also emphasize how these stories' founders grabbed the public toward sustainable consumption, how did they motivated consumers to consume less and better products, what was the idea behind their thoughts, and what their vision is.
Aim and	The aim of this module is to familiarize the participants with real success stories in sustainable consumption and production and to give them an activity to innovate idea that might grab the attention of consumers toward sustainable consumption and production in their local area, society, or even the whole country.
Learning Outcomes	In a team, work effectively to prepare a professional, logical and coherent idea on promoting sustainable consumption and production within a specific area or country. Gain, evaluate and synthesize information and existing knowledge from a number of sources and experience. Deliver an oral presentation in a professional and engaging manner.
Units	11 Success Stories
Readings	Dr. Pierre Sonigo, J. B. (2012). *Policies to encourage sustainable consumption*. http://u4614432.fsdata.se/wp-content/uploads/2013/09/120629SuccessStoryNamibia.pdf http://www.whysgbs.org/responsible-consumption/

SD Pillars	environment	economy	social	culture
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share
SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTs Workload	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6	2		5	5	5	3		26

Vision 2030	This module ideas generated by participants would help the government to promote sustainable consumption and production because the ideas come from regular consumers that consume any products without being caution regarding it environmental damages.
Community Based learning Activity	Overview: The activity consists of a group project that covers most of the course modules. Participants will engage with the community to experience different consumer behaviors and attitudes through observation. They will also contact the targeted groups personally in their chosen community to influence them to consume green products. Students should be divided into groups of 4 - 5 Participants and each group will choose a community for the implication implementation of their activity. Goal: The goal is to engage students with the consumers and experience the different consumer behaviors and attitudes **purpose of community or service learning component:** to convince consumers to consume green products **The expected learning outcomes** Observe consumers behavior. Experience different consumers' attitude. **Actual Community Needs** Increase awareness regarding green consumption

Phase	Duration	Description
Phase 1	2 days	Each Group should search and select retail within a certain community where they will apply their activities on. (must be organized with the retail)
Phase 2	7 days	The group will make a field trip to their chosen community and observe the consumers' behaviour in that retail in the regards of th Ads they perceive, their purchased products, purchased amounts, and disposal method.
Phase 3	7 days	Analyse the observation of the community's consumption of food products and determine the most consumed products and is it a need or a want.
Phase 4	14 days	Choose one of the most consumed products and seek its alternativ

			green/sustainable product then engage with consumers and speak with them about the product and its differences & advantages. An document your engagement.
	Phase 5	7 days	Analyse and Reflect on your engagement with the consumers and note the different consumers' attitude and motivation.
	Phase 6		Presentation

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	10	3	30	3	6	6	3	6	6	30
Online	6	2	12	2	2		6	2	2	12
Lab work										
Reading articles (3 pages per hour)	60	0.3	20	3	5	3	3	3	3	20
Reading book chapters (5 per/h)	75	0.5	15	2	5	2	2	2	2	15
Preparing course activities	2	12.5	25	5	5	5	5	5	5	25
Project work	2	16	33	10	3	5	5	5	5	33
Preparation for exam	4	3	12			4	3	2	3	12
Writing the exam	2	3	6							6
Total			152	25	26	25	25	25	26	152

SDGs RUBRIC

Commented [NK2]: It is suggested to add this rubric and mark in the table the corresponding info - to be consistent with all other syllabi submitted

	SDGs	CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				

7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



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CCSAFS COURSE SYLLABUS

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Jerash University

~~Course Syllabus~~

Course Number (0604716)

Course Title
Economics of Climate Change, Sustainable Agriculture and Food Security

Instructor Information

Instructor: Dr.Mohamed AlTarawneh
Office Location: Faculty of Agriculture Building
Telephone: 0096226350521
Office Hours (Times & Days).
E-mail: m.tarawneh@jpu.~~-~~edu.jo

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Website: http://www.jpu.edu.jo/jpu/profile.php?id=50Course Identification

Course Number:0604716
Course Name: Economics of Climate Change, Sustainable Agriculture and Food Security
Course Location: Faculty of Agriculture
Class Times: Not Now
Prerequisites: Food Security (603374) Policies and Agricultural Economic Development (603353)
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

Climate change can be viewed as a fundamentally economic problem; however, climate change has a unique set of attributes that makes standard economic analysis hard to apply. It is a global problem which requires unprecedented international cooperation. It is pervaded by uncertainty in every step of the process of translating global emissions into local damages. The costs and benefits of its mitigation are highly mismatched geographically as well as temporally, and ~~. And~~ its damages are largely irreversible. This course ~~includes~~ examines~~the~~ basic problems of ~~human kind,~~

production of nutrition food productionresources, socio-cultural and psycho-social factors on food security and nutrition policy. It considers, critical factors influencing food security and, global problems of the world, historic situation and historic progress of nutrition situation inaround the world. The course covers, concepts of agricultural economics and policy from the viewpoint perspective of providing food security., problems of hunger and malnutrition in the world, nutrition food policy inof developing and developed countries, provision of world population, ecological problems of food resources production, resources and quality of plant and animal food. Students are encouraged to discuss s, solutions to theof food security problem in the world, and programme of developed countries for improving nutrition situation.

Course Learning Objectives:

The course aims at:

1. The course aims at predicting dDiscussing environmental impacts of any development process.
2. Discussing the opportunity of mitigation against negative environmental impacts and enhanceenhancings positive environmental impacts
3. Providing the methods of uUsing economics for Cost Benefit Analysis "benefit cost analysis" as an integral part of project selection.
4. Develop a knowledge and uUnderstanding of analyzing the economic assessment of the environmental impacts of the project.
5. Understanding the inter-relationship between climate change, environment, food security and sustainability at global and regional level.
6. Understandsing the concept of food security and its related issues.
7. Understanding the ways of adaptation for climate changes, and how to manage the environment keeping and food security sustainability.
8. The prPromotingon of critical thinking and problem-solving skills.

Course Content Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Discuss / explain the environmental impacts of any agriculture activityies.
2. Use economic analysis as policy tools and instruments.
3. Understand the use of public policies and support programs in influencing environmental actions by developers, manufactures, farmers and consumers.
4. Identify the interrelationships between environment and economics.
5. Implement analytical skills to quantify the environmental impacts and interpret of quantified results.
6. Understands the production of food resources, their ecological problems, factors of nutritive policy, food safety and nutritive policy.
7. Apply the ways of adaptation for climate changes and managing environmental keeping and food security sustainability.

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Course Resources~~s~~.

1. Beddington J., Asaduzzaman M., Cndez A., Guillou M., Jahn M., Erda L., Mamo T., Van Bo N., Nobre C.A., Scholes R., Sharma R. andWakhungu J. (2012). Achieving Food Security in the Face of Climate Change: Final Report from the Commission on Sustainable Agriculture and Climate Change. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark, Available online at: www.ccafs.cgiar.org/commission.
2. National Research Council (2012). A Sustainability Challenge: Food Security for All, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc.
3. Food Insecurity Atlas of Rural India (2001) MS Swaminathan Research Foundation and World Food Programme.
http://home.wfp.org/stellent/groups/public/documents/ena/wfp076968.pdf
4. National Research Council (2012). *Sustainability Challenge: Food Security for All*, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc
5. Lichtfouse, E., Navarrete, M., Debaeke, P., Véronique, S., Alberola, C. 2009, Sustainable Agriculture.
6. UNDP, 2012. Chapter 5: Sustainable Agriculture,
https://www.cbd.int/financial/finplanning/g-plantools5-undp.pdf.
7.OSU Extension Small Farms, An Introduction Sustainable Farming. http://extension.oregonstate.edu/sorec/sites/default/files/Sustainable_Farming.pdf
8. Archer, "The Perturbed Carbon Cycle."
9. Schneider, "What Is 'Dangerous' Climate Change?".
10. Forster et al., "Changes in Atmospheric Constituents and in Radiative Forcing."
11. Kolbert, "The Curse of Akkad."
12. Surowiecki, "Better and Better: The Myth of Inevitable Progress."
13. Pew, "The Causes of Global Climate Change."
14. Jules Pretty,2007. Agricultural sustainability: concepts, principles and evidence, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2610163/.
15. Fritz J. Häni, László Pintér and Hans R. Herren,2006, Sustainable Agriculture: From Common Principles to Common Practice, International Forum on Assessing Sustainability in Agriculture (INFASA), https://www.iisd.org/pdf/2007/infasa_common_principles.pdf.

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Course Website(s)

Required Course Texts and Materials

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Optional Course Texts and Materials

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Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least passing grade ~~mark~~)

Grading Policy

Component	Grade
Assignments	80%
Exams	NO EXAM?
Class Attendance/ Participation	20%
Total Points	100%

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to all classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me early before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and / or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assignment materials before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Course Schedule

Week	SUBJECT
1	General Introduction: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection.
2	Introduction and Concepts of Economics of Climate Change and Sustainable Agriculture and Food Security.
3	History of Earth's Climate and Causes of Climate change.
4	Economic approach to value climate change damages.
5	Sustainable Development and climate change.
6	Sustainable Agriculture: Principles and Application
7	Challenges to Agricultural Production
8	Features of agriculture: sustainable and unsustainable.
9	Food Security: challenges & opportunities
10	Food production
11	How climate change affect sustainability and food security
12	Case study
13	Revision
14	Field trip: Visit to agricultural research institutes
15	Student Presentations
16	Final exam

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Course	Economics of Climate Change, Sustainable Agriculture and Food Security
Module 1	Science of Climate Change
Key Concepts	Global Warming, Climate Change, Sustainability
Overview	This module provides a general overview of climate science and climate change impacts, highlighting the current state of knowledge and remaining uncertainties about climate change and sustainable development.
Aim	The overriding aim of this module is to turn students able to understand the following: 1. Introduce the students to climate science and climate change impacts and associated environmental problems. 2. Provide a basic understanding of the global cycles of greenhouse gases. 3. Provide a basic understanding of the workings of the global climate system. 4. Develop an understanding of the complexity surrounding the public debate on climate change.
Learning Outcomes	At the end of this module students will be able to: 1. Gain a general understanding of the issues of Climate Change and Sustainable Development. 2. Understand and critically assess the concepts of climate change and sustainability.
Units	1- The Earth Natural Greenhouse Effect -General Overview 2- Impacts of climate change. 3- Climate change damages. 4- Economic approach to value climate change damages. 5- Aggregating climate change damages. 6- Greenhouse Gas Cycles. 7- Sustainable Development and climate change. 8- Environmental Law
Readings	1. Archer, "The Perturbed Carbon Cycle." 1. Schneider, "What Is 'Dangerous' Climate Change?". 2. Forster et al., "Changes in Atmospheric Constituents and in Radiative Forcing." 3. Kolbert, "The Curse of Akkad." 4. Surowiecki, "Better and Better: The Myth of Inevitable Progress." 5. Pew, "The Causes of Global Climate Change."
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. 5. Learning by group. 6. Learning by Project

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SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	×	×	×										×			×	
10Cs/6 LEARNINGGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	×	×	×	×	×	×	×	×	×			×	×		×	×	
ECTS WORK LOAD	Lecture 24		Online 9		Lab 4		Reading 35		Course activity 15		Project		Prepare exam		Writing exam		Total 87

Module 2 Key Concepts Overview	Sustainable Agriculture: Principles and Application Sustainable, agriculture, soils, agriculture approaches. This module will provide an overview of sustainable agriculture. It will focus on the sustainability of food production at multiple levels: farm resources, community, regional, national and global. Students will gain basic understanding of the environmental problems caused by conventional agriculture/horticulture and understand the challenges to alternative forms of sustainable agriculture.
Aim	Objectives Upon completion of this course, students should be able to: 1. Use critical reading skills to guide interpretation of articles. 2. Identify the key principles of sustainable agriculture and ecology; 3. Describe several different models of sustainable agriculture systems. 4. Identify potential career opportunities in sustainable agriculture. 5. Design an agriculture system that incorporates key ecological principles and sustainable management practices
Learning Outcomes	At the end of this module students will be able to: 1. Learn how issues at various levels--farm, community, regional, national and global-- influence agriculture sustainability and future food supply. 2. Learn to think critically about where their food comes from, and be able to analyse the environmental, economic, and social costs and benefits involved in delivering food from farm to market. 3. Gain knowledge about the pros and cons to global trade, and what forms of sustainable agriculture will best suit the needs of a growing global population.
Units	1. What is sustainability, What is agriculture? 2. Features of agriculture: sustainable and unsustainable. 3. Soils and Sustainability. 4. Water and Sustainability 5. Cropping systems, Livestock systems. 6. "Alternative" agriculture approaches. 7. Issues in sustainable agriculture. 8. Economic Dimensions of Farm Sustainability.
Readings	1. Lichtfouse, E., Navarrete, M., Debaeke, P., Véronique, S., Alberola, C. (2009), Sustainable Agriculture.

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	2. UNDP, (2012). Chapter 5: Sustainable Agriculture, https://www.cbd.int/financial/finplanning/g-plantools5-undp.pdf. 3. OSU Extension Small Farms, An Introduction Sustainable Farming. http://extension.oregonstate.edu/sorec/sites/default/files/Sustainable_Farming.pdf. 4. Jules Pretty, (2007). Agricultural sustainability: concepts, principles and evidence, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2610163/. 5. Fritz J. Häni, László Pintér and Hans R. Herren, (2006), Sustainable Agriculture: From Common Principles to Common Practice, International Forum on Assessing Sustainability in Agriculture (INFASA), https://www.iisd.org/pdf/2007/infasa_common_principles.pdf.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. 5. Learning by group. 6. Learning by Project

SDGs Sub goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	×	×	×					×				×					×

10Cs/6 LEARNINGGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	× ×	× ×	× ×	× ×	×	×	×	× ×	
	24	3	2	30	15				74

Module 3 Key Concepts Overview	Food Security: challenges & opportunities Production, Safety, Security, climate change. This module will provide students for an overview of food security. The module looks at food production at multiple levels: farm resources, community, regional, national and global. Students will gain basic understanding of the environmental problems caused by conventional agriculture/horticulture and understand the challenges of alternative forms of sustainable agriculture.
Aim	Objectives Upon completion of this course, students should be able to: 1. Understand ways of adapting to climate change and managing the environment keeping in mind food security and sustainability. 2. To understand the concept of food security and issues in achieving it.
Learning Outcomes	At the end of this module students will be able to: 1. Understands the production of food resources, their ecological problems, factors of nutritive policy, food safety and nutritive policy. 2. Identify the inter-relationship between climate change,

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	environment, food security and sustainability at global and regional level.
Units	1.Concept of food Security. 2.Food production. 3. Accessibility of food resources. 4. Food distribution. 5. Food safety. 6. Policy, economic and social aspect of food. 7. How climate change affect sustainability and food security.
Readings	1. Beddington J., Asaduzzaman M., Cndez A., Guillou M., Jahn M., Erda L., Mamo T., Van Bo N., Nobre C.A., Scholes R., Sharma R. andWakhungu J. (2012). Achieving Food Security in the Face of Climate Change: Final Report from the Commission on Sustainable Agriculture and Climate Change. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark, Available online at: www.ccafs.cgiar.org/commission. 2. National Research Council (2012). Sustainability Challenge: Food Security for All, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc. 3. Food Insecurity Atlas of Rural India (2001) MS Swaminathan Research Foundation and World Food Programme. http://home.wfp.org/stellent/groups/public/documents/ena/wfp076968.pdf
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. 5. Learning by group. 6. Learning by Project. 7. *As a community service ~~task~~activity, ~~allow~~ ask students to contact ~~with~~ different farmers involved in animal and plant production to introduce the impact of climate change on their products safety and sustainability.* *8. Developing water monitoring programs and introduce~~s~~ it to plant and animals' farmers and increase~~s their~~ awareness about the effect of climate change on water resources and on agriculture sustainability and food security concepts.*

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sub goals	×	×	×										×			×	×

10Cs/6 LEARNINGGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
			×	×	×	×	×	×	×			×	×		×	×	

~~ECTS WORK~~ LOAD	× Lecture	×	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total

Commented [NK7]: The activities in most modules are pretty much the same.

Commented [NK8]: What about the economics and policy aspect? Not reflected in the activity

	24	9	4	35	15				87

SUMMARY OF ECTS WORKLOAD

Learning Components	No	Time Factor	Workload	Course Modules			Workload
				1	2	3	
Lectures (face-to-face)	23	3	69	24	24	21	69
Online	6	3	18	9	3	6	18
Lab work	4	2	8	4	2	2	8
Reading articles (3 pages per hour)	120	0.5	60	25	20	15	60
Reading book chapters (5 per/h)	140	0.2	28	10	10	8	28
Preparing course activities	9	5	45	15	15	15	45
Project work	1	30	30				30
Preparation for exam	1	15	15				15
Writing the exam	2	3	6				6
Total			279	87	74	70	279


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS


Constructing knowledge
Critical thinking and problem solving
Communi-cation
Collabo-ration
Creativity and innovation
Connectivity and networking
Critical conscious-ness
Critical reflection
Cross/inter-cultural competence
Co-responsibility
ICTs as enabling tools for the 10Cs

COMMENTS TO IMPROVE THE COURSE

Economics of Climate Change, Sustainable Agriculture and Food Security

- Only two objectives relate to economics (# 3 and 4)
  3. Using Cost Benefit Analysis as an integral part of project selection.
  4. Understanding economic assessment of the environmental impacts of the project.

- Course resources and readings need update especially when it comes to economics of climate change. Follow APA style in referencing for consistency

- The community service activity needs more elaboration

- It is suggested to improve the correspondence between the objectives and the outcomes.

- Your course should emphasize the economics and policy aspect of climate change, with emphasis on sustainable agriculture and food security. However, the concepts related to economics and policies are not well developed.

- The modules described are not enough to cover the course objectives and learning outcomes. More modules should be added in way that the course outline and objectives show consistency with the topics in the modules. The modules to add should examine environmental assessment principles and integration of systematic environmental and socio-economic evaluation into national policy-making.

- The elaboration of methods and economic techniques for socioeconomic assessments, cost benefit analysis, contingent valuation methods is most needed.

- It is suggested to introduce some principles of economics policy, discussing how a policy can be developed and the tools that can be applied. Particular attention should be given to policy tools aiming to reduce market failure as in the case of commons (e.g. natural resources) or negative externalities (e.g. pollution, GHG emission).

- The focus on climate change economics should ensure that interrelated disciplines (environmental science, agriculture, food security, and economics) is not missing. These disciplines should be examined in a holistic view, and not in separate sections as in the syllabus provided. The course developer has distinct sections on climate change, sustainable agriculture and food security, but the contribution of the course to climate change economics in relation to policy and decision making is still weak because the aspects of the interrelated disciplines (sustainable agriculture and food security) are not well blended.

- This course, as described, views climate change as a "fundamentally economic problem; however, climate change has a unique set of attributes that makes standard economic analysis hard to apply"….. "It is pervaded by uncertainty in every step of the process of translating global emissions into local damages. The costs and benefits of its mitigation are highly mismatched geographically as well as temporally, and its damages are largely irreversible". The description obviously shows that the course should focus about the way human decisions affect the quality of the environment (anthropogenic greenhouse gases that contribute to climate change), how human values and institutions shape our demands for quality (consumption); and, about how to design effective economic and development policies to bring about these improvements. The relatedness of environmental issues to economic, social, political, and technical dimensions is not clearly identified.

- The course includes only 3 modules: climate change, sustainable agriculture and food security. I suggest more in-depth understanding of climate change economics and sustainability policy and I ask the course developer to integrate those in the syllabus and link the concepts discussed in a comprehensive way.

- I AM PORPOSING BELOW detailed MODULES TO BE ADDED or COMBINED with your course syllabus to improve the scope and give it a broader perspective. In the modules below, I have suggested other relevant readings and activities. You can use the modules below in combination of the modules you believe are important in your original syllabus you sent me- and am sure you can come up with a more comprehensive syllabus.
- Also, please check my recommendations regarding course outline and detailed modules below.
- Once you have a final version of the syllabus, you should rearrange the SD pillars, 21st ESD, SDGs, ECTS, and vision 2030 (the vision 2030 is missing- please refer to the template of Dr. Makrakis) to fit your final syllabus.
- Provide a clean version of the syllabus- without comments and with changes addressed.

Suggested Course Schedule

	TOPICS for discussion
01	Syllabus / Introduction to the course
02	Scarcity, opportunity cost, and economic rationality
03	Pareto efficiency and the Kaldor/Hicks criteria Positive and normative economics
~~04~~	~~Economics and Sustainability~~
~~05~~	~~Theory of consumer choice and the demand curve~~
~~06~~	~~Profit maximization and the supply curve~~
~~07~~	~~The economics of market allocation~~
~~08~~	~~Positive and Negative Externalities~~
~~09~~	~~Public Goods and Sustainability~~
10	Human transformation of the Earth: drivers of change: *Demographic drivers (population size, age and gender structure, and spatial distribution) *Economic drivers (national and per capita income, macroeconomic policies, international trade) *Sociopolitical (democratization, roles of women and local communities, role of private sector) *Scientific and technological (research and development, adoption of new technologies) *Cultural and religious (choices individuals make about what and how to consume and what they value)
~~11~~	~~Climate change and the Kyoto Protocol~~
~~12~~	~~The Sustainable Development Goals of the United Nations~~
13	Decision-making: Individual vs. collective action The Rational Actor Paradigm Self-interest vs. social goals
~~14~~	~~Non-Market Valuation~~
~~15~~	~~Benefit-Cost Analysis~~
~~16~~	~~Students' presentations~~

Suggested Course Modules

Course	Economics of Climate Change, Sustainable Agriculture and Food Security
Module 1	Climate change economics and sustainability policy
Key Concepts	climate change economics, sustainability policy
Overview	Anthropogenic climate change represents the most challenging global problem confronting policymakers. This course begins with a module that explains anthropogenic greenhouse gas emissions as a function of a number of economic variables.
Aim	The aim of this module is for students to learn to discourse on climate change economics and sustainability policy.
Learning Outcomes	At the end of this module learners will be able to: 1. Understand economic rationality and the concept of climate change 2. understand the complex factors influencing changes in carbon dioxide emissions
Units	Unit 1. Fundamental economic Concepts Unit 2. The relationship between environment and economics Unit 3. Ecosystems and their services
Readings	Assigned readings from various websites (see in the activity section below and choose relevant readings to agriculture and food security)
Activity	Ask students to browse the sites below: □ World Meteorological Organization (WMO) □ United Nations Environment Programme (UNEP) □ United Nations Framework Convention on Climate Change (UNFCCC) □ Global Environment Facility (GEF) □ Linkages by International Institute for Sustainable Development (IISD) □ IPCC Data Distribution Centre □ United Nations Convention to Combat Desertification
SD pillars 21st ESD SDGs ECTS workload	
Vision 2030	
Module 2	Sustainability and Climate Change
Key Concepts	Pillars of sustainability, climate change, mitigation, adaptation, The Sustainable Development Goals
Overview	In this module, we examine the nature and scope of sustainability in relation to climate change. We begin with a definition of sustainability and a discussion of its relationship to other fields, including agriculture

	and food security. We emphasize strategies to ensure sustainability of both natural ecosystems and human well-being by integrating economic, environmental, social and cultural aspirations. The Sustainable Development Goals and the Millennium Ecosystem Assessment reports will be used to illustrate the integration of information from natural and social sciences and to harmonize the use of ecosystem services with human needs (food security and sustainable agriculture)
Aim	The aims of this module are to: 1) distinguish between the different dimensions of sustainability, 2) introduce the Sustainable Development Goals, 3) explore decision-making options that can harmonize the use of ecosystem goods and service with human needs (such a food provision and other ecosystem services)
Learning Outcomes	At the end of this module, learners will be able to: • Distinguish between sustainability dimensions • Assess the status of the Sustainable Development Goals in Egypt and in the region • Examine decision-making to mitigate and adapt to climate change
Units	Unit 1. Sustainability Unit 2. The relationship between sustainability and economics Unit 3. the Sustainable Development Goals Unit 4. The Millennium Ecosystem Assessment Unit 5. Making policy decisions to mitigate and adapt to climate change
Readings	Millennium Ecosystem Assessment for the Arab region http://gis.cedare.int/arabma/docs/MA_final%20full%20Report_Low.pdf
Activity	Discussion related to the application of economic issues, such as climate change and sustainable ag
SD pillars 21st ESD SDGs	
ECTS workload Vision 2030 Module 3	Human transformation of the Earth: drivers of change
Key Concepts	Drivers of change: Demographic, economic, sociopolitical, scientific and technological, cultural and religious. Benefits and Costs of Climate Change Mitigation, Threats caused by climate change, Policy Initiatives.
Overview	In this module, we discuss- in a holistic view-the different drivers of change for the transformation of the earth (including climate change) * Demographic drivers (population size, age and gender structure, and spatial distribution) * Economic drivers (national and per capita income, macroeconomic policies, international trade) * Sociopolitical (democratization, roles of women and local communities, role of private sector) * Scientific and technological (research and development, adoption of

	new technologies) *Cultural and religious (choices individuals make about what and how to consume and what they value).
Aim	The aims are: 1) to discuss the drivers of climate change; 2) to understand the threats caused by climate change on humans and other living things through impacts on ecosystems, agriculture and food security; 3) to analyze economically estimates of mitigation benefits and costs in the case of various market distortions; 4) to discuss making policy choices under uncertainty in climate change models
Learning Outcomes	At the end of this module, learners will be able to: 1. Identify drivers of change; 2. Understand the threats caused by global climate change through impacts on agriculture and food security; 3. Analyze economically estimates of mitigation benefits, improved understanding of costs in the presence of various market distortions, 4. Design tools for making policy choices under uncertainty
Units	Unit 1: Drivers of change Unit 2: Assessing the Benefits and Costs of Climate Change Mitigation Unit 3: Dealing with Uncertainty of climate policy Unit 4: International Policy Coordination
Readings	Millennium Ecosystem Assessment Reports http://maweb.org Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity (www.eia.doe.gov/oiaf/kyoto/kyotorpt.html): Comprehensive economic analysis of the costs of complying with the Kyoto Protocol, sponsored by the U.S. Energy Information Administration
Activity	Write a five-page essay in which you summarize what is known about global climate change. Discuss how the complexity, the long-term nature of the problem, the uncertainty regarding climate change effects, and the challenging policy problems related to sustainable agriculture and food security.
SD pillars 21st ESD SDGs ECTS workload	
Vision 2030 Module 4	Climate Change: Science, Policy, and Economics
Key Concepts	Greenhouse Gas Emissions and Global Climate Change, trends in greenhouse gas emissions, climate change predictions, international action on Climate Change: The Earth Summit , The Kyoto Protocol

Overview	According to the Intergovernmental Panel on Climate Change (IPCC), the present carbon dioxide concentration has not been exceeded during the past 650,000 years, and likely not during the past 20 million years. The current rate of increase is unprecedented during at least the past 20,000 years. Climate models are extremely complex, and so as our understanding of the world's climate improves, so too will our ability to model climate change caused by greenhouse gas emissions.
Aim	The aims of this module are to: 1) understand that deterioration of ecosystems due to climate change could have negative consequences for the world's economy, 2) introduce climate change models and predictions, 3) discuss international action on climate change.
Learning Outcomes	At the end of this module, learners will be able to: • Understand that major alterations to ecosystems due to climate change could possibly have negative consequences for the world's economy • Explore assumptions of climate change scenarios • Discuss the Earth Summit and The Kyoto Protocol that includes three incentive-based economic instruments.
Units	Unit 1: The scientific aspect of climate change Unit 2: Assessing the Benefits and Costs of Climate Change Unit 3: Policy Initiatives
Readings	Hackett, S. C. (2006) Environmental and Natural Resource Economics: Theory, Policy, and the Sustainable Society. M.E. Sharpe, Armonk, NY (3rd ed.) - chapter 11
Activity	An Inconvenient Truth (movie)
SD pillars	
21st ESD	
SDGs	
ECTS workload	
Vision 2030	
Module 5	Climate Change and Economic Development
Key Concepts	Gas emissions and impacts of climate change on developing nations
Overview	This module examines climate change impacts on developing nations, particularly on poor people, and identifies the most vulnerable zones across the world. The cost of these direct and indirect climate change impacts are primarily borne by the poor as they directly depend on environmental resources for their livelihood. Strategies to slow down the progress of climate change and policy adaptations to help the "poor" are discussed.
Aim	The overriding aims of this module are: 1) to examine the topic of climate change and its impact on developing nations, particularly the poor; and 2) to discuss the strategies that need to be pursued to impede the pace of climate change.
Learning Outcomes	At the end of this module, learners will be able to: • Analyze the development challenges caused by climate change

	□ Examine strategies to slow down climate change and adapt policies to help the poor, mostly affected by this problem
Units	Unit 1: Estimating the human and environmental impacts of global environmental problems, such as climate change Unit 2: The impacts of climate change on developing nations, particularly the poor Unit 3: Policies to impede the progress of climate change
Readings	□ http://www.ipcc.ch/ □ http://climatechange.worldbank.org/ □ Adaptation to a changing climate in the Arab countries: a case for adaptation governance and leadership in building climate resilience http://www.preventionweb.net/english/professional/publications/v.php?id=29948
Activity	Write a report to discuss the responsibilities of developing and developed countries with respect to climate change and its impacts on the economy and the lives of people.
SD pillars	
21st ESD SDGs ECTS workload Vision 2030	
Module 6	Decision-making: Individual vs. collective action
Key Concepts	The Rational Actor Paradigm, Self-interest vs. social goals
Overview	This module provides an overview on how individuals make decisions in collective action situation
Aim	The aim of this module is to explain individual behavior in the case of a collective action
Learning Outcomes	At the end of this module learners will be able to: 1. Understand the social dimension of environmental problems 2. Analyze decision-making from an economic perspective (RAP) 3. Understand cooperation in collective action situations
Units	Unit 1. Environmental problems and their social dimensions Unit 2. The Rational Actor Paradigm Unit 3. Collective action cooperation
Readings	Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press, New York Ostrom, E. (2000). Collective Action and the Evolution of Social Norms. Journal of Economic Perspectives 13 (4): 137-158. Titenberg, T. (2002). The tradable Permits Approach to Protecting the Commons: What Have We Learned? Pages 197-232 in E. Ostrom, T. Dietz, and N. Dolsak, eds. The Drama of the Commons. National Academy Press, Washington, DC. http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

Activity	Discuss the climate change problem in terms of individual vs. collective decisions to reduce its impact on the economy and the lives of people
SD pillars 21st ESD SDGs ECTS workload Vision 2030	
Module 7	Economic Valuation Methods
Key Concepts	Present value, future value, social discount rate, cost benefit analysis, willingness to pay, contingent valuation method (CVM), ecosystem assessment
Overview	This module overviews basic microeconomics as it applies to climate change economics. Also, it presents the methodologies available for quantifying benefits and costs. • Tradeoffs between current and future consumption. • Using an appropriate social discount rate. • How to correctly value the environment as a resource whose depletion represents a cost to future generations. • How to internalize negative externalities and correct for market failures.
Aim	The overall aims of this module are: 1) to run a cost-benefit analysis, 2) to define types of economic values and total willingness to pay, 3) to understand the various nonmarket valuation methods , 4) to provide an overview of cost estimation methods, 5) to illustrate complexities including benefits transfers, the monetization of intangibles, the treatment of risk and the choice of the discount rate.
Learning Outcomes	At the end of this module, learners will be able to: • Outline the complexities of cost-benefit analysis • Define types of values: use value, option value, existence value and willingness to pay • Classify the available non-market valuation methods • Examine the potential complexities associated with the contingent valuation method and other cost estimation methods
Units	Unit 1: Current conditions of ecosystems and the effect of climate change agriculture and food security Unit 2: Essential tools of environmental analysis and economic valuation, including the assessment of trade-offs, benefits, costs, cost-effectiveness, contingent valuation. Unit 3: Ecological and social systems interactions, trade-offs involved in decisions concerning climate change Unit 4: Economic policy to better achieve human development
Readings	• The Millennium Ecosystem Assessment (http://www.maweb.org/en/index.aspx) • Environmental valuation

	http://cmsdata.iucn.org/downloads/09_compendium_of_case_studies_introduction.pdf • Environmental Valuation: Challenges and Practices http://www.rff.org/Documents/08_Tropics_Conference/Tropics_Conference_Papers/Tropics_Conference_Dixon_Environmenal_Valuation.pdf • The Economic Valuation of Environmental Amenities and Disamenities: Methods and Applications: http://environment.yale.edu/files/biblio/YaleFES-00000201.pdf
Activity	• An in-class example or problem set related to discounting will let the students learn with a hands-on example and will likely ease their minds about the difficulty of the concept of environmental valuation. Example: A spreadsheet problem is a hypothetical example of two proposed uses for an area (development project vs. agricultural area). A set of costs and benefits is given for a 5-year period. The problem is set up so that the net present value changes from positive to negative with a change in the discount rate. This is a nice illustration of the effect of the discount rate. The example is also set up so that a different project would be pursued at a different rate. • Case study (in the field). You can the Community Based Learning Activity you have designed



CCSAFS COURSE SYLLABUS

Jerash University

Course Number (0604720)

Course Title

Consumer Behaviour and Food Security and Marketing

Instructor Information

Instructor: Dr. Mohamed AlTarawneh
Office Location: Faculty of Agriculture Building
Telephone: 0096226350521
Office Hours (Times & Days).
E-mail: m.tarawneh@jpu.edu.jo
Website: http://www.jpu.edu.jo/jpu/profile.php?id=50

Course Identification

Course Number: 0604720
Course Name: Consumer Behaviour and Food Security and Marketing
Course Location: Faculty of Agriculture
Class Times: Not Now
Prerequisites: Food Security (603374), Agri. Marketing (603361)
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description~~/Overview~~

This course focuses on the relationship between consumer behaviour, food security and marketing. The framework for consumer analysis, the affect and cognition, conditioning and learning process will be discussed. During the course, students will be familiarized with some concepts such as: motivations, perceptions, attitudes, cultural and cross cultural influences, social class, reference group and family; market segmentation and product positioning, consumer behaviour and new product adoption.

I SUGGEST THE FOLLOWING course description:

All of us are consumers. On daily basis, we are faced with situations where we must decide how to spend our time and money. This course is designed to shed light on why we behave as we do as consumers. Topics covered in this course will include: external and internal influences on consumer behavior, the consumer decision process, organizations as consumers, and marketing regulation/ethics.

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Commented [NK1]: Is this the official title of the course? You have 2 "and".

Commented [NK2]: This is typical consumer behaviour class. Where is food security? And how it is related to the course? This should be highlighted in the course description

This course focuses on the study of what it means to be a consumer in a global, information-oriented (technology-oriented, market-oriented) culture. We will examine concepts, processes and approaches that inform marketing strategy as to what, how, when, where and why people consume. The course emphasizes marketing strategy implications of the propositions that compose consumer decision-making processes. The course topics provide a managerial oriented understanding of consumption in post-modern life, where climate change becomes a major threat. In this sense, the course integrates the themes of sustainability in the context of consumer behaviour. It considers the impact that global and local social and economic issues have on marketing and food security. It is the aim of the course to equip students with current knowledge about sustainable development topics and the promotion of critical thinking skills and competences of how individual psychology (motivations, perceptions, attitudes), and socio-cultural factors (cultural and cross cultural influence, reference group) influence consumer behaviour in an ESD framework.

Course Learning Objectives:

1. Provide students with the knowledge on consumer behavior in an informed systematic way.

2. Understand the processes used when individuals, group or organizations make consumption decisions.

3. Learn to use economic concepts to analyze world food problems.

4. Become familiar with world food problems in general, and their relationship to agricultural production, development, and policies.

5. Develop basic food policy analysis skills.

I SUGGEST THE FOLLOWING LEARNING OBJECTIVES:

The goals of the course are to introduce students to main concepts in consumer behavior and to demonstrate their practical use. The course is designed to give students a clear understanding of the ways consumers process the marketing messages directed at them by sellers; how they're likely to respond to those messages; and the many ways they can use this information to formulate a comprehensive marketing strategy. At the end of this course, students should be able to:

1. Understand the role of the consumer in marketing from a variety of disciplinary approaches (e.g., cultural, sociological, psychological, postmodern consumption patterns)

2. Demonstrate how the study of consumer behavior can be used in marketing strategy formation using consumer behavior analysis (brand equity, customer satisfaction and loyalty, consumer impact on marketing strategy, database marketing, market segmentation, diffusion of innovation, qualitative field research: shopping behavior)

3. Develop an understanding of why people consume and the socio-cultural and psychological processes influencing consumption behavior decision-making, household influence, marketing cultural influences, personality and lifestyle, perceptions, learning, memory, motivation and values, consumer involvement,

attitudes, communications, purchase situation, post-purchase evaluation, group influence and opinion leadership.

4. develop an appreciation of how the consumption of products, services, ideas and experiences contribute to the broader social world, including global marketing and international business

5. develop an understanding of the positive and negative aspects of consumption and marketing practices (ethical and public policy issues in relation to consumer behavior, particularly with respect to marketing related to food security in the context of sustainability)

6. Become familiar with world food problems, and their relationship to agricultural production, development, and policies.

Course ~~Content~~ Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Understand the concept of consumer behaviour, food security and the relationship between the two concepts.
2. Identify and evaluate the scale of the global challenges to food security and the drivers of change in the context of poverty alleviation and food security.
3. Demonstrate a critical understanding to the scope of components of food security agenda and communicate contemporary issues relating to international and local responses to food supply and nutrition.
4. Critically analyse the potentially conflicting requirements of environmental protection and food production.

Course Resources:

There is no single text for this course. Readings will come from a variety of articles, books and reports including reports on Climate Change and sustainability issues. The following may be helpful.

1. Michael Solomon, et al , Consumer Behaviour: A European Perspective, (2006), Third edition, Pearson Education Limited.
http://www.books.mec.biz/tmp/books/nxhqrthbq2l87niu6yvn.pdf
2 . Leon Schiffman, Leslie Kanuk, and Mallika Das. (2006). Consumer Behaviour. Canadian (1st) edition. Pearson Education., ~~2006.~~
3. https://repository.up.ac.za/bitstream/handle/2263/29162/03chapter3-1.pdf?sequence=4.
4. Gary L. Lilien, Philip Kotler, (1983). Marketing decision making: a model-building approach.
5. Beddington J., Asaduzzaman M., Cndez A., Guillou M., Jahn M., Erda L., Mamo T., Van Bo N., Nobre C.A., Scholes R., Sharma R. andWakhungu J. (2012). Achieving Food Security in the Face of Climate Change: Final Report from the Commission on Sustainable Agriculture and Climate Change. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark, Available online at: www.ccafs.cgiar.org/commission.

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6. Giovannucci D., Scherr S., Nierenberg D., Hebebrand C., Shapiro J., Milder J. and Wheeler K. (2012). Food and Agriculture: The Future of Sustainability, A Strategic Input to the Sustainable Development in the 21st Century (SD21) Project, New York: United Nations Department of Economic and Social Affairs, Division for Sustainable Development. http://www.un.org/esa/dsd/dsd_sd21st/21_pdf/agriculture_and_food_the_future_of_sustainability_web.pdf .
7. National Research Council (2012). ASustainability Challenge: Food Security for All, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc
8. Marketing management, de essentie. Kotler, Robben & Geuens (2003). Pearson Education Benelux
9. Agro-food marketing. Padberg, Ritson & Albisu (1997). CAB International
Verbeke, W. (2005). Consumer acceptance of functional foods: socio-demographic, cognitive and attitudinal determinants. Food Quality and Preference, 16 (1), 45-57.
10. W. D. Perreault, Jr., J.P Cannon, and E. J. McCarthy (2009), Basic Marketing: A Marketing Strategy and Planning Approach, 17th ed., Irwin/McGraw Hill

Course Website(s)

Required Course Texts and Materials

1. Bryan L. McDonald (, 2010), Food Security, 1st Edition.

2. Philip Kotler (, 1974), Marketing Decision Making: A Model-building Approach.

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Optional Course Texts and Materials

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading Policy

Component	Grade
Assignments	80%
Exams	
Class Attendance/ Participation	20%
Total Points	100%

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And 50% exams

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to all classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me early before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and / or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and

thought about the assignment materials before you come to class. I expect active class participation, which counts for 20% of the grade.

Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by-case basis.

Course Schedule

Week	SUBJECT
1	General Introduction: Discussion of syllabus and assignments, course requirements and prerequisites, criteria for student selection.
2	Foundation of consumer behaviour.
3	Consumer Behaviour: Consumers as individuals, Consumers as decision makers.
4	Principles of consumer behaviour towards food
5	Consumers in the marketplace
6	Principles of marketing research.
7	Food Security and marketing.
8	Incidence of Food Insecurity.
9	Sustainable Livelihoods Framework.
10	Agricultural Development.
11	Trends and Future of Global Food Security.
12	World Trade and Food Security.
13	Local Food Security Challenges.
14	Why Market Analysis in a Food Security Context?.
15	Case study
16	Student Presentations
	Final exam

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Course	Consumer Behaviour, ~~and~~ Food Security and Marketing
Module 1	Consumer Behaviour as individuals and decision makers
Key Concepts	Consumer, behavior, a~~A~~ttitudes, decision makers
Overview	Students develop an appreciation for the influence of consumer behaviour on marketing activities. Students will apply a psychological, social and cultural concept for marketing decision making. These module topics will include the importance of consumer behaviour and research; internal influences such as motivation and involvement, personality, self-image, life-style, perception, learning, attitude formation and change, and communication; external influences such as culture, subculture, social class, reference groups and family, and the diffusion of innovations; and consumer decision making.
Aim	The overriding aim of this module is to turn students able to understand the following: 1. Consumer behaviour in an informed systematic way. 2. The processes used when individuals, group or organizations make consumption decisions. 3. What marketing can and can't do and the ethical restrictions on the marketing profession. 4. The interrelationship with other functional areas of business as part of the management process.
Learning Outcomes	At the end of this module students will be able to: 1. Gain a general understanding of the issues of consumer behaviour. 2. Identify and critically assess the concepts of consumer behaviour.
Units	1. Principles of consumer behaviour. 2. Marketing segmentation and positioning. 3. Consumer motivation and personality. 4. Consumer learning, memory and involvement. 5. Consumer attitudes. 6. Consumer decision-making process. 7. Organizational buying behaviour.
Readings	1. Leon Schiffman, Leslie Kanuk, and Mallika Das. Consumer Behaviour. (2006) Canadian (1st) edition. Pearson Education, ~~2006~~. 2. TITLE : https://repository.up.ac.za/bitstream/handle/2263/29162/03chapter3-1.pdf?sequence=4 3. Bryan L. McDonald (,2010), Food Security, 1st Edition. 4. Philip Kotler ,(1974, ~~–~~). Marketing Decision Making: A Model-building Approach. 5. Gary L. Lilien, Philip Kotler,(1983). Marketing decision making: a model-building approach.
Activity	1. Seminars / Lectures; a series of lectures and seminars will provide guidance in the understanding of the course topic. The lectures are held by the main instructor (course examiner) and invited lecturers. 2. Group exam task with presentations; with the acquired understanding achieved through the course, the students will be ready for a group task exam. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit, the students will submit an individual reflection paper of approximately 1000 words. 5. case study, 6.project-based learning tasks, 7. role-playing

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	AS ACTIVITES, I SUGGEST TO HAVE 2 ROUND-TABLE DISCUSSIONS: Roundtable on Consumer Decision Making. Pick a consumer decision that your household just made. Analyze it in terms of the search, evaluation of alternatives, and purchase. Did you go through all the steps?? Why or why not? Why would a firm want to know what steps you went through? Roundtable on Perceptions and Advertising: How many ads did you perceive today? Did you remember everything about them? Give examples of ads that you tuned out. How can marketers encourage consumers to pay attention to their messages?
10Cs/6 LEARNING GOALS	
ECTS WORK LOAD	
VISION 2030	
SDGs	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Sub goals	× × × ×
Key Concepts Overview	Food, marketing management, product, price, promotion, place, health, nutrition. This modulE focuses on the relation between food security and marketing. It discusses the framework for consumer analysis, affect and cognition, conditioning and learning process. It also familiarizes the students with concepts such as: motivations, perceptions, attitudes, cultural and cross cultural influences, social class, reference group and family; market segmentation and product positioning, consumer behavior and new product adoption.
Aim	The overall aim of this module is to encourage students to gain knowledge and develop understanding that enables them to critically evaluate challenges and problems related to the future of food security, and solutions proposed to improve future food security. This will include knowledge/understanding of issues related to global changes in population, land use and climate and resource availability and use efficiency in food production.
Learning Outcomes	At the end of this module students will be able to: 1. Develop a basic understanding of food security. 2. Identify the strategic elements of food security. 3. Expand understanding of food security entrances. 4. Determine the role of international organizations and world trade in food security. 5. Knowing the principles and basic concepts with respect to marketing of food products, as well as principles and concepts with respect to consumer behaviour towards food.

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	6. Identify the language and principles of marketing and sales departments within a food and agribusiness context.
Units	1. Defining food security. 2. Culture and ~~A~~agricultural sustainability~~e~~ in the post-modern Wworld. 3. The ~~C~~climate change and its relation to consumption patterns Connection. 4. Trends and f~~F~~uture of ~~G~~global ~~F~~food ~~S~~security. 5. Market Aanalysis~~zing Markets~~. 6. Building a Market Profile. 7. Why Market Analysis in a Food Security Context?. 8. Analyzing Domestic Food Supply and Demand. 9. Analyzing Data and Reporting.
Readings	1. Beddington J., Asaduzzaman M., Cndez A., Guillou M., Jahn M., Erda L., Mamo T., Van Bo N., Nobre C.A., Scholes R., Sharma R. andWakhungu J. (2012). Achieving Food Security in the Face of Climate Change: Final Report from the Commission on Sustainable Agriculture and Climate Change. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark, Available online at: www.ccafs.cgiar.org/commission. 2. Giovannucci D., Scherr S., Nierenberg D., Hebebrand C., Shapiro J., Milder J. and Wheeler K. (2012). Food and Agriculture: The Future of Sustainability, A Strategic Input to the Sustainable Development in the 21st Century (SD21) Project, New York: United Nations Department of Economic and Social Affairs, Division for Sustainable Development. http://www.un.org/esa/dsd/dsd_sd21st/21_pdf/agriculture_and_food_the_future_of_sustainability_web.pdf . 3. National Research Council (2012)A Sustainability Challenge: Food Security for All, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc 4. Marketing management, de essentie. Kotler, Robben & Geuens (2003). Pearson. Education Benelux 5. Agro-food marketing. Padberg, Ritson & Albisu. (1997). CAB International Verbeke, W. (2005). Consumer acceptance of functional foods: socio-demographic, cognitive and attitudinal determinants. Food Quality and Preference, 16 (1), 45-57. 6. W. D. Perreault, Jr., J.P Cannon, and E. J. McCarthy (2009), Basic Marketing: A Marketing Strategy and Planning Approach, 17th ed., Irwin/McGraw Hill.
Activity	1. Seminars / Lectures; a series of lectures and seminars will provide guidance in the understanding of the course topic. The lectures are held by the main instructor (course examiner) and invited lecturers. 2. Group exam task with presentations; with the acquired understanding achieved through the course, the students will be ready for a group task exam. 3. case study, 4.project-based learning tasks, 5. role-playing SUGGESTED PROJECT: Marketing Perspective: Analysis of Food Product Advertisements. It is the job of marketing departments within business organizations to conduct research on potential consumers, and then design advertising

Commented [NK9]: Explain the project. Am suggesting a project below

	campaigns that will reach and persuade these customers to purchase the products. With this in mind, you are to collect print advertisements for five different brands of food products. Identify the emphasized product attributes involved in each ad. Describe the consumer segments that are the apparent targets. You are expected to work with your team in locating the ads, analyzing their content, and discussing the segmentation issues. Come to class ready to give a brief oral report of your work (all term members participating). Have a brief report of your activities and conclusions ready to hand in at the end of your oral report (2-3 pages).																
10Cs/6 LEARNING GOALS																	
ECTS WORK LOAD																	
VISION 2030																	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sub goals		×	×					×			×	×				×	×
Module 3	Food Security and Sustainability																
Key Concepts	Food, marketing management, product, price, promotion, place, health, nutrition.																
Overview	The~~is introductory course~~ module emphasizes ~~is taught by instructors with decades of experience in university teaching and~~ real life projects about access to food all over the world. It enhances This course will be beneficial to students,understanding of food security in the context of marketing within a sustainability framework.. It highlights~~-~~ dilemmas at household, local, national and international levels and unravels the connections between levels and actors regarding access to food; namely food and nutrition policy makers, development practitioners and trainers at international, national, household and individual level.																
Aim	Understanding The basic principles of food access Understanding actors' choices influencing food access Discerning dilemmas at household, local, national and international levels Unraveling the connections between levels and actors regarding access to food																
Learning Outcomes	At the end of this module students will be able to: 1. Develop a basic understanding of food security. 2. Identify the strategic elements of agricultural development food security. 3. Expand understanding of food security entrances. 4. Determine the role of international organizations and world trade in food security. 5. Know~~ing~~ the principles and basic concepts with respect to marketing of food products, as well as principles and concepts with respect to consumer behaviour towards food. 6. Identify the language and principles of marketing and sales departments within a food and agribusiness context.																
Units	1. Introduction to food access as one of the pillars of global food security. 2. Households accessing and allocating food. 3. Introduction to distribution and trading food at the local level.																
Readings	1. Christopher Barrett, (2010)., ~~-~~"Measuring Food Security" ~~2010~~																

Commented [NK10]: INCLUDE THESE IN ALL YOUR MODULES

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	2. M S Swaminathan, Science and Sustainable Food Security,2009 http://www.worldscientific.com/worldscibooks/10.1142/7414. 3. David Barling (2017)., Advances in Food Security and Sustainability,~~2017,~~ Volume 2,1st Edition. Publisher?
Activity	1. Seminars / Lectures; a series of lectures and seminars will provide guidance in the understanding of the course topic. The lectures are held by the main instructor (course examiner) and invited lecturers. 2. Group exam task with presentations; with the acquired understanding achieved through the course, the students will be ready for a group task exam. 3. case study, 4.project-based learning tasks, 5. role-playing *6. Dividing students to groups, and assign them to donate different sources of food with the cooperation of different farms and industries to a chosen poor community near the university as a community service task.* *7. Introduce the importance of sustainability and consumers rule in agricultural industries to farmers by performing seminars and lectures given by the students as a community service task.*

10Cs/6 LEARNING GOALS																
ECTS WORK LOAD																
VISION 2030																
SDGs Sub goals	1 ×	2 ×	3 ×	4	5	6	7	8	9	10	11	12	13 ×	14	15	16 ×	17 ×

Commented [NK12]: This is the community-based activity. Please elaborate it as per the guidelines sent to you earlier

Commented [NK13]: INCLUDE THESE IN ALL YOUR MODULES

I SUGGEST ADDING 2 MODULES. THREE MODULES ARE NOT ENOUGH FOR THE TOPICS IN THIS COURSE

Module 4: Marketing strategy implications using consumer behavior analysis (brand equity, customer satisfaction and loyalty, consumer impact on marketing strategy, database marketing, market segmentation, diffusion of innovation, qualitative field research: shopping behavior)

Module 5: Sustainability in the context of consumer behavior.

- Focus on the impact that global and local social and economic issues have on marketing and food security
- develop an appreciation of how the consumption of products, services, ideas and experiences contribute to the broader social world, including global marketing and international business

Table 1: The workload of Consumer Behaviour, ~~and~~ Food Security and Marketing 10 ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules			Workload
				1	2	3	
Lectures (face-to-face)	15	3	45	15	15	15	45
Online	4.5	3	13.5	5	4	4.5	13.5
Lab work	4	2	8	4	2	2	8
Reading articles (3 pages per hour)	160	0.3	48	17	17	14	48
Reading book chapters (5 per/h)	140	0.2	28	10	10	8	28
Preparing course activities	3	15	45	15	15	15	45
Project work	1	30	30				30
Preparation for exam	1	50	50				50
Writing the exam	2	3	6				6
Total			273.5	66	65	58.5	273.5

GENERAL COMMENTS

- The course includes 3 modules. You can easily add 2 OTHER MODULES. THREE MODULES ARE NOT ENOUGH. I suggest:

Module 4: Marketing strategy implications using consumer behavior analysis
Module 5: Sustainability in the context of consumer behavior.
You may choose to add other topics as well.

- I believe that the course developer can explore greater opportunities from the perspective of course design, reading materials, course delivery and assessments to bring about more innovative insights to such an important course for students since it is very relevant to their own lives as consumers.
- The ECTS in the courses are not clearly calculated. It does not show how the work load is allocated in obvious way to assess whether the learning outcomes are achieved. Maybe when adding two other modules, this can be better achieved. You need to make sure that:

  1) Alignment: the allocation of student workload should match up well with learning objectives and outcomes,

  2) Balance: there should be strong evidence that the distribution of the working hours is done appropriately between the course modules,

3) Coverage: the allocation of student workload should match up well with course activities and assessments,

4) Communication: there should be strong evidence that the student workload allocation is clearly understood and communicated to students,

5) Monitoring: there should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

 The aims of the community-based activity should:

a) Contribute to the awareness-raising;

b) Promote the progressive appropriation of environmental assessment principles and integration of systematic environmental / social / economic evaluation into national policy-making;

c) Contribute to the elaboration of assessments methods that can be adapted to other countries in the region.

This clear association of theoretical learning to practical and ongoing personal and professional practice is missing in the community-based activity. It is recommended to elaborate and explain it better, so as to ensure that all interrelated disciplines are studied in terms of knowledge and research, as well as make sure to show how the activity can contribute to decision-making.

To improve the Community/service-based activity, make sure that learning goals should focus on the following:

1) Define Activity Goals, Objectives and Outcomes. The activity should clearly define clearly the goals, the purpose of community or service learning component and the expected learning outcomes. Also, the connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.
2) Meet Actual Community Needs Collaboratively. The activity should meet an actual need in the community and is coordinated through collaboration with the community.
3) Merge Theory with Practice & Course Curriculum Connection. The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. It should be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course.
4) Enhance Active Student Reflection. The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. It should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation.
5) Develop learning to give and share. The community-based or service learning activity should provide the student with the opportunity to develop learning to give

and share. It should help solve a real-life problem, meet a need or address an issue in community served.

6) Make a Difference in Community. The activity should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved.

 PLEASE INCLUDE THE SDGS RUBRIC IN ALL COURSES.

ALSO IN THE CLIMATE CHANGE ECONOMICS COURSE

SDGs RUBRIC

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS TEMPLATE

~~Course Syllabus~~

Course Number:…….

Risk Analysis in the Food Chain

Second Semester ~~2nd~~

Instructor Information

Instructor: Dr. Kamel I. Sultan
Office Location:
Telephone:
Office Hours:
E-mail: ????
Website:

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Course Identification

Course Number:
Course Name: Risk Analysis in the Food Chain
Course Location:
Class Times:
Prerequisites:
Faculty Web Page:

Course Description/Overview

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This course is intended to explain the concepts of risk analysis, risks in engineered systems, environmental risks, security risks; methods of risk analysis, fault trees and event trees; quantification of probabilities, use of data, models, and expert judgments; risks and decisions, interlinking risk analysis with risk management and applications to homeland security decisions. This course also intended to explain the food chains and the marketing and distribution of food all over the world. There will be also some explanation about the adverse effects of climate change on food chains.

Commented [NK3]: The course is addressed to risk analysis in the food chain

Course Learning Objectives

The objectives of this course are:

- Understand the food chain analysis.
- Understand the basic concepts of risk analysis and the relationship between probability theory and modelling, risk analysis, and decision analysis in the food chains.
- Understand how to interpret probability and probabilistic modelling, in the evaluation of risk
- Learn how to understand and interpret the basic tools of risk analysis - fault trees, event trees, and simulation models
- Understand the issues surrounding the use of risk analysis in decision making

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

1- Know risk types and how people interact towards ~~R~~risk.

2- Know the methods of risk analysis.

3- Assess the types of risk facing food production.

4- Know the methods of risk mitigation programmes and how farmers should interact towards risk and uncertainty problems in Food production.

5- Understand the effect of risk mitigation on food farming sustainability and security.

6- To prepare risk and uncertainty confrontation measures for sustainable food production.

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It is recommended to emphasize these so you address the CCSAFS themes.

Your modules are more likely focusing on the mathematical approach tp risk

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Course Resources

Course Website(s)

Jerash University website.

Required Course Texts and Materials

Baron, D. 2000. "The Market and Nonmarket Environments" Chap.1 in Business and the Environment, Prentice-Hall.

Covaliu Z., 2001. Decision Analysis: Concepts, Tools and Promise. Fair Isaac White Paper, USA.

Kunreuther H., S. Gupta, V. Bosetti, R. Cooke, V. Dutt, M. Ha-Duong, H. Held, J. Llanes-Regueiro, A. Patt, E. Shittu, and E.

Weber, 2014: Integrated Risk and Uncertainty Assessment of Climate Change Response Policies. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P.

Commented [NK5]: Incomplete reference. Date. Publisher…..

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Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Herron H., Bohn B., Roy S. and Evans W., 2016. Climate Change Data and Risk Assessment Methodologies for the Caribbean. Inter-American Development Bank Environmental Safeguards Unit by Tetra Tech, Inc., USA.

Kammen, D.H., and Hassenzahl, D,M. 1999. Should We Risk It? New Haven: Princeton University Press, 1999, Chapter 1. (Hereafter, KH.)

King D., Schrag D., Dadi Z., Ye Q. and Ghosh A., 2014. Climate Change a Risk Assessment. Centre for Science and Policy, UK.

Kunreuther H., 2002. "Risk Analysis and Risk Management in an Uncertain World." Risk Analysis, 22(4):655-664.

McNamee P. and John Celona J., 2008. Decision Analysis for the Professional. 4th ed., SmartOrg, Inc., USA.

Neven D., 2014. Developing sustainable food value chains: Guiding principles. FAO, Rome. Italy.

Parnell G., Bresnick T., Tani S., and Johnson E., 2013. Decision Analysis. John Wiley & Sons, Inc., Canada.

Robert T. Clemen and Terence Reilly, 2013. Making Hard Decisions with Decision Tools. 3rd Ed., South-Western, OH, USA.

Optional Course Texts and Materials

Abi-Nader, J. A., A., Harris, K., Herra, H. Eddings, D., Habib, D., Hanna, J., Paterson, C., Sutton, K., Villanuesva, L. (2009). Whole measures for community food systems: Value-based planning and evaluation. In C. F. S. Coalition (Ed.). Portland, OR.

Broad, G. (2016). More than just food: Food justice and community change. University of California Press, CA.

Fischer, R. A., Byerlee, D., & Edmeades, G.O. (2009). Can technology deliver on the yield challenge to 2050? Expert meeting on how to feed the world in 2050. Food and Agriculture Organization of the United Nations, Economic and Social Development Department. Food and Agriculture Organization. (2009). Rome Principles: World summit on food security. United Nations. Available at http://www.fao.org/fileadmin/templates/wsfs/Summit/Docs/Final_Declaration/WSFS09_D eclaration.pdf

Grantmakers in Health. (2012). Too few choices, too much junk: Connecting food & health. Issue brief no. 39. Washington, DC. Available at http://www.gih.org

Commented [NK7]: All references should be same style. If you prefer APA, please correct the references above

Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, JF., Pretty, J., Robinson, S., Thomas, S.M., & Toulmin, C. (2010). Food security: The challenge of feeding 9 billion people. Science, 327(5967), 812-818.

Gottlieb, R., & Joshi, A. (2016). Food justice. MIT Press, Cambridge, MA.

Hamm, M.W. (2009). Principles for framing a healthy food system. Journal of Hunger and Environmental Nutrition 4(3-4), 241-250.

Hamm, M. & Bellows, A. (2003). Community food security and nutrition educators. Journal of Nutrition Education and Behavior, 35, (1), 37-43.

Holben, D. H. (2002). An overview of food security and its measurement. Nutrition Today, 37(4), 156-162.

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Holt-Giménez, E., Altieri, M.A. (2013). Agroecology, food sovereignty and the new green revolution. Journal of Sustainable Agriculture. 37(1), 90-102.

Holt-Giménez, E., Shattuck, A., Altieri, M., Herren, H., Gliessman, S. (2012). We already grow enough food for 10 billion people … and still can't end hunger. Journal of Sustainable Agriculture. 36(6), 595-598.

Niewolny, K. & D'Adamo-Damery, P. (2016). Learning through story as political praxis: The role of narratives in community food work. In Sumner, J. (Ed.), Learning, food, and sustainability: Sites for resistance and change. Palgrave/Macmillan: New York

Patel, R. (2009). What does food sovereignty look like? Journal of Peasant Studies, 36(3), 663-706.

Pothukchi, K. (2007). Building community food security: Lessons from community projects: 1999-2003. In K. Siedenburg (Ed.). Venice, CA: Community Food Security Coalition.

Slocum, R. (2007). Whiteness, space and alternative food practice. Geoforum, 38, 520-533.

Stevenson, G. W., Ruhf, K., Lezberg, S., & Clancy, K. (2007). Warrior, builder, and weaver work- Strategies for changing the food system. In C. Claire Hinrichs & T. A. Lyson (Eds.), Remaking the North American food system- Strategies for sustainability (pp. 33-62). Lincoln: University of Nebraska Press.

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Assignments and Grading Scheme

Grading System

Grading Policy

Grades can be based on the following: (Example)

Assignments	40%
Exams	40%
Class attendance/participation	20%
Total Points	100

Course Policies

Late Assignments

Classroom Protocol

Students are expected to attend all classes. Students cannot pass the class under any circumstances if they miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If a student knows that he has to leave early, he should notify the instructor before class starts. All are expected to treat faculty and other students with respect. During class, students are asked not to disrupt the class. Students who violate these minimal expectations will be asked to leave. Students are expected to have read and completed the assigned material before coming to class. The instructor expects attendance and active class participation, which counts for 20% of the total grade.

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Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodation. Establishing reasonable accommodation should be considered on a case-by-case basis.

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Important Dates to Remember

Course Schedule

Week	Date	Topics
1		What is risk analysis?
2&3		Formulating decision problems
4		Statistics for Risk Analysis
5		Uncertainty and Limited Information
6		Applying decision analysis
7		Technological and climate change Risk Assessment
8		Health Risk Assessment
9		Risk Perception
10		Valuation of Risk
11		Risk Communication
		risk management
12		Terrorism Risk
13		Project Presentation
14		In-Class Final Exam

I suggest adding 2 modules: risk management
And another on risk perceptions

Course	Risk Analysis in the Food Chain
Module 1	Introduction
Key Concepts	Food chains definition and systems and Risk definition and types.
Learning Outcomes	At the end of this module students will be able to: Know the food chain systems and their work and the best economic chain in food industry and farming. Understand risk; differentiate between risk types, especially, the relevant types to food production.
Units	Food chains definition and types Risk definition Risk types Types of people according to their behavior towards risk Risk facing agriculture and food industry
Readings	Kahn B., Larson M., Norris C. and Young B., 2005.The Food Chain Instruction Plan. University of Maryland, USA. http://www.rcsnc.org/UserFiles/Servers/Server_4702937/File/lynne%20huskey/FoodChainGang.pdf ALL ABOUT FOOD CHAINS. http://mrnussbaum.com/pdfs/All%20About%20Food%20Chains.pdf Kunreuther H., 2002. "Risk Analysis and Risk Management in an Uncertain World." Risk Analysis, 22(4):655-664.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6	
~~LEARNINGGOALS~~ ECTS WORK LOAD	
SDGs	
Vision 2030	
~~Module 2~~	~~Formulating decision problems~~
Learning Outcomes	At the end of this module students will be able to: To understand the possible ways to formulate risk by mathematical functions.
Units	The decision making process . Types of decision making processes. Tools used for decision making
Readings	Kunreuther H., 2002. "Risk Analysis and Risk Management in an Uncertain World." Risk Analysis, 22(4):655-664. 7 Steps to Effective Decision Making. UMASS . Dartmout . https://www.umassd.edu/media/umassdartmouth/fycm/decision_making_process.pdf Harvey J. and Technical Information Service, 2007. Effective decision making.The Chartered Institute of Management Accountants 26 Chapter Street London SW1P 4NP United Kingdom.

Commented [NK11]: Please clarify the activity as per the guidelines sent before

	http://www.cimaglobal.com/documents/importeddocuments/40_effective_decision_making.pdf
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 LEARNINGGOALS ECTS WORK LOAD SDGs Vision 2030	
Module 3 Learning Outcomes	Statistics for Risk Analysis At the end of this module students will be able to: • To use the statistical tools to analyze different types of risks. •
Units	Prepare statistical models for inference testing. • Statistical analysis refreshment. • Statistical tools used in risk analysis. •
Readings	Risk analysis practice. Montgomery, V., 2009. New statistical methods in risk assessment by probability bounds. Department of Mathematical Sciences Durham University UK. http://maths.dur.ac.uk/stats/people/fc/thesis-VM.pdf Hult H. and Lindskog F., 2007. Mathematical Modeling and Statistical Methods for Risk Management. https://people.kth.se/~lindskog/papers/RMlecturenotes07B.pdf Embrechts P., Hofert M., 20014 Statistics and Quantitative Risk Management for Banking and Insurance. Swiss Federal Institute of Technology, Zurich, Switzerland. https://people.math.ethz.ch/~embrecht/ftp/qrm_stat_review.pdf Strand R. and Oughton D., 2009. Risk and Uncertainty - as a Research Ethics Challenge. National Committees for Research Ethics in Norway. https://www.etikkom.no/globalassets/documents/publikasjoner-som-pdf/risk-and-uncertainty-2009.pdf
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual homework of risk staiscal analysis of an actual field of agriculture production.
10Cs/6 LEARNINGGOALS ECTS WORK LOAD SDGs Vision 2030	
Module 4 Learning Outcomes	Applying decision analysis At the end of this module students will be able to: • To know the how analyze risk decision especially risk related to climate change and agricultural production in all types of farming (the plant and the animal production) . • The decision analysis methods.
Units	• The application of decision analysis in food chain. • Decision makers types and attitude towards risk. • Tools for decision analysis and application.

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	Decision quantification. Decision Process Capability Building.
Readings	McNamee P. and John Celona J., 2008. Decision Analysis for the Professional. 4th ed., SmartOrg, Inc., USA. Chap 5. Robert T. Clemen and Terence Reilly, 2013. Making Hard Decisions with DecisionTools. 3rd Ed., South-Western, OH, USA.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 LEARNINGGOALS ECTS WORK LOAD SDGs Vision 2030	
Module 5	Technological and climate change Risk Assessment
Learning Outcomes	At the end of this module students will be able to: Assess the climate change risk Assess technological risk
Units	Technological Risk Assessment Climate Change Risk Assessment.
Readings	Bertule M., Appelquist L., Jason Spensley J., Trærup S. and Naswa P.. YEAR Climate Change Adaptation Technologies for Water a Practitioner's Guide to Adaptation Technologies for Increased Water Sector Resilience. UNEnvironment - DHI Centre on Water and Environment, Climate Technology Centre and Network (CTCN) and the UNEP DTU Partnership. UN. Smith J., O'Grady M., Surbaugh H., Ray A., Duckworth M. and Meernik T., 2014. Technologies to Support Climate Change Adaptation in Developing Asia. Asian Development Bank, Mandaluyong City, Philippines.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
Module 6	Health Risk Assessment
Learning Outcomes	At the end of this module students will be able to: Assess risk in health sector. Propose several programs to mitigate risk associated with climate change.
Units	Types of possible health risks associated with climate change Programmes prepared to mitigate the associated climate change health hazards
Readings	Davis G., Hickox W. and Denton J., 2012. A Guide to Health Risk Assessment. California Environmental Protection Agency Office of Environmental Health Hazard Assessment, Sacramento, CA, USA. WHO, 2012.Human Health Risk Assessment Strategic Research Action Plan 2012 - 2016. U.S. Office of Research and Development Human Health Risk Assessment Environmental Protection Agency. Priestly B. and Ong J., Environmental Health Risk Assessment. enHealth. Australia.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content.

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Commented [NK17]: Why health risk?

No need. You should replace this with a module on risk in the food chain that should be place after module 1 (introduction)

Unit 1. Risk Analysis in food chain
Unit 2. Food safety environment
Unit 3. Components of risk analysis

Readings that you can use:
Assuring Food Safety and Quality
http://www.fao.org/3/a-y8705e.pdf

Scientific Criteria to Ensure Safe Food (2003)
https://www.nap.edu/catalog/10690/scientific-criteria-to-ensure-safe-food

Commented [NK18]: New types of activities are recommended

	4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 LEARNINGGOALS	
ECTS WORK LOAD	
SDGs	
Vision 2030	
Module 7	Valuation of Risk
Learning Outcomes	At the end of this module students will be able to: 1) Quantify risk assessment. 2) Use probability to make the decision to avoid risk. 3) Using risk quantification and valuation to mitigate risk associated with climate adverse conditions
Units	Steps followed to value risk. The possible process of risk evaluation. Quantifying risk probability.
Readings	Cisneros-Molina M., 2006. Mathematical Methods for Valuation and Risk Assessment of Investment Projects and Real Options. PhD thesis, Oriel College, University of Oxford. https://core.ac.uk/download/pdf/97052.pdf
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 LEARNINGGOALS	
ECTS WORK LOAD	
SDGs	
Vision 2030	

Commented [NK19]: You need to design a community based / service learning activity.

Please refer to comments at the end of the document

The workload of Risk Analysis in the Food Chain 10 ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules							Workload
				1	2	3	4	5	6	7	
Lectures (face-to-face)	10	3	30	6	5	5	6	4	4	4	30
Online	3	3	9	1	-	2	2	1	3	1	9
Lab work	4	2	8	-	-	3	3	2	-	2	8
Reading articles (3 pages per hour)	150	0.3	45	6	8	7	7	8	9	8	45
Reading book chapters (5 per/h)	140	0.2	28	4	3	6	5	5	5	3	28

Preparing course activities	5	15	75	10	15	20	20	10	-		75
Project work	1	20	20					5	15		20
Preparation for exam	1	50	50					20	30		50
Writing the exam	2	1.5	3						3		3
Total			268	30	40	40	55	50	77		268

General Comments

1- The course description / overview should be re-written to match the course objectives and learning outcomes

2- There is clear evidence in the course description and concepts that the course is designed using a set of methodologies including: probability theory and modelling, risk analysis, and decision analysis, probability and probabilistic modelling, simulation models. Even in the suggested readings, the emphasis is rather on the mathematical side of risk analysis than on the field of risk analysis in the food chain in such a way to progress the student learning to understand types of risk in the food chain, risk perceptions, and to differentiate between risk analysis, risk management and risk communication.

3- If the course instructor has expertise on the mathematical approach to risk analysis, this would be a plus to work on this aspect. However, I suggest that the course instructor develops more critical thinking in the students to approach this topic of risk analysis in the food chain from a more holistic perspective- not only mathematical modelling What are the opportunities presented by this area? What are the possible threats? What is happening at a local level? Are there good examples from a global level of how food security can be managed? What are the main theories underpinning risk analysis, risk management and risk communication?

4- I suggest including a module on risk perceptions. There is a wide literature on this topic and I believe it should be included in this course. I also suggest another module on risk management. It would be great to see greater evidence of more in-depth and reasoned debate as part of the risk analysis process, especially that this course is designed at the Master level. There are possibilities presented throughout the modules. However, this needs to be more closely linked to the Learning Outcomes that should reflect critical thinking, problem solving and deeper learning.

5- Two of the course objectives are not addressed in the modules of the course. It is recommended to emphasize these so you address the CCSAFS themes. These are objectives (4) and (5).

Objective 4-Know the methods of risk mitigation programmes and how farmers should interact towards risk and uncertainty problems in Food production.
Objective 5-Understand the effect of risk mitigation on food farming sustainability and security.

6- Module 6 on Health Risk Assessment. Why health risk? No need for this module unless the readings and activities link the health risks to food security- and this is not clear in the module. I believe the focus should be on risk in the food chain, and such a topic is preferably placed after module 1 (introduction). It includes units as below:

Unit 1. Risk Analysis in food chain
Unit 2. Food safety environment
Unit 3. Components of risk analysis

And,

Readings that you can use:

Assuring Food Safety and Quality
http://www.fao.org/3/a-y8705e.pdf
Scientific Criteria to Ensure Safe Food (2003)
https://www.nap.edu/catalog/10690/scientific-criteria-to-ensure-safe-food

7- In a nutshell, the course aims to examine the main themes of risk analysis in the food chain. The main contents should be linked with some of the most relevant economic and environmental issues of sustainable development and climate change. This link should be addressed in a way transferable cognitive skills and attitudes (responsibility awareness, critical thinking, etc.). Also, the link could be emphasized through teaching methodology and class activities, which should be explained more in detail, considering the role of the student-centered approach and the importance of participatory learning strategies (see note 8 below for more information regarding the activities)

8- Both the course activities and the Community-Based / Service Learning Activity need to be more elaborate. Please take the following points into consideration to improve the activities in all your modules:

a) The activity needs to be more elaborate. You should define the goals of the activity, its objectives and learning outcomes. Also, you need to connect academic achievement, civic engagement, and personal growth supporting transformative learning to the activity goals and learning outcomes.

b) The activity should meet an actual need in the community and is coordinated through collaboration with the community.

c) The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. It should be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong

connection to the whole course in a way to merge theory with practice & course curriculum.

d) A well-designed activity should challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. It should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation.

e) The community-based activity should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in community served.

f) The activity should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved.

9- ALL your modules should add the following:

10Cs/6 LEARNINGGOALS
ECTS WORK LOAD
SDGs
Vision 2030

10- All references should follow same style. Some references are not complete.

11- Some sections in the syllabus (class policies, classroom protocol, and disability) are missing. I added suggestions above in the corresponding sections

12- Please include at the end of the course the table on SDGs- as I sent to you after the Cairo meeting (SDG rubric).



CCSAFS COURSE SYLLABUS ~~TEMPLATE~~

~~Course Syllabus~~

Course Number:…….

Small Scale Farming, Indigenous Knowledge and Local Food Supply
Semester 1st

Instructor Information

Instructor: Dr. Kamel I. Sultan
Office Location: Office 407, Faculty of Agriculture
Telephone: 00962795009498
Office Hours: 12.00-14.00 Sun & Tus
E-mail: k_sultan54@yahoo.ca
- kamel.isultan@jpu.edu.jo
Website: http://www.jpu.edu.jo/jpu

Course Identification

Course Number: ……
Course Name:- Small Scale Farming, Indigenous Knowledge and Local Food Supply
Course Location:
Class Times:
Prerequisites:
Faculty Web Page:

Course Description/Overview

This course will explain the small sustainable farming systems, and their effects in mitigating the effect of climate change impacts, with building the farmers capacities in their specialisation. The small farms can keep up– to– date knowledge in their fields. So students will learn how to keep these farms running in the expected bad effects of climate change.

This course aims to provide an understanding of the fundamentals that apply to starting and managing a small farm business. Students will examine the basics of traditional and organic farming systems and learn about resources and strategies to get

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started and manage a small farm business. The information gained in this course prepares students to explore indigenous knowledge and local food supply chains from a holistic perspective.

Course Learning Objectives

- To gain knowledge of the practical aspects of whole farm planning for a wide variety of enterprises.
- To gain an understanding of the various components of sustainable small-scale farming systems
- To gain skills in assessing the feasibility of developing a viable, sustainable, small-scale farming enterprise including how to evaluate personal and family goals, evaluate land and personal resources, and improve environmental outcomes.
- To learn about available resources and support networks for sustainable farming.
- To develop a whole farm plan that meets social, environmental, and financial goals.

Course Content Learning Outcomes

Upon successful completion of this course, students will be able to:

1- ~~Know~~ Earn knowledge about the principle of small farming and its effect on the sustainability of food production and human welfare.

2- Know~~ledge~~ about the systems used in sustainable food production with small farming.

3- Make decisions about ~~How~~ efficient allocation of scarc~~es~~ resources ~~will be efficiently allocated~~ to meet growing food demand using sustainable and safe food production methods.

4- ~~To know~~ Understand how sustainable food production can be done using environmental safe systems of production.

5- Practice soil preservation systems to sustain food production.

6- Examine ~~H~~how marketing food channels can achieve food security.

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Course Resources

Course Website(s)

Required Course Texts and Materials

Lynn Byczynski, 2013. Market Farming Succe~~ss~~ : The Business of Growing and Selling Local Food, 2nd Editon. Chelsea Green Publishing.

Elliot Coleman, 1995. The New Organic Grow~~e~~r : A Master's Manual of Tools and Techniques for the Home and Market Gardener, 2nd Edition. Chelsea Green Publishing.

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Additional resources and reading materials provided in class

Optional Course Texts and Materials

Marzin J., Bonnet P., Bessaoud O. and Ton-Nu C.,.,2016. Study on Small-Scale Family Farming in the Near east and North Africa Region. FaaAO. Rome, Italy. http://www.fao.org/3/b-i6436e.pdf

Hughes M., Granger K, Hashley J.and Owens C., 2010.How to Begin your Small Farm Dream. Agriculture, Food and Environment Program, Boston, USA.

Agricultural Sustainability Institute. 2013. Farm to Institution. Davis, CA: University of California, Davis. asi.ucdavis.edu/sarep/sfs/ftoi

Alkon, Allison Hope, and Julian Agyeman. (2011). Introduction: The food movement as polyculture. In A. H. Alkon & J. Agyeman (Eds.), Cultivating Food Justice: Race, Class, and Sustainability (pp. 1-20). Cambridge, MA: MIT Press.

Allen, Patricia. 2004. Together at the Table: Sustainability and Sustenance in the American Agrifood System. University Park: Pennsylvania State Press.

American Farmland Trust. 2013. American Farmland Trust. http://www.farmland.org/

Applied Research Center (2012) About Us. www.arc.org/content/blogsection/4/200/

Cochrane, Willard W. 1993. The Development of American Agriculture: A Historical Analysis. Minneapolis, MN: University of Minnesota Press.

Community Alliance with Family Farmers. 2013. Programs. http://caff.org/programs/

Community Food Security Coalition. 2013. What is Community Food Security? foodsecurity.org/what-iscommunity-food-security/

Danbom, David B. 1979. The Resisted Revolution: Urban American and the Industrialization of Agriculture, 1900-1930. Ames, IA: The Iowa State University Press.

http://extension.wsu.edu/skagit/wp-content/uploads/sites/29/2014/09/Market-Garden-Whole-Farm-Plan.pdf

http://extension.wsu.edu/skagit/wp-content/uploads/sites/29/2014/09/Mushrooms-Whole-Farm-Plan.pdf

http://extension.wsu.edu/skagit/wp-content/uploads/sites/29/2014/09/Raspberry-Whole-Farm-Plan.pdf

http://extension.wsu.edu/skagit/wp-content/uploads/sites/29/2014/09/Raw-Milk-Dairy-Whole-Farm-Plan.pdf

http://extension.wsu.edu/skagit/wp-content/uploads/sites/29/2014/09/Sustainable-Agriculture_-An-Introduction.pdf

Web resourcees

http://agr.wa.gov/FoodAnimal/Organic/#CertificationServices

http://smallfarms.wsu.edu/

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

http://www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateO&navID=ViewU.S.TerminalMarketPriceReports&rightNav1=ViewU.S.TerminalMarketPriceReports&topNav&leftNav&page=FVMarketNewsTerminalMarketReportsMorehttp://agr.wa.gov/foodanimal/organic/

http://www.marketfarm.com/

http://www.charliesproduce.com/

"Fresh Produce Facts" at http://postharvest.ucdavis.edu/post harvest Agriculture Handbook Number 66

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https://pubs.wsu.edu/ http://www.tractorhouse.com/
WSU WSU Organic Ag

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Assignments and Grading Scheme

Grading System

Grading Policy

Grades can be based on the following: (Example)

Assignments	40%
Exams	40%
Class attendance/participation	20%
Total Points	100

Course Policies

Students are expected to attend all classes. Students cannot pass the class under any circumstances if they miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If a student knows that he has to leave early, he should notify the instructor before class starts. All are expected to treat faculty and other students with respect. During class, students are asked not to disrupt the class. Students who violate these minimal expectations will be asked to leave. Students are expected to have read and completed the assigned material before coming to class. The instructor expects attendance and active class participation, which counts for 20% of the total grade.

Late Assignments

Late assignments will not be accepted ~~and dealing with it as if it was not accomplished~~ unless the student presented an accepted excuse for the delay.

Classroom Protocol

Attendance is needed for all the lectures unless there is an uergent absence with an accepted excuse.

Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodation. Establishing reasonable accommodation should be considered on a case-by-case basis.

Important Dates to Remember

Course Schedule

Week	Date	Topics
1		Small farming and Sustainability Concepts
2 & 3		Developing the whole farm plan

4		Evaluation of Resources & Enterprise Assessment
5 & 6		Sustainable Crop Production
7		Basics of Ecological Soil Management
8 &9		Integrated Pest and Weed Management
10		Sustainable Livestock and Poultry & Grazing Management on Small Acreages
11		Equipment and Facilities
12		Marketing Strategies and enterprise budgets
13		~~Tools for success and prep for presentations~~Implementation of applied small farming
14		Presentations

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Course modules	Small Scale Farming, Indigenous Knowledge and Local Food Supply
Module 1	Science of Small Scale Farming
Key Concepts	Small scale farm concept, Climate Change, Sustainability
Overview	This module provides a general overview of Small farming concept ~~and climate change impacts~~, highlighting the current state of knowledge and ~~remaining~~ uncertainties about climate change and agricultural sustainability development~~s~~.
Aim	The overriding aim of this module is to turn students able to understand the following: 1. ~~Introduce the students to~~ The small farming concept. 2. ~~Provide a basic understanding of t~~The global trends of greenhouse gases and pollution. 3. ~~Provide students with c~~Climate change mitigation methods using small farming concepts.
Learning Outcomes	At the end of this module students will be able to: □ Gain a general understanding of the issues of Climate Change and Sustainable Development. □ Understand and critically assess the concepts of climate change and sustainability.
Units	1- Impacts of climate change. 2- Climate change damages. 3- Economic approach to value climate change damages. 4- Aggregating climate change damages. 5- Greenhouse Gas Cycles. 6- Sustainable Development.
Readings	1. Archer, 2017. "The Perturbed Carbon Cycle." In Global Warming: Understanding the Forecast 2nd Edition ~~1.~~2. Schneider, "What Is 'Dangerous' Climate Change?". ~~2.~~ Forster et al., 2006. "Changes in Atmospheric Constituents and in Radiative Forcing." Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 3. ~~Kolbert, "The Curse of Akkad."~~ 4. Surowiecki, 2007. ~~"~~"Better and Better: The Myth of Inevitable Progress. Foreign Affairs. NY, USA.~~"~~ 5. Funk C. and Brian Kennedy B., ~~Pew,~~2016. "The Causes of

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	Global Climate Change." Pew Research Center, Science and Society, NY, USA.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. This paper will express students reaction towards the subjects needed for this course
10Cs/6	Character Education, Communication
LEARNINGGOALS	
ECTS WORK LOAD	30
SDGs	1, 2, 3, 6, 8, 11, 12, 15, 16
Vision 2030	National Economy and Domestic Product Growth, Sustainable Development and Developing Qualified Human Resources
Module 2	Developing the whole farm plan and Evaluation of Resources and Enterprise Assessment
Key Concepts	The farm scale, optimum farm size and the feasibility study of the farm using available resources management. Planning the farm project.
Overview	This module will give the students an idea about the economics of farm size and the optimum farm size for the economic production of agricultural products
Aim	The main aim of this module is to make comparison according to the size of the farm and to choose the optimal scale for production and to compare it with the available small scale farms in the area.
Learning Outcomes	At the end of this module, students will be able to make comparisons among farms according to their scale and to choose the feasible optimum farm size and compare with the benefits of sustainability in food production.
Units	1) Farm size and relation to sustainability of agricultural production. 2) Feasibility study of farms. 3) Planning of farm in plant production. 4) Planning farms of Animal production.
Readings	Stott D., Lee E. and Nichols E., 2014. Feasibility Study of Small/Medium Farm Product Distribution System In the Lower Mainland. http://www.farmfolkcityfolk.ca/PDFs_&_Docs/Distribution/Report%206_Small_Medium%20Farm%20Product%20Distribution%20System%20Development.pdf

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	Feasibility Study Rural Household Biogas & Conservation Tillage CDM Project Development. http://www.un-csam.org/publication/CDMFinalReport.pdf Saša Slijepčevid Amela Dosovid - Medid, 2011. Goat Farm Feasibility Study; Sustainable Business and Inclusive Markets. www.ba.undp.org/content/dam/bosnia.../BiH_Goat-Farm-Feasibility-Study.pdf Feasibility Study on Priority Projects and Programs. http://open_jicareport.jica.go.jp/pdf/11752524_02.pdf FAO, 2005. Guidelines for the Design of Agricultural IY Projects. http://www.fao.org/3/a-v4810e.pdf Jordan Investment Commission, 2017. Pre-Feasibility Study Establishing a Cut Flowers Farm Madaba. https://jic.gov.jo/esfwebadmin/upload/%D8%A7%D9%84%D8%AE%D8%A7%D8%B1%D8%B7%D8%A9%20%D8%A7%D9%84%D8%A7%D8%B3%D8%AA%D8%AB%D9%85%D8%A7%D8%B1%D9%8A%D8%A9%201/A%20Cut%20Flowers%20Farm-%20Madaba.pdf
Activity	Students will be asked to prepare the following: □ Farm plan. □ A feasibility study of a small farm. □ Compare the feasibility and sustainability measures.
10Cs/6 LEARNINGGOALS	Character Education, Citizenship, Critical Thinking, Creativity
ECTS WORK LOAD	40
SDGs	1, 2, 32, 6, 8, 11, 16
Vision 2030	Service and Infrastructure, Sustainable development, Developing Qualified Human Resources
Module 3	Sustainable Crop Production, Sustainable Livestock and Poultry, and Grazing Management on Small Acreages
Key Concepts	Sustainable, agriculture, soils, agriculture approaches, sustainable animal production and grazing management.
Overview	This module will provide an overview of sustainable agriculture. It will focus on the sustainability of food production at multiple levels: farm resources, community, regional, national and global. Students will gain basic understanding of the environmental problems caused by conventional agriculture/horticulture and understand the challenges to alternative forms of sustainable agriculture.
Aim	~~Objectives~~ Upon completion of this course, students should be able to: 1. Use critical reading skills to guide interpretation of articles. 2. Identify the key principles of sustainable agriculture and ecology; 3. Describe several different models of sustainable agriculture systems. 4. Identify potential career opportunities in sustainable agriculture. 5. Design an agriculture system that incorporates key ecological principles and sustainable management practices
Learning Outcomes	At the end of this module students will be able to: 1. Learn how issues at various levels--farm, community, regional, national and global-- influence agriculture sustainability and future

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	food supply. 2. Learn to think critically about where their food comes from, and be able to analyse the environmental, economic, and social costs and benefits involved in delivering food from farm to market. 3. Gain knowledge about the pros and cons to global trade, and what forms of sustainable agriculture will best suit the needs of a growing global population.
Units	1. What is sustainability, What is agriculture? 2. Features of agriculture: sustainable and unsustainable. 3. Soils and Sustainability. 4. Water and Sustainability 5. Cropping systems, Livestock systems. 6. "Alternative" agriculture approaches. 7. Issues in sustainable agriculture. 8. Economic Dimensions of Farm Sustainability.
Readings	1. Lichtfouse, E., Navarrete, M., Debaeke, P., Véronique, S., Alberola, C. 2009, Sustainable Agriculture. 2. UNDP, 2012. Chapter 5: Sustainable Agriculture, https://www.cbd.int/financial/finplanning/g-plantools5-undp.pdf. 3. OSU Extension Small Farms, An Introduction Sustainable Farming. http://extension.oregonstate.edu/sorec/sites/default/files/Sustainable_Farming.pdf. 4. Jules Pretty, 2007. Agricultural sustainability: concepts, principles and evidence, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2610163/. 5. Fritz J. Häni, László Pintér and Hans R. Herren,2006, Sustainable Agriculture: From Common Principles to Common Practice, International Forum on Assessing Sustainability in Agriculture (INFASA), https://www.iisd.org/pdf/2007/infasa_common_principles.pdf.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 LEARNINGGOALS	Character Education, Citizenship, Communication
ECTS WORK LOAD	40
SDGs	1, 2, 6, 8, 12, 16
Vision 2030	Constructive change and Building Support System, Surface and Infrastructure,
Module 4	Equipment and Facilities
Key Concepts	Ploughing equipment, Irrigation Equipment, Pumps, Green houses equipment, Aquatic production equipment
Overview	This module allows students to know about the environmentally

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	friendly equipment used in modern agriculture to produce with more water usage efficiency and higher productivity efficiency.
Aim	At the end of this module students are aware of the following: 1. Know the suitable equipment used in sustainable vegetable production. 2. Know the animal production facilities for sustainable small farm production.
Learning Outcomes	At the end of this module students are able to do the following: 1. ~~Able to d~~Design the suitable farming system will be used in small farming production. 2. ~~Able to u~~Use this equipment in both crop and animal production at the small scale farming. 3. ~~Able to a~~Adapt and incorporate the modern technologies in small farming.
Units	1. Environmentally safe ploughing equipment. 2. Modern vegetable production system used in small farms. 3. Modern systems and equipment used in small animal farms.
Readings	Small Farm Equipment for Developing Countries. http://books.irri.org/971104157X_content.pdf FFTC annual report, 2012. Small farm mechanization systems development, adoption and utilization. http://en.fftc.org.tw/htmlarea_file/library/20110726133001/ac2005c.pdf Sims B. and Kienzle J., 2006. Farm power and mechanization for small farms in sub-Saharan Africa. Agricultural and Food Engineering Technical Report, FAO. https://vtechworks.lib.vt.edu/bitstream/handle/10919/68476/4239_a0651e00.pdf?sequence=1. Matthewson M., Powell M., Andrews N., Ellen G., Tipping D., Franklin T., Elkovich S., 2010. Designing a Whole Farm System: Whole Farming Principles and Strategies. Oregon State University Extension Small Farms. http://extension.oregonstate.edu/sorec/sites/default/files/designing_a_whole_farm_system_manual.pdf
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. The students will also be asked to write summaries new published papers about the subjects on the lectures content. 3. At the end of this module students will submit an individual farm equipment design paper.
~~10Cs/6 LEARNINGGOALS~~	Character Building, Critical Thinking, Collaboration, Creativity
~~ECTS WORK LOAD~~	55
~~SDGs~~	~~1, 2, 4, 5, 6, 7, 8, 9, 10, 13, 16, 17~~
~~Vision 2030~~	~~Care, Compassion, Courage, Commitment~~
Module 5	Food Security.
Key Concepts	Production, Safety, Security, climate change.
Overview	This module will provide students for an overview of food security. The module looks at food production at multiple levels: farm

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	resources, community, regional, national and global. Students will gain basic understanding of the environmental problems caused by conventional agriculture/horticulture and understand the challenges of alternative forms of sustainable agriculture.
Aim	Objectives Upon completion of this course, students should be able to: 1. Understand ways of adapting to climate change and managing the environment keeping in mind food security and sustainability. 2. ~~To~~ ~~Understand~~Understand the concept of food security and issues related to small scale farming and indigenous knowledge to ~~achieve~~achieve~~in achieving~~ it.
Learning Outcomes	At the end of this module students will be able to: 1. Understand~~s~~ the production of food resources, their ecological problems, factors of nutritive policy, food safety and nutritive policy. 2. Identify the inter-relationship between climate change, environment, food security and sustainability at global and regional level.
Units	1. Food production. 2. Accessibility of food resources. 3. Food distribution. 4. Food safety. 5. Policy, economic and social aspect of food.
Readings	1. Beddington J., Asaduzzaman M., Cndez A., Guillou M., Jahn M., Erda L., Mamo T., Van Bo N., Nobre C.A., Scholes R., Sharma R. andWakhungu J. (2012)Achieving Food Security in the Face of Climate Change: Final Report from the Commission on Sustainable Agriculture and Climate Change. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark, Available online at: www.ccafs.cgiar.org/commission. 2. National Research Council (2012). Sustainability Challenge: Food Security for All, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc. 3. Food Insecurity Atlas of Rural India (2001) MS Swaminathan Research Foundation and World Food Programme. http://home.wfp.org/stellent/groups/public/documents/ena/wfp076968.pdf 4. National Research Council (2012). Sustainability Challenge: Food Security for All, Report of Two Workshops. Washington, DC: The National Academies Press. http://www.nap.edu/catalog.php?record_id=13378#toc
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content.

	4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 LEARNINGGOALS	Citizenship, Communication, Critical Thinking, Creativity
ECTS WORK LOAD	50
SDGs	1, 2, 3, 8, 9, 10, 11, 12, 13, 16,
Vision 2030	Constructing Change and Building Support System, National Economy and domestic Product Growth, Health Society Welfare
Module 6	Marketing Strategies and enterprise budgets
Key Concepts	Marketing, marketing rings, marketing strategies, enterprise budgeting
Overview	This module will explain the possible marketing strategies of farm products to overcome the environmental worse conditions and how to use the suitable marketing chain to distribute safe food products.
Aim	Upon completion of this course, students should be able to: 1. Design the suitable strategy will be used in marketing small farm safe food products. 2. Think of the alternatives to be used in small farm food products marketing.
Learning Outcomes	Upon finishing this module students will have the following knowledge: 1. The different strategies used in food chain marketing. 2. The designing of the suitable marketing procedure for the small farm food products
Units	1) Marketing rings of food products. 2) Marketing strategies of food products. 3) Firms and farms budgets. 4) Cost benefit analysis of farms.
Readings	Marketing Strategies for Farmers and Ranchers. Sustainable. Agriculture Network (SAN), Sustainable Agriculture Network. https://www.sare.org/content/.../Marketing_Strategies_for_Farmers_and_Ranchers.pdf Yeager I., 2013. Marketing Strategies for Small Scale Producers. Utah State University. https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1260&context=gradreports Kima M., Curtis b K. and Yeager I., 2014. An Assessment of Market Strategies for Small-Scale Produce Growers. International Food and Agribusiness Management Review (17): 187-207. https://www.ifama.org/resources/Documents/v17i3/Kim-Curtis-Yeager.pdf
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. 3. The students will also be asked to write summaries on the lectures content. 4. The students will be asked to report a small farm in the area. 5. 4. The students will submit an individual abstract of a paper about the explained subjects .

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Commented [NK10]: The community-based activity needs to be redesigned - see comments below.

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10Cs/6 LEARNINGGOALS	Character Education, Citizenship, Communication, Critical Thinking, Creativity
ECTS WORK LOAD	77
SDGs	2, 6, 7, 8, 9, 11, 12, 16, 17
Vision 2030	Constructing Change and Building Support System, National Economy and domestic Product Growth, Health Society Welfare

The workload of Risk Analysis in the Food Chain 10 ECTS Workload Allocation

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	10	3	30	5	5	5	5	5	5	30
Online	3	3	9	1	-	2	2	2	2	9
Lab work	4	2	8	-	-	2	2	2	2	8
Reading articles (3 pages per hour)	150	0.3	45	6	7	6	6	10	10	45
Reading book chapters (5 per/h)	140	0.2	28	4	4	5	5	5	5	28
Preparing course activities	5	15	75	10	15	20	20	10	-	75
Project work	1	20	20				3	5	12	20
Preparation for exam	1	50	50				10	15	25	50
Writing the exam	2	1.5	3						3	3
Total			268	30	40	40	55	50	77	268

	SDGs	CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere		X	X	1,2, 3, 4, 5
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture		X	X	1,2, 3, 4, 5, 6
3	Ensure healthy lives and promote well-being for all at all ages	X	X	X	1, 2, 5
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all		X	X	4
5	Achieve gender equality and empower all women and girls		X	X	4

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6	Ensure availability and sustainable management of water and sanitation for all	X	X	X	1, 2, 3, 4, 6
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				4, 6
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all		X	X	1, 2, 3, 4, 5, 6
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation		X	X	4, 5, 6
10	Reduce inequality within and among countries		X	X	4, 5
11	Make cities and human settlements inclusive, safe, resilient, and sustainable	X	X	X	1, 2, 5, 6
12	Ensure sustainable consumption and production patterns		X	X	1, 3, 5, 6
13	Take urgent action to combat climate change and its impacts				4, 5
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss	X	X	X	1, 2
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions on all levels		X	X	1,2, 3, 4, 5, 6
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				4, 6

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GENERAL COMMENTS

The course objectives and learning outcomes need more focus on critical thinking, problem-solving and decision-making skills, active and participatory tasks (e.g. case study, project-based learning tasks), etc. The objectives are focused on the achievement of concepts and skills related to small scale faming. However, the achievement of other skills (cognitive, psychological, and social skills) such as life-

learning skills, transferable skills, active participation in the community, responsible citizenship- is not highlighted in the course. It is suggested to emphasize these ESD skills in the objectives and learning outcomes.

The use of case studies and field visits are important to bring together these skills, and they should be emphasized from a sustainability perspective in order to show how disciplinary concepts can be blended meaningfully. The readings should reflect how disciplinary concepts can be blended in a pedagogical way.

Module activities should be more structured in a way that addresses the issues of: climate change, food security, and sustainable agriculture. It is important to stress the main themes in the course title: local food supply and indigenous knowledge. The teaching methodology is centered on transmitting contents. It is recommended to incorporate well designed activities in the modules in order to enhance the active role of students and encourage critical thinking and problem-solving skills.

Activities can be designed in a better way in order to link theory with practice, considering local community. It is significant to connect academic achievement, civic engagement, and personal growth and provide students with new knowledge and skills that they apply in real life situations. The community-based activity needs to be better designed.

a) You should define the goals of the activity, its objectives and learning outcomes. Also, the activity should emphasize transformative learning.

b) The activity should be coordinated through collaboration with the community to meet an actual community need.

c) The activity be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course in a way to merge theory with practice.

d) The activity should challenge students to make meaning of their community service experience, and provide them with an opportunity to reflect upon their own learning and their societal role.

e) The community-based activity should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in the community served.

f) The activity should include specific actions that empower students to make a difference in the community.

Add the following in the modules

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10Cs/6 LEARNINGGOALS
ECTS WORK LOAD
SDGs
Vision 2030

Include the SDG table to show which SDG is addressed in the different modules.

Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc

SDGs		CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions on all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS

Jerash University

~~Course Syllabus~~

Course Number (604726)

Course Title

Sustainability Justice and Food Security

Fall Semester 2018/2019

Instructor Information

Instructor: Dr. Ebraheem Altahat
Office Location: Faculty of Agriculture Building
Telephone: 0096226350521
Office Hours:.
E-mail: tahat1972@gmail.com
Website: http://www.jpu.edu.jo/jpu/profile.php?id=50

Course Number: 604726
Course Name: Sustainability of Justice and Food Security
Course Location: Faculty of Agriculture
Class Times: Not Now
Prerequisites: Food Security (603374).
Faculty Web Page:http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

Commented [NK1]:

Should be re-written with more focus on the concept of sustainability justice and food security.

Please refer to the course modules that Prof. Makrakis has developed and you can have a better course description

Also, check the suggested description I have developed. See my track changes at the end of this section

This course engages students in a wide ranging exploration of the theories, practices, and opportunities for enhancing sustainability justice and ffFood security ~~in the domains of public policy and urban planning~~. The course will be a forum for students to draw on their work experiences and educational experiences to more fully understand, articulate, and advocate for sustainability ~~of~~ justice and ~~f~~Food ~~security in policy and planning~~. Th~~e~~is course utilizes an interdisciplinary approach to understand how fields such as psychology, sociology, public health, and urban studies conceive

of issues related to sustainability of justice and ~~f~~Food security (i.e., housing, built environment, and community spaces), social justice, and practical solutions that exist within policy and planning to achieve ~~the~~ food security.

This seminar explores the concept of sustainability and the role of law in achieving it. Using sustainability challenges such as climate change, biodiversity conservation, forestry, ecological services, toxics and water, students will discuss the various dimensions of sustainability and the institutional tools for implementing sustainability policies. Students will explore the evolution of the concept of sustainable development in international law and policy, and its relationship to international principles such as the precautionary, polluter pays and intergenerational equity principles.

Students will explore sustainability-related issues such as social justice, poverty, equity, implications of multilateral trade and investment rules, corporate social responsibility, sustainable agriculture, economic instruments, the precautionary principle, sustainability assessment, the role of science and evidence, international wildlife trade, and governance, with an emphasis on the role of law and policy. The seminar will feature a number of guest lectures to provide a multiplicity of perspectives

COURSE DESCRIPTION

Commented [NK2]: My suggestion

Social justice is a concept that is well-discussed in curricula. Sustainability justice is a rather new concept that, in addition to social justice, integrates environmental, economic and cultural justice. Most people usually have a basic understanding of Sustainability and Sustainable Development (SD). The concept of "sustainability justice", as it has been conceptualised in this course, reflects the four pillars of sustainable development: environment, society, economy and culture. The course explores the need and importance of the concept of sustainability justice and its constituencies, and aims to bridge the gap between the academic discourse and the mainstream discourse by engaging students to reflect on the ethical and political implications of food and agricultural practices in relation to sustainability justice, with special attention to climate change.

The course addresses the development of sustainable solutions towards sustainable-just food security, using systems thinking approaches. The course explores the Community food security (CFS) as a relatively new movement that promotes food security strategies within a region or community's food system. Using case studies that examine a number of community-based sustainable farming, the course promotes sustainability justice and greater equality to reduce poverty and hunger, prepare families to assume responsibility for ethical eating and revive the cultural values of solidarity. The course will use case studies to convey ways to strengthen ties to the regional economy, support local businesses, offer new entrepreneurial opportunities, and engage residents as well as local/state governments in seeking solutions to food insecurity and healthy food choices.

Course Learning Objectives:

1. Understand the relationship between sustainability justice and Food security
2. Identify emerging approaches to addressing injustices in urban planning
3. Assess the role of public policy in urban spaces to the Food security
4. Develop practical solutions to issues related to housing, the design of cities, and inequities in public policy that affect the Food security
5. Gain an interdisciplinary understanding for the relationship between social justice and sustainability to achieve the Food security
6. Apply key theories, concepts, and emerging strategies toward Food security
7. Reflect on your personal and professional experiences as they related to sustainability justice and Food security

8. End hunger, achieve , food, security and improved nutrition and promote sustainable agriculture
9. Ensure healthy lives and promote well-being for all at all ages
10. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
11. Achieve gender equality and empower all women and girls
12. Reduce inequality within and among countries
13. Make cities and human settlements inclusive, safe, resilient and sustainable
14. Ensure sustainable consumption and production patterns
15. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
16. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Commented [NK3]: See my suggestions below… your objectives are not focused and they do not match the modules.

Commented [NK4]: How does this relate to the course?

COURSE LEARNING OBJECTIVES

1. To understand the need and importance of the concept of sustainability justice and its constituencies
2. To engage students to reflect on the ethical and political implications of food and agricultural practices in relation to sustainability justice, with special attention to climate change
3. To allow students to begin to visualize the complex nature and interrelations of Food Security & Sustainability Justice.
4. To address the development of sustainable solutions towards sustainable-just food security, using systems thinking approaches
5. To apply systems thinking in dealing with sustainable farming, food security and climate change through the lenses of sustainability justice. 6. To understand the complexities that face local communities and countries in terms of highly complex and interrelated systems.
7. To illustrate innovative methods of production, efficient ways of food distribution, and methods of processing or waste recycling

Commented [NK5]: My suggestions

Course Content Learning Outcomes:

~~Upon successful completion of this course, students will be able to:~~

~~• An understanding of the intersections between food security and food justice;~~
~~• An ability to apply social science conceptualization and methods in the analysis of complex problems;~~

~~• A capacity for formulating a research problem either independently or in collaboration with a real-world partner and carry out the research needed to produce useful knowledge for non-academic partners in industry, the third sector, or in local/regional/national government~~

~~• An ability to draw out the sustainable justice aspects in specialist topics related to food security~~

- Identify the key concepts of sustainability justice in terms of social, cultural, environmental and economic aspects
- Understand the importance of sustainability justice in the context of a sustainability crisis.
- Recognize the constituencies of sustainability justice and their connection to the pillars of sustainable development.
- Identify critical issues related to sustainability justice and food security
- Describe key challenges for food justice from local and national governance perspectives
- Discuss sustainable farming and understand its connection with food security under climate change conditions through the lenses of sustainability justice
- Develop action plans to raise the awareness of farmers and other stakeholders to assure sustainable farming and food security locally.
- Understand the diversity of food production systems under climate change
- Understand the principles of system analysis and how it can be applied in sustainable farming and food production systems.
- Gain comparative and holistic knowledge of today's food systems (production, distribution, consumption, and waste).
- Analyze how the food choices we make as individuals collectively influence: 1) political, socio-economic and ecological changes taking place locally, regionally and globally and 2) both climate change and food security.
- Discuss how disadvantaged social groups are disproportionately affected by climate/food injustice policies and practices.
- Assess how sustainability justice contributes to transforming climate and food injustices.
- Identify and analyze the aims and actions of climate justice and food justice organizations and movements, locally, regionally and globally.

Course Resources.

Walker, Gordon (2012) *Environmental Justice: Concepts, Evidence and Politics.* London: Rouledge.

Course Website(s)

Required Course Texts and Materials

Optional Course Texts and Materials

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading Policy

Component	Grade
Assignments	20%
Exams	60 %
Class Attendance/ Participation	20%
Total Points	100%

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to all classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me early before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and /or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assignment materials before you come to class. I expect active class participation, which counts for 20% of the grade.

Disability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Important Dates to Remember

Course Schedule

Commented [NK6]: Please change these as it corresponds to the modules below that Prof. Makrakis has developed

Week	SUBJECT	Date
1	General Introduction	
2	Sustainability Justice	
3	Food Security and Self-sufficiency	
4	Food Systems in Context: Industrialization & Colonialism	
5	Food Security & the Economic Pillar of Sustainability Justice	
6	Food Security & the Societal Pillar of Sustainability Justice	
7	Food Security & the Cultural Pillar of Sustainability Justice	
8	Food Security & the Ecological of Sustainability Justice	
9	Farmers as critical members of society	
10	Introduction to rural sociology	
11	Rural communities, FS, & SJ	
12	Agricultural communities; rural sociology; SD in a rural context	
13	Case study	
14	Inequity & Injustice in the Food System	
15	Case study	
16	Final exam	

Commented [NK7]: ~~See Prof Makrakis modules below~~

Course Module

Course Sustainability Justice and Food Security

Module 1 General Introduction

Key Concepts Sustainability Justice

Overview	Most people usually have only a basic or cursory understanding of Sustainability, Sustainable Development (SD), & Sustainability Justice (SJ). Students, when asked about it, will mostly talk in terms of environmental issues and ignore the other pillars. This module is focused on allowing students to gain a much more thorough understanding of SD & SJ by going through each of the different pillars individually and discussing them in order to gain a more solid understanding of these fundamental concepts.
Aim	The overriding aim of this module is for students to be able to fully understand the holistic approach toward SD & SJ through their four pillars.
Learning Outcomes	At the end of this module learners will be able to: • Identify the key concepts of sustainability justice in terms of social, cultural, environmental and economic aspects. • Realize the relationship between sustainability justice and food security
Units	Unit 1.1: Ecological Pillar of SJ Unit 1.2: Economic Pillar of SJ Unit 1.3: Social Pillar of SJ Unit 1.4: Culture Pillar of SJ
Readings	Jaffee, D. (2014). Brewing justice: Fair trade coffee, sustainability, and survival. Univ of California Press. Alkon, A. H., &Agyeman, J. (2011). Cultivating food justice: Race, class, and sustainability. MIT Press.
Activity	The main activity for this module will mainly focus on engaging students on the different pillars of SD and sustainability justice. As such, students will be split into 4 separate groups, each group representing one of the pillars of Sustainability Justice and will be required to discuss it at length in collaborative sessions. Each group will be responsible for setting out the main concepts of their selected pillar as well as the main challenges and obstacles facing it. Students will then submit their project for peer review from another group. Finally, after all of the feedback is received, students will collaboratively develop a Wiki providing comprehensive overview of the pillars of SD and Sustainability Justice.

10Cs/6 LEARNINGGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√						√	√	√			√	√			

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activit	Project	Prepare exam	Writing	Total

					y			exam	
	3h	2h		8h	15h				28

Module 2	Inequity & Injustice in the Food System
Key Concepts	Food Security and Self-sufficiency
Overview	Food security in Jordan is often confused and conflated with the concept of self-sufficiency. While the two are related, it is important to place clear points of separation between the two in order to clarify which is a more important objective to achieve. Critical to understanding this is to understand the UN SDG of No Hunger as well as the similarities and differences between it and the aim of achieving no malnutrition in the world. Students are challenged in this module to understand and be able to differentiate between these concepts and to realize their importance and relevance in the 21st century.
Aim	The overriding aim of this module is to ensure that students fully understand the concept of Food Security
Learning Outcomes	At the end of this module learners will be able to: • Realize the relationship between sustainability justice and food security • Understand the problems & obstacles faced by minority and disadvantaged groups in achieving sustainability justice and food security • Differentiate between food security and self-sufficiency in the context of sustainable development • Synthesize between the role of the farms and society at large in achieving both sustainability justice and food security • Apply the concept of sustainability into the agriculture activities and how to build these connections between the different aspect of sustainability and agriculture • Analyse the current situation of food security in Jordan in terms of using indigenous resources and global experiences. • Develop action plans to raise the awareness of indigenous resources and global experience to assure food security in Jordan.
Units	Unit 2.1: Clarifying the concept of Food Security. Unit 2.2: Differentiating between Food Security and other, similar concepts (e.g. self-sufficiency) Unit 2.3: Policy considerations of Food Security in the jordan context Unit 2.4: Food Security under Climate Change
Readings	Maxwell, S. (1996). Food security: a post-modern perspective. Food policy, 21(2), 155-170. Pinstrup-Andersen, P. (2009). Food security: definition and measurement. Food security, 1(1), 5-7. Schmidhuber, J., &Tubiello, F. N. (2007). Global food security under climate change. Proceedings of the National Academy of Sciences, 104(50), 19703-

	19708.
Activity	In this activity, students will be required to identify critical aspects of food insecurity facing Jordan. Each student will post on a forum on a specific problem of Food Security in Jordan. Then, students will be required to engage in detailed forum discussions in order to identify the root causes of Food Insecurity in these specific circumstances.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√		√	√	√		√	√	√		√	√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√			√	√					√			√	√			√

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	4h	2h		12h	13h				29

Module 3	Food Systems in Context: Industrialization & Colonialism
Key Concepts	Industrialization & Colonialism
Overview	This module will focus on the inter& multidisciplinary connections between both Food Security & Sustainability Justice. Particular emphasis will be placed on the interconnections between the individual pillars of SD & Sustainability Justice (Economy, Ecology, Society, & Culture) and Food Security. Thus, students will begin to understand Food Security not only just the result of increased agricultural output or economic prosperity, but also as a result of societal and cultural factors that need to be addressed in a holistic and sustainable manner.
Aim	The aim of this module is to allow students to begin to visualize the complex nature and interrelations of Food Security & Sustainability Justice.
Learning Outcomes	At the end of this module learners will be able to: • Synthesize between the different concepts of Food Security & Sustainability Justice • Realize the complex relationships between FS & SJ • Analyze the impact of the 4 pillars of SJ on FS in the context of Jordan
Units	Unit 3.1: Food Security & the Economic Pillar of Sustainability Justice Unit 3.2: Food Security & the Societal Pillar of Sustainability Justice Unit 3.3: Food Security & the Cultural Pillar of Sustainability Justice Unit 3.4: Food Security & the Ecological of Sustainability Justice
Readings	Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220.

	https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf																
Activity	In this Activity, students are expected to better understand and integrate the concepts of food security and SD/SJ. Thus, students will take a specific case relating to food security in local context. Students will then critically deconstruct the issue in light of the 4 pillars of SD & SJ in order to understand the issue in light of these concepts.																
10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√		√	√		√	√	√	√	√		√	√		√		
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√	√	√						√	√	√					√
ECTS WORK LOAD	Lecture 4h		Online 3h		Lab		Reading 10h		Course activity 13h		Project		Prepare exam		Writing exam		Total 30
Module 4	Farms & Society																
Key Concepts	Agricultural communities; rural sociology; SD in a rural context																
Overview	This module will focus on the integration of farmers and rural communities in the pillars of SD & SJ. Students will learn how these communities play an integral role in addressing food security while also facing difficulties of food insecurity themselves. Students will learn how SD & SJ factor into their communities and challenges.																
Aim	The aim of this module is to allow students understand rural communities and agriculture as critical components of society and sustainable development																
Learning Outcomes	At the end of this module learners will be able to: • Visualize the rural communities as a complex society critical to society at large • Communicate with different members of rural and agricultural communities to identify critical issues and problems																
Units	Unit 4.1: Farmers as critical members of society Unit 4.2: Introduction to rural sociology Unit: Rural communities, FS, & SJ																
Readings	Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf																
Activity	In this Activity, students are expected to engage with members of the rural communities. Students will use different methods of qualitative research to gather critical data from the farmers and members of rural communities in order to identify key problems as well to deconstruct the problems in light of SJ.																
10Cs/6 LEARNIN	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA

GGOALS	√	√		√	√		√	√		√		√	√		√	√	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				√	√					√	√	√	√				
ECTS WORK LOAD	Lecture 5h		Online 4h		Lab		Reading 11h		Course activity 11h		Project		Prepare exam		Writing exam		Total 31

Key Concepts Overview	Food Security; Sustainability Justice; This module will focus on the integration of the concepts of FS & SJ in light of all of the previous module. Students will begin to understand how to apply systems thinking in these contexts.
Aim	The aim of this module is to allow students to apply the concepts of systems thinking on FS & SJ
Learning Outcomes	At the end of this module learners will be able to: • Use systems thinking for FS & SJ • Synthesize between all of the concepts in the previous modules
Units	Unit 5.1: Systems thinking, FS & SJ
Readings	Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf
Activity	Systems thinking activity. As a community service task, allow students to contact with different farmers involved in animal and plant production to introduce the impact of climate change on their products safety and sustainability.

10Cs/6 LEARNIN GGOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√		√	√	√	√		√	√		√	√			√	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				√	√	√					√	√				√	√
ECTS WORK LOAD	Lecture 3h		Online 1h		Lab		Reading 8h		Course activity 10h		Project		Prepare exam		Writing exam		Total 22

GENERAL COMMENTS ABOUT THE COURSE

The course modules are already prepared by Professor Makrakis. These should be used.

The course description, course objectives and learning outcomes have been re-written. Please refer to the changes I made in this regards- so it fits the modules.

Please use the modules below as developed by Prof. Dr. Vassilios Makrakis

Course	Sustainability Justice, Climate Change & Food Security Developed by Prof.Dr. Vassilios Makrakis, University of Crete
Module 1	The Constituencies of Sustainability Justice
Key Concepts	Sustainability justice; environmental sustainability, social sustainability; economic sustainability; cultural sustainability
Overview	While social justice is a frequently employed concept in the deconstruction and reconstruction of the school curriculum and discussion of instructional practice in schools, sustainability-justice that, in addition to social justice, integrates environmental, economic and cultural justice, has not been discussed. Most people usually have only a basic or cursory understanding of Sustainability and Sustainable Development (SD). The concept of Sustainability Justice (SJ) has been recently advanced by Prof. Dr. Makrakis. The concept of "sustainability justice" as it has been conceptualised by Makrakis reflects the four pillars of sustainable development: environment, society, economy and culture. It is thus a concept that when students could be asked about it, they will mostly talk in terms of environmental issues and ignore the other dimensions or constituencies of sustainability justice.
Aim	The overriding aim of this module is for students to be able to understand the need and importance of the concept of sustainability justice and its constituencies
Learning Outcomes	At the end of this module learners will be able to: • Identify the key concepts of sustainability justice in terms of social, cultural, environmental and economic aspects. • Realize the rationale and critical importance of sustainability justice in the context of sustainability crisis. • Recognize the constituencies of sustainability justice and their connection to sustainable development pillars.
Units	Unit 1.1: The environmental dimension of sustainability justice Unit 1.2: The social dimension of sustainability justice Unit 1.3: The economic dimension of sustainability justice Unit 1.4: The culture dimension of sustainability justice
Readings	Makrakis, V. (2017). Unlocking the potentiality and actuality of ICTs in developing sustainable-justice curricula and society. Knowledge Cultures, 5(2), 103-122. doi:

	0.22381/KC5220177 http://petarjandric.com/images/pdf/Knowledge-Cultures522017.pdf Makrakis, V. (2017). Developing and validating a sustainability justice instrument to transform curriculum, learning and teaching. 9th International Conference in Open & Distance Learning - November 2017, Athens, Greece-PROCEEDINGS https://eproceedings.epublishing.ekt.gr/index.php/openedu/article/viewFile/1368/1303 Vouzaksakis, G. & Makrakis, V. (2017). Embedding sustainability justice in secondary education economic courses enabled by ICTs (with G.). 9th International Conference in Open & Distance Learning - November 2017, Athens, Greece-PROCEEDINGS file:///D:/Downloads/1371-3200-1-PB%20(1).pdf https://eproceedings.epublishing.ekt.gr/index.php/openedu/article/viewFile/1368/1303
Activity	Assignment 1a: The main activity for this module will mainly focus on engaging students on the different dimensions or pillars of sustainability justice. As such, students will be organized in groups of 4. Each student will represent one of the pillars of Sustainability Justice and will be required to prepare one page report which will be discussed during an online session among the group members. Assignment 1b: Each group of students will exchange their reports for peer reviewing. After peer reviewing, students will collaboratively develop a Wiki providing a comprehensive overview of the pillars of Sustainability Justice and their connection to corresponding sustainable development pillars. The wikis developed will be presented and discussed in class during the second week. Assignment 1c (Community-based learning project): In this activity, the students have to disseminate their Wikis through the social media, especially through the development of a Facebook page, aiming to give and share knowledge and information as well as raising awareness on issues of sustainability justice, in relation to climate and food injustices. The deadline for both assignments will be two weeks after the end of the module.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√		√	√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total

	6h	2h		12h	10h	10h			40
Module 2	Climate Change, Food Security and Sustainability Justice in Context								
Key Concepts	Climate justice, food justice, sustainability justice								
Overview	In recent years, due to climate change humanity has witnessed wild weather and unpredictable seasons that have affected what farmers can grow and the prices and quality of the food. Besides that, millions of people, including children face inhumane working conditions to produce the food we all eat, while they do not have enough to eat themselves. Recent evidence (https://www.weadapt.org/knowledge-base/vulnerability/food-in-an-uncertain-future) shows that the MENA region is the only region outside of Sub-Saharan Africa where the number of undernourished people has increased since the early 1990s, Although, climate change and food security are two critical issues threatening humanity, the way these two interact in relation to justice has started to receive attention in recent years. Indeed, there is considerable discussion of climate justice and food justice and their interrelationship with climate change. Both climate justice and food justice are two emerging movements that can be seen in the context of sustainability justice, a concept that bridges together the four pillars of sustainable development. Sustainability justice reveals the critical intersection of climate change and food security issues in relation to the environmental, social, economic and cultural injustices emanating from climate change and food insecurity. In this sense, climate justice is food justice and sustainability justice offers a framework for addressing food and nutritional insecurity at levels from local to international in light of climate change. It is particularly effective in highlighting the injustices caused by climate change impacts on food security and the effects they have for the poorest and most vulnerable.								
Aim	The overriding aim of this module is to bridge the gap between the academic discourse and the mainstream discourse by engaging students to reflect on the ethical and political implications of food and agricultural practices in relation to sustainability justice, with special attention to climate change.								
Learning Outcomes	At the end of this module students will be able to: • Discuss the concepts of climate change and food security through the lenses of sustainability justice. • Realize the complex relationships between climate change, food security and sustainability justice. • Discuss how food justice and climate justice intersect with sustainability justice, and with inequities involving race, class, gender and governance. • Analyze how the food choices we make as individuals collectively influence: 1) political, socio-economic and ecological changes taking place locally, regionally and globally and 2) both climate change and food security. • Discuss how disadvantaged social groups are disproportionately affected by climate/food injustice policies and practices. • Assess how sustainability justice contributes to transforming climate and food injustices. • Identify and analyze the aims and actions of climate justice and food justice								

	organizations and movements, locally, regionally and globally.
Units	Unit 2.1: Clarifying the Concepts of Climate Justice and Food Justice. Unit 2.2: Climate/Food Justice Policy Considerations and Actions in the Egyptian/Jordanian context.
Readings	Human rights: their role in achieving climate justice and food and nutrition security: A New Dialogue : Putting People at the Heart of Global Development https://www.mrfcj.org/media/pdf/Human-Rights-FNS-Climate-Justice.pdf Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf Schmidhuber, J., &Tubiello, F. N. (2007). Global food security under climate change. Proceedings of the National Academy of Sciences, 104(50), 19703-19708. file:///D:/Downloads/Global_Food_Security_under_Climate_Change.pdf Agriculture, Food Security and Climate change: Outlook for knowledge, tools and action. CCAFS Report No. 3 file:///D:/Downloads/ccafs_report_3-low-res_final.pdf Purifou, D. Food policy councils: Integrating food justice and environmental justice. https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1302&context=delpf Jobbins, G. & Henley, G. (2015). Food in an uncertain future: the impacts of climate change on food security and nutrition in the Middle East and North Africa. Overseas Development Institute, London / World Food Programme, Rome. Available at file:///D:/Downloads/wfp283866.pdf
Activity	
	Assignment 2 Visit the site http://www.icarda.cgiar.org/arab-food-security entitled "Enhancing Food Security in Arab Countries", led by ICARDA. Read carefully the cases of Egypt or Jordan and based on the list of readings, write a 10 pages (1.5 Times New Roman) essay, identifying critical aspects of food insecurity facing the country of choice in light of potential climate change effects. Each student will post his/her essay. Then, students will be required to engage in an online forum to identify and discuss the root causes of food insecurity in these specific circumstances. Students will be required to write a 5 page summary reflective report, including in an annex the forum post and replies. The deadline for this assignment is two weeks after the end of the module

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√	√	√	√	√	√	√	√	√			√		√		

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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
	√	√											√				

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	6h	3h		10	12				31

Module 3	Sustainable Farming and Food Justice/Security under Climate Change
Key Concepts	Sustainable agriculture, food security, climate change, food system
Overview	The current agriculture and food system practices and climate threatening seem to damage sustainable farming and food security. Increasing agricultural and food production through intensive and pesticide means, and over-grazed lands, heavily pollutes air, water, and farmworkers health. As a whole, the food system, especially meat production is responsible for a significant portion of greenhouse gas emissions. In this module, particular attention will be given to the assumption that if our food and farming methods are to be sustainable over time, we must shift from unsustainable to sustainable farming. In doing so, maintain the health and productivity of land and must conserve water, energy, and the other natural resources upon which agricultural productivity ultimately depends. Any system of food and farming that fails to meet the needs of a sustainable society will fail in the long term. Climate change raises complex issues of science, economics, and politics; it also raises difficult issues of sustainable farming and food justice.
Aim	The aim of this module is to allow students to begin to visualize the complex nature and interrelations of Food Security & Sustainability Justice.
Learning Outcomes	At the end of this module students will be able to: • Discuss food and agriculture systems and how these are changing to impact on sustainable farming • Identify and understand the connection of sustainable farming with food justice • Get information about sustainable farming, food security and justice under climate change effects using online searching machines • Work with other students to define sustainable farming practices under climate change conditions through the lenses of sustainability justice • Analyse the current situation of food security/justice and think over what can be done • Develop action plans to raise the awareness of farmers and other stakeholders to assure sustainable farming and food security locally.
Units	Unit 3.1: Climate Friendly Farming Unit 3.2: Sustainable Farming and Food Security Unit 3.3: Empowering Community Farmers Unit 3.4: Sustainability Justice and Sustainable Climate/Food Justice
Readings	Wreford, A.A., Ignaciuk, A. & Guere, G. (2017). Overcoming barriers to the

<table>
<tr><td></td><td colspan="17">adoption of climate-friendly practices in agriculture. Papers 101. Paris: OECD DOI:http://dx.doi.org/10.1787/97767de8-en
https://read.oecd-ilibrary.org/agriculture-and-food/overcoming-barriers-to-the-adoption-of-climate-friendly-practices-in-agriculture_97767de8-en#page1

European Commission (2012). Sustainable agriculture for the future we want. https://ec.europa.eu/agriculture/sites/agriculture/files/events/2012/rio-side-event/brochure_en.pdf</td></tr>
<tr><td>Activity</td><td colspan="17"></td></tr>
<tr><td></td><td colspan="17">Assignment 3a
Each student should construct three digital concept maps, using any type of software (e.g. Cmap, Inspiration): one for sustainable farming, the other for climate justice and the last for food justice. Then, they will critically reflect on the association and links of the three concept maps to produce a new one that merges the three.

Each student should post his/her merged concept map in the blended learning environment and invite another student to comment on the concept map, highlighting similarities and differences using the discussion forum. The idea of this reflective assignment is to examine the need of revising the concept maps. Write down a comprehensive 3 pages report on the conceptual changes in students' thinking for revising the initial concepts maps.

Assignment 3b
Explore further the subject of sustainable farming and food security/justice under climate change visiting the Sustainable Development Knowledge Platform at https://sustainabledevelopment.un.org/topics/foodagriculture and access the FAO (2014) report on the State of "Food Insecurity in the World". Read the lessons learned from the analysis of individual countries and try to find similarities and differences with lessons in your own country, making connections to SDG1; SDG2; SDG3; SDG13 & SDG16. Each student will develop a wiki about this assignment to be discussed in the second week of the class and post it in the blended learning environment.

The deadline for both assignments is within the period of the module, that lasts for two weeks.</td></tr>
<tr><td rowspan="2">10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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	6h	2h		10h	14h				32
Module 4	Sustainable Just Climate & Food Security: The Value of Systems Thinking								
Key Concepts	Systems thinking, climate change, food security, values								
Overview	Systems thinking, in general, is the ability to think about a system as a whole, rather than in its parts. It also helps to see the world as a complex system and better understand its interconnectedness and interrelationships. In other words, systems thinking is a way of approaching complicated issues through connecting the dots and understanding them as inter-related parts of a greater whole that constitutes the system. Understanding and working with the complexity of sustainable food production systems requires the values of systems thinking. In this module, students will apply systems thinking in line with sustainability justice to tackle the sustainability of food production systems. In a way, this module synthesizes knowledge and skills from the previous modules, addressing the development of sustainable solutions towards sustainable-just food security, using systems thinking approaches. Thus, students will begin to understand how to apply systems thinking in dealing with sustainable farming, food security and climate change through the lenses of sustainability justice. Moreover, they will also begin to understand the complexities that face their local communities and countries in terms of highly complex and interrelated systems that this module deals with.								
Aim	The overriding aim of this module is: 1) to provide students with an understanding of the "big ideas" regarding systems thinking, complexity, and resilience as well as with an understanding of some of the methods and tools of analysis in the context of sustainable farming, food security and climate change. 2) To allow students to apply the principles of a systems thinking approach for a sustainable-just climate and food security.								
Learning Outcomes	At the end of this module students will be able to: • Understand the complexity and diversity of food production systems under climate change through the lenses of sustainability justice. • Understand the principles of system analysis and how it can be applied in sustainable farming and food production systems. • Evaluate strong and weak points of different food production in terms of sustainability justice. • Gain comparative and holistic knowledge of today's food systems (production, distribution, consumption, and waste). • Explore the idea of food justice and alternative food systems in the local context.								
Units	Unit 4.1: Systems Thinking: What, Why, When, Where and How? Unit 4.2: The Climate and Food System Concept Unit 4.3: The Values of Systems Thinking Unit 4.4: Climate Change and Food Security Systems in Action								
Readings	Arnold, R.D. & Wade, J.P. (2015). A Definition of Systems Thinking: A Systems Approach Procedia Computer Science 44 (2015) 669 - 678 Behla, D. & Ferreiraa, S. (2014). Systems Thinking: An Analysis of Key Factors and								

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<tr><td></td><td>Relationships Procedia Computer Science 36 (2014) 104 - 109

Keegan, M. (n.d.).Systems thinking, rural Development and food security. Migration Institute of Australia. https://core.ac.uk/download/pdf/15125474.pdf

Kwamina E. Banson, K. et. al. A systems thinking approach to address the complexity of agribusiness for sustainable development in Africa. http://journals.isss.org/index.php/proceedings57th/article/viewFile/2119/697

Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf</td></tr>
<tr><td>Activity</td><td>Overview
Assignment 4
Students will write a 10-page paper that analyses a given aspect of food security in light of climate change and its impacts and effects on environment, society, economy and culture. It will examine this as a social-ecological system and incorporate the knowledge acquired so far from previous readings and assignments. The report may cover the perspective of specific groups of people, at the local, national or regional level.

An online discussion forum will be arranged to discuss the key points of the papers written. A power point presentation will be prepared by each student for class presentation and discussion during the third week of the module.

This deadline of this assignment will be carried out during the three weeks of the module.</td></tr>
<tr><td>10Cs/6 LEARNING GOALS</td><td><table>
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<tr><td>Module 5 Key Concepts Overview</td><td>Community Food Security and Sustainability Justice
Community food security (CFS), hunger, sustainability justice, democratic decision-making
Community food security (CFS) is a relatively a new movement that promotes food security strategies within a region or community’s food system. In this sense, CFS is</td></tr>
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	concerned with the full range of food chain events including agriculture, the availability of supermarkets and other affordable outlets for quality and accessible food. It is also concerned with the involvement of the wider citizenry and local/state governments in seeking solutions to food insecurity and healthy food choices. While officially a movement since only 1994, CFS is now practiced by hundreds of organizations and communities worldwide, engaging thousands of groups, volunteers, government and non-government representatives in projects and activities that have improved their communities' capacity to meet their own food needs. Looking into past experiences, one can see projects and activities that include farmers' markets, food assistance program outreach, community gardens, youth food and agriculture programs, farmland preservation and farm viability projects, food system planning and food policy councils, nutrition education and health promotion strategies, farm-to-school projects and a range of public education and awareness campaigns. In general, CFS encourages progressive planning that addresses the underlying causes of hunger and food insecurity facing the current global food system. Although such a system has witnessed highly efficient food production, it has created many undesirable environmental, social, economic and cultural impacts. Small farmers' mostly profit margins that have significantly led to the abandonment of their agricultural activities. In general, the economic viability of small and medium-sized farms has reduced the number of farm-related local business and made farming less attractive to younger generations. Many studies show that food production has been less community-based, diminishing farmers' collective knowledge and sustainable agrarian practices. At the same time, the unprecedented demand for local and regionally identified foods has created many opportunities for agricultural producers and communities. In this module, we will bring a number of community-based sustainable farming and food case studies aiming to the promotion of sustainability justice and greater equality. Such case studies show how to reduce poverty and hunger, prepare families to assume responsibility for ethical eating and revive the cultural values of solidarity among families and social responsibility. Some case studies illustrate innovative methods of production, others demonstrate more efficient ways to distribute food, and some are exemplary methods of processing or waste recycling. The majority of case studies convey ways to strengthen ties to the regional economy, support local businesses, offer new entrepreneurial opportunities, and engage residents.
Aim	It is promoting greater compassion for the food insecure, expanding awareness of local food systems and the range of options available to build local food security, and engaging the talents, resources, and wisdom of more participants than ever before to end food insecurity and hunger .
Learning Outcomes	At the end of this module students will be able to: • Identify critical issues and problems related to SJ and FS • Understand the problems & obstacles faced by minority and disadvantaged groups in achieving food justice • Discuss how low-income communities are disproportionately impacted by food injustice • Explore the idea of food justice and alternative food systems in the local

	context • Describe key challenges for food justice from local and national governance perspectives
Units	Unit 5.1: What is a Community-Based Sustainable Food System? Unit 5.2: Indicators of Community-Based Sustainable Food System Unit 5.3: Community Food Security in Action: Case Studies
Readings	Building a Community-Based Sustainable Food System. University of Michigan Urban & Regional Planning Capstone Project April 2009. http://closup.umich.edu/publications/misc/Community-Based-Sustainable-Food-Systems.pdf Bendfeldt, E. et.al. (2011), A Community-based food system: Building health, wealth, connection, and capacity. Virginia Tech. https://pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/3306/3306-9029/3306-9029-PDF.pdf Mares, T. M., & Peña, D. G. (2011). Environmental and food justice. Cultivating food justice: Race, class, and sustainability, 197-220. https://www.foodethicscouncil.org/uploads/publications/2010%20FoodJustice.pdf Ismail, S. et.al. (2003). Community-based food and nutrition programmes: What makes them successful -A review and analysis of experience. FAO Food and Nutrition Division 1. BRAZIL CASE STUDY 2. KENYA CASE STUDY 3. BANGLADESH CASE STUDY http://www.fao.org/docrep/006/y5030e/y5030e00.htm
Activity: Community-based learning	Assignment 5a Choose one out of the three case studies and 1) discover the strengths and weaknesses; 2) discuss how such a case study can be contextualized in your own community. Based on it, organise an online discussion forum to share best practices in community-based, sustainable food systems for application in your own local communities. Write-up an action plan to show how changes to the current local food system could enhance the presence of healthy, affordable food and serve as an economic development tool in your local community. Assignment 5b: Community-based learning project "Sustainable-Just Dining" Create a number of Sustainable-Just Food Working Groups, preferably 2-3 students in each group. Each group will focus on a community sector that has services for dining and/or selling food, such as university, supermarkets, hotels, etc. Each group will have to examine ways to increase sustainable food policies that can be turned

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<tr><td></td><td colspan="17">into concrete actions. The aim will be to reduce landfill food waste and promote the idea of ethical eating and to ensure that unsold leftovers are suitable for donating to vulnerable groups in the community. Each group should write a reflective essay about their experience and develop a .ppt presentation to share them. For “Writing a Good Reflective Essay: from Introduction to Conclusion” visit the https://writemyessay4me.org/blog/reflective-essay

Organise an off-line (in class) and an online conference session to present and discuss your results.

The deadline of the last assignment will be at the end of the examination period.</td></tr>
<tr><td rowspan="2">10Cs/6 LEARNING GOALS</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>LG</td><td>BE</td><td>KN</td><td>LT</td><td>DO</td><td>GS</td><td>TRA</td></tr>
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SUMMARY OF ECTS WORKLOAD

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Learning Components	No	Time	Work load	Course Modules								Work load
				1	2	3	4	5	6	7	8	
Lectures (face-to-face)												
Online												
Lab work												
Reading articles (3 pages per hour)												
Reading book chapters (5 per/h)												
Preparing course activities												
Project work												
Preparation for exam												
Writing the exam												
Total												





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CCSAFS COURSE SYLLABUS

Jerash University

Course Syllabus

Course Number 604721

Commented [NK1]: Which course number is correct?

Course Title
Sustainable Fisheries and Food Security

Instructor Information

Instructor: Dr. Ebraheem Altahat
Office Location: Faculty of Agriculture Building
Telephone: 0096226350521
Office Hours:.
E-mail: tahat1972@gmail.com
Website: http://www.jpu.edu.jo/jpu/profile.php?id=50

Course Identification

Course Number: 603721

Commented [NK2]: Which course number is correct?

Course Name: Sustainable Fisheries and Food Security
Course Location: Faculty of Agriculture
Class Times:
Prerequisites:
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

Commented [NK3]: Please show the link between sustainable fisheries and the other themes of the program: sustainable agriculture, food security and climate change.

Fisheries are an important source of food and recreational opportunities, yet many are in poor shape due to overfishing and/or habitat degradation. Managing fisheries sustainably and restoring fisheries that have been degraded is a complex task that requires a broad set of competencies from fisheries professionals. The course aims to help students develop key competencies including knowledge of essential ecological, social, institutional, and economic dimensions offisheries management; skills in fisheries systems analysis,

interview and social survey techniques, resource assessment and modeling, institutional analysis, participatory planning and reflection-in-action; and a repertoire of case studies. The course also aims to foster motivation for shared problem-solving in an interdisciplinary and participatory manner, critical thinking and innovation. Lectures will be used to outline key concepts and approaches, and laboratories and homework assignments will provide experience in applying key methods. Throughout thecourse, all students will develop a case study on a fishery of their choice, applying what they have learned, providing concrete examples for class discussions, and eventually providing an independent review and recommendations for the further management of the fishery. Graduate students will also conduct an integrative, interdisciplinary group project to explore options for improving the management of a current fisheries issue. This interdisciplinary course is intendedfor graduate or undergraduate students majoring in any subject relevant to fisheries management including fisheries/aquatic science, wildlife, resource economics, geography, and political science.

Commented [NK4]: I haven't found any lab work in the modules

Commented [NK5]: Where? I did not find in the modules

Commented [NK6]: Where in the modules?

Course Learning Objectives:

1) Appreciate the complex, multi-dimensional nature of fisheries management problems and the benefits of integrative-interdisciplinary approaches to addressing them.
2) Understand key relevant concepts in the areas of fisheries ecology, stakeholder characteristics and behavior, governance systems, fisheries economics, and management and planning processes
3) Gain practical skills in fisheries assessment, interview techniques, institutional analysis, economic analysis, and participatory planning.
4) Gain practical experience in analyzing fisheries management issues in a problem and outcome-oriented, interdisciplinary manner.
5) Reflect on the wider management or conservation context of their research problem (or another issue of their choice)
6) Strengthen group work, communication, facilitation and reporting skills

Commented [NK7]: What research problem?

7) End poverty in all its forms everywhere
8) End hunger, achieve , food, security and improved nutrition and promote sustainable agriculture
9) Ensure healthy lives and promote well-being for all at all ages
10) Achieve gender equality and empower all women and girls
11) Ensure availability and sustainable management of water and sanitation for all
12) Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work fo rall
13) Build resilient infrastructure,promoteinclusiveandsustainableindustrializationandfosterinnovation
14) Ensuresustainableconsumptionandproductionpatterns
15) Takeurgentactiontocombatclimatechangeanditsimpacts
16) Conserveandsustainablyusetheoceans,seasandmarineresourcesforsustainabledevelopment
17) Protect,restoreandpromotesustainableuseofterrestrialecosystems,sustainablymanageforests,combat desertification,andhaltand reverse land degradation and haltbiodiversityloss
18) Promotepeacefulandinclusivesocietiesforsustainabledevelopment,provideaccesstojusticeforallandbuildeffective,accountableandinclusiveinstitutionsatalllevels

Commented [NK8]: Please dissociate the words…

Commented [NK9]: These are not learning outcomes. I am not sure why they are here.

Course Content Learning Outcomes:

The requirement for fish and seafood in the word is increasing. This can either be harvest from the sea through, traditionally fisheries,y or it can be produceds trough aquaculture. These are complex systems and productions that may interfere with each other and the surrounding environment. The overall aim with the course is to give the students the necessary basic information about fisheriesy and aquaculture. This should be set in overall view so the students are able to critically evaluate the factors which are important for a sustainable growth in the industry.

A student who has met the objectives of the course will be able to:

- discuss advantages and disadvantages with the two aquatic food primary production systems, fishery and aquaculture
- discuss important factors for performing a sustainable fishery and a sustainable aquaculture

Commented [NK10]: Nothing in the course description and objectives above related to aquaculture.
This should be added above

Commented [NK11]: Not linked to the objectives

Teaching and learning approach

The course is designed to foster multi-disciplinary and integrative problem-solving skills in fisheries management. It starts off with structured lectures and labs/homework assignments, but progresses towards more open-ended, student-driven and often group-based learning.

From you as a student, the course requires enthusiasm for grappling with complex and poorly defined real-world fisheries management issues ("messes"). From graduate students, it further requires initiative and a willingness and ability work in groups (you will receive a substantial share of your grade based on group work). ~~Many students enjoy these challenges but some don't.~~

If you want to be told what to do at all times, are uncomfortable engaging with problems that don't have a right or wrong answer, or dislike group work then this course may not be for you.The course is taught in mixed mode for both on-campus and distance students. On-campus and distance students will interact directly through a variety of electronic means and work collaboratively throughout the course.

Commented [NK12]: It is a graduate course. No need to mention this. Also, before

Commented [NK13]: Why many words are next to each other? No spaces?

Course Resources

1) Acheson, J.M. (1975). Fisheries management and social context: the case of the Maine lobsterfishery. *Transactions of the American Fisheries Society* 104: 653-668.

2) Adkins, T.J. (2010). Fishing for masculinity: recreational fishermen's performances of gender.M.A. Thesis, Kent State University. 64pp.

3) Allison, E. H. & Ellis, F. (2001). The livelihoods approach and management of small-scaleFisheries. *Marine Policy* 25: 377-388.

4) Arlinghaus, R. &Mehner, T. (2006). Determinants of management preferences of recreational anglers in Germany: Habitat management versus fish stocking. *Limnologica*35: 2-17.

5) Garcia, S. & Rosenberg, A. (2010). Food security and marine capture fisheries: characteristics,trends, drivers and future perspectives. *Philosophical Transactions of the Royal Society B*365: 2881-2896.

6) NOAA (2007). Magnuson-Stevens Fishery Conservation and Management Act. Public Law 94-265.

7) Rice, J.C. (2005) Understanding fish habitat ecology to achieve conservation. *Journal of Fish Biology* 67(SB): 1-22.

Course Website(s)

Required Course Texts and Materials

WHICH COURSE TEXTS ARE REQUIRED?

Optional Course Texts and Materials

WHICH COURSE TEXTS ARE OPTIONAL?

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading Policy

Component	Grade
Assignments	60%
Exams	20 %
Class Attendance/ Participation	20%
Total Points	100%

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to all classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me early before class starts.

Commented [NK14]: What do you mean by seminar type? It shows lecturing…

You are expected to treat faculty and other students with respect. During class students are obliged ~~to~~ not disrupt class by making noise and /or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assignment materials before you come to class. I expect active class participation, which counts for 20% of the grade.

Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Important Dates to Remember

Course Schedule

Commented [NK15]: The schedule does not match with the modules below.

Week	SUBJECT	Date
1	General Introduction: Introduction to the course. Introductions and discussion of student's interests and research ~~Initial discussion on possible topics, interests, tasks, timeline~~	
2	Discussion I: Importance of fisheries, status and management challenges. ~~Understanding fisheries systems~~	
3+ 4	Qualitative interview studies Stakeholders as individuals: values, attitudes, assets and drivers of behavior	
5	Case study	
6	Minor exam	
7+8	Fisheries assessment I: Biomass dynamics models ~~Fisheries Assessment II: Dynamic pool models~~	
9	Communication strategies forworking with stakeholders	
10	Field trip: Visit to agricultural research institutes	
11	~~Habitat in fisheries management~~	
12	Sustainability certification of fisheries products ~~managing small-scale fisheries in developing countries~~	
13	Student Presentations	
14	Final exam	

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~~Commented [NK17]: Can't find these in the modules~~

~~Commented [NK18]: Nothing in the modules~~

~~Commented [NK19]: Where in the modules?~~

Course	Sustainable Fisheries and Food Security
Module 1 Key Concepts	Introduction Fish Populations, Fisheries Ecology
Learning Outcomes	At the end of this module students will be able to: To understand the factors that affect fish population size and fish catch; ~~understand why fish stocks are particularly vulnerable to overfishing; use of severity ranking of collateral impacts~~
Units	The Biology of Fish Populations Growth and Mortality of Stocks Tropical Fish Ecology: Species and Habitats Affect each Other Fishing Status and Decline Fish Catch and Fishing Effort: Do More Boats Catch More Fish? Use of Destructive Fishing Methods and Gear Ecology of Multispecies Fisheries External Issues Causing Fisheries Decline Case Studies: ETPS Site Presentations on Status of Fisheries (diversity of fisheries, levelof effort, status and trends
Readings	FAO. 2005b. Fisheries and aquaculture topics, Impacts of species introductions. Topics fact sheets. Text by Devin Bartley. *In* FAO Fisheries and Aquaculture Department (on line). Rome GAA (Global Aquaculture Alliance). 2011. *Antibiotic residues* (www.gaalliance.org/newsroom/whitepapers-detail.php?Antibiotic-Residues-10). Garaway, C. 2005. Fish, fishing and the rural poor. A case study of the household importance of small-scale fisheries in the Lao PDR. *Aquatic Resources, Culture and Development*, 1(2): 131-144. Williams, M.J., Porter, M., Choo, P.S., Kusakabe, K., Vuki, V., Gopal, N. &Bondad-Reantaso, M. 2012a. Guest editorial: gender in aquaculture and fisheries - moving the agenda forward. *Asian Fisheries Science*, Special Issue 25S: 1-13.
Activity	1.Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each ~~unit the students will submit an individual reflection paper of approximately 1000 words.~~

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	K	LT	D	GS	TRA
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SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√	√	√									√				

~~ECTS~~ WORK	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total

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a)The activity should meet an actual need in the community.
b)The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
c)The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society.
d)The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e)The activity should provide students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f)It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

Please try to redesign the activityy to show the connections between academic achievement, civic engagement, and personal growth

LOAD	4h	2h		10h	12h				26

Module 2	Fisheries From an Economic Perspective
Learning Outcomes	At the end of this module students will be able to: To understand the economic drivers behind overfishing; to understand the pros and cons of alternative livelihoods (including tourism)
Units	Economic Efficiencies and Rents Economic Causes of Overfishing Economics of Open Access Fishery Industry Costs, Revenues, and Fishing Effort Market Supply and Demand The Sole Owner Fishery Profit Margins Tax on Fish Landings Declining Fisher Incomes Changes to Fishing Communities Alternative Livelihoods and Credit Schemes Case Studies: Economic Drivers Behind Different Fisheries Exercise: Designing an Economically Efficient and Environmentally Sound fishery.
Readings	Beveridge, M., Phillips, M., Dugan, P. &Brummett, R. 2010. Barriers to aquaculture development as a pathway to poverty alleviation and food security: policy coherence and the roles and responsibilities of development agencies, in *Advancing the aquaculture agenda*, Proceedings of a workshop, Paris, 15-16 April. Paris, OECD. Bharucha, Z. and Pretty, J. 2010. The roles and values of wild foods in agricultural systems. *Phil. Trans. R. Soc. B* 27 September 2010 vol. 365 no. 1554 2913-2926 Cheng, M.H. 2010. Asia-pacific faces diabetes challenge. *The Lancet*, 375: 2207-2210. Chokesanguan, B., Ananpongsuk, S. &Wanchana, W. 2009. Impact of fisheries management in improving safety at sea measures: a case study in Thailand. *Fish for the People*, 7(2): 29-35.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√	√		√		√	√	√	√				√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√					√	√				√	√				√

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	3h	2h		13h	15h				32

Module 3	Community Involvement
Learning Outcomes	At the end of this module students will be able to: Understanding the local community and how to incorporate them in the management planning process

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Units	Participatory Approach Understanding the Community Winning the Support of the Community Community Organization Fostering Partnerships Advisory Committees Use of Traditional Knowledge Contribution to Conservation Case Studies: Examples of Community-based Fisheries Management Case Studies: Examples of Use of Traditional Knowledge Exercise: Develop Plan for Winning Support of Community
Readings	Bush, S.R., Belton, B., Hall, D., Vandergeest, P., Murray, F.J., Ponte, S., Oosterveer, P., Islam, M.S., Mol, A.P., Hatanaka, M., Kruijssen, F., Ha, T.T., Little, D.C. &Kusumawati, R. 2013. Certify Sustainable Aquaculture? *Science* 341(6150): 1067-1068. Cabello, F.C. 2006. Heavy use of prophylactic antibiotics in aquaculture: a growing problem for human and animal health and for the environment. *Environmental Microbiology*, 8(7): 1137-1144. Cabello, F.C., Godfrey, H.P., Tomova, A., Ivanova, L., Dolz, H., Millanao, A. &Buschmann, A.H. 2013. Antimicrobial use in aquaculture re-examined: its relevance to antimicrobial resistance and to animal and human health. *Environmental Microbiology*, 15(7): 1917-1142. Chamnan C., Thislted, S.H., Roitana, B., Sopha, L., Gerpacio, R.V. &Roos, N. 2009 *The role of fisheries resources in rural Cambodia: combating micronutrient deficiencies in women and children*. Phnom Penh, Department of Fisheries Post-harvest Technologies and Quality Control, Fisheries Administration, Ministry of Agriculture, Forestry and Fisheries. 106 p.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.

10Cs/6	1	2	3	4	5	6	7	8	9	10	L	BE	KN	LT	DO	GS	TRA
LEARNING GOALS	√		√	√			√	√	√		G		√		√		√

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17
ECTS WORK LOAD	√ Lecture 5h	√ Online 3h	Lab	Reading 8h	Course activity 13h	√ Project	√ Prepare exam	√ Writing exam	Total 27								

Module 4 Learning Outcomes	Fundamentals of Fisheries Management At the end of this module students will be able to: Understanding of how to incorporate up-front management principles that link to site-specific goals and objectives
Units	Goals of Fisheries Management Fisheries Management Principles Ecosystem Principles, Goals and Policies Precautionary Principle Adaptive Management Reversing Downward Trends Optimal Sustainable Yield vs Maximum Sustainable Yield

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	Local Government Involvement in Fisheries Management Local Government Partnerships with National Agencies
Readings	EC (European Commission). 1999. Shrimp culture. Impact of tropical shrimp aquaculture on the environment in Asia and the Pacific/Mangroves, shrimp and the development of coastal areas in Central America. *EC* *Fisheries Cooperation Bulletin*, 12(4). EFSA. 2010. Scientific opinion on dietary reference values for fats, including saturated fatty acids, polyunsaturated fatty acids, trans fatty acids and cholesterol. *EFSA Journal*, 8(3): 1461. EJF (Environmental Justice Foundation). 2003. Risky business: Vietnamese shrimp aquaculture - impacts and improvements. London. 34 p. Eknath, A.E. 1995. Managing aquatic genetic resources. Management example 4: the Nile tilapia, *In* J.E. Thorpe, G. Gall, J.E. Lannan & C. E. Nash, eds. *Conservation of fish and shellfish resources: managing diversity*, pp. 176-194. London, Academic Press, Harcourt Brace Company, Publishers. Eknath, A.E. & Doyle, R.W. 1990. Effective population size and rate of inbreeding in aquaculture of Indian major carps. *Aquaculture*, 85: 293-305.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
		√	√		√	√	√		√			√	√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

ECTS WORK LOAD	Lecture	Online	Lab	Reading	Course activity	Project	Prepare exam	Writing exam	Total
	4h	2h		10h	11h				27

	-
Module 5 Learning Outcomes Units	Fisheries Management Tools At the end of this module students will be able to: ~~U~~understand~~ing of~~ the pros and cons of different fisheries management tools Issue Identification and Baseline Assessment Assessing Bycatch and Habitat Damage Fisher, Vessel, Company Licensing Limiting Entry into the Fishery Total Allowable Catch Seasonal Restrictions Technology and Gear Restrictions Gear Restrictions Gear Modifications Rotational Closures
Readings	Aswani, S. &Furusawa, T. 2007. Do marine protected areas affect human nutrition and health? A comparison between villages in Roviana, Solomon Islands. *Coastal Management*, 35(5): 545-565. Badayos-Jover, M.B.P. 2013. *Gendered concerns in coastal disasters: an analysis of women's political subordination and prospects for empowerment*. Presented at 4th Global Symposium on Gender in Aquaculture and Fisheries,

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	Yeosu, Korea. May 2013 (http://genderaquafish.files.wordpress.com/2013/04/ppt_2.pdf). Bush, S.R., Belton, B., Hall, D., Vandergeest, P., Murray, F.J., Ponte, S., Oosterveer, P., Islam, M.S., Mol, A.P., Hatanaka, M., Kruijssen, F., Ha, T.T., Little, D.C. &Kusumawati, R. 2013. Certify Sustainable Aquaculture? *Science* 341(6150): 1067-1068. Cabello, F.C. 2006. Heavy use of prophylactic antibiotics in aquaculture: a growing problem for human and animal health and for the environment. *Environmental Microbiology*, 8(7): 1137-1144. Globefish Research Programme. 2013. *By-products of tuna processing*, by E.G. Gamarro, W. Orawattanamateekul, J. Sentina&T.KSrinivasaGopal. Rome, FAO. Gomna, A. &Rana, K. 2007. Inter-household and intra-household patterns of fish and meat consumption in fishing communities in two states in Nigeria. *British Journal of Nutrition*, 97(1): 145-152.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.

10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√		√	√		√	√	√	√			√	√		√	√	

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTS WORK LOAD	√ Lecture	Online	Lab	√ Reading	√ Course activity	Project	√ Prepare exam	Writing exam	Total
	3h	2h		11h	13h				29

Module 6	Marine Reserves and Zonal Management
Learning Outcomes	At the end of this module students will be able to: ~~To~~ understand the appropriate use and process for developing MPA zones
Units	Fisheries Refugia, Size, Location and Design Spill-Over Effects, Replenishment Effects Zonal Management Schemes to Address User Conflicts Single Species Management vs Ecosystem Management Adaptive Management Case Studies: Different Processes for Implementing Marine Reserves ~~Case Studies: Examples of the Role of the Community in Implementing Marine Reserves~~ Case Studies: The Science, Politics and Economics of Reserve Design Exercise: Design a Zonal Plan for Sustainable Fisheries that Complements Your Sustainable Tourism Plan
Readings	Allison, E.H. & Ellis, F. 2001. The livelihoods approach and management of small-scale fisheries. *Marine Policy*, 25(5): 377-388. Allison, E.H. & Seeley, J.A. 2004. HIV and AIDS among fisherfolk: a threat to 'responsible fisheries'? *Fish and Fisheries*, 5(3): 215-234 Eknath, A.E. 1995. Managing aquatic genetic resources. Management example 4: the Nile tilapia, *In* J.E. Thorpe, G. Gall, J.E. Lannan& C. E. Nash, eds. *Conservation of fish and shellfish resources: managing diversity*, pp. 176-194. London, Academic Press, Harcourt Brace Company, Publishers. Eknath, A.E. & Doyle, R.W. 1990. Effective population size and rate of inbreeding in aquaculture of Indian major carps. *Aquaculture*, 85: 293-305. Henson, S. J. &Mitullah, W. 2004. *Kenyan exports of Nile Perch: impact of food safety standards on an export-oriented supply chain*. World Bank Policy Research Working Paper No. 3349, Washington, DC, World Bank. Henson, S. J., Brouder, A.M. &Mitullah, W. 2000. Food safety requirements and food

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	exports from deeloping countries: the case of fish exports from Kenya to the European Union. *American Journal of Agricultural Economics*, 82(5): 1159-1169.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.

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10Cs/6 LEARNING GOALS	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA
	√		√	√	√		√	√	√		√		√	√	√		√
~~SDGs~~	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ECTS WORK LOAD	~~Lecture~~	~~Online~~	~~Lab~~	~~Reading~~	~~Course~~ activity	~~Project~~	~~Prepare~~ exam	~~Writing~~ exam	~~Total~~
	√ √		√	√			√		
	4h	3h		10h	15h				32

Module 7	Sustainable Fisheries Management Planning
Learning Outcomes Units	At the end of this module students will be able to: Understanding of the steps to develop a sustainable fisheries plan Making Good Coastal Resource and Fisheries Management Plans Goals and Objectives of Sustainable Fisheries Plans Resource Co-Management Promoting Gear Innovation Changing Fishing Practices Promoting Gear Innovations Behavioral incentives Specific Management Considerations for Different Habitat Types Establishing Area-Based and Time-Based Restrictions Integrated Zonal Methodology Planning Interconnecting Issues in Fisheries Management ~~Fisheries-Related Enforcement~~ Importance of Monitoring and Evaluation Information Management, Education and Outreach
Readings	Islam, F.U. 2007. Self-recruiting species (SRS) in aquaculture: their role in rural livelihoods in two areas of Bangladesh. Ph.D. Thesis, University of Sterling. Jahan, K.M., Ahmed, M. & Belton, M. 2009. The impacts of aquaculture development on food security: lessons from Bangladesh. *Aquaculture Research*, 41(4):481-495. Jamu, D. &Brummett, R. 2004. Opportunities and challenges for African aquaculture. *In* M.V. Gupta, D.M. Acosta & B.O. Bartley. *Use* of genetically improved and alien species for aquaculture and conservation of aquatic biodiversity in Africa, pp.1-9. Penang, Malaysia, Worldfish Center. Marmulla, G., ed. 2001. Dams, fish and fisheries. Opportunities, challenges and conflict resolution. *FAO Fisheries Technical Paper*. No. 419. Rome, FAO. 2001. 166 p. Martin, G. 2008. *ACIAR fisheries projects in Indonesia: review and impact assessment*. ACIAR Impact Assessment Series Report No. 55, 76 p.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words. 5. Dividing students to groups, and assign them to donate different sources of food with the cooperation of different farms and industries to a chosen poor community near the university as a community service task.

Commented [NK28]: Is this the community-based activity??

How does show the relevance of the activity with the food security, climate change, community problems??

10Cs/6 LEARNIN	1	2	3	4	5	6	7	8	9	10	LG	BE	KN	LT	DO	GS	TRA

GGOALS	√		√		√	√		√	√		√		√		√	√	
SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	√	√		√	√										√	√	
ECTS WORK LOAD	Lecture		Online		Lab		Reading		Course activity		Project		Prepare exam		Writing exam		Total
	3h		3h				11h		14h								31

Comments on the overall course

- The course overview / description includes reference to a range of interdisciplinary concepts: from fisheries as an important source of food, overfishing and/or habitat degradation, sustainable management of fisheries, restoring fisheries, resource economics, geography, and political science….. However, when it comes to the course objectives, learning outcomes, schedule and modules, all these concepts presented in the description are not well-emphasized. There needs to be more links between the course description and the other components of the syllabus. Fsheries and food security should be emphasized in relation to climate change form the theoretical background of sustainability. Not making clear these connections will lead to unclear set of course objectives and modules.

- The instructor indicates that the course aims to help students "develop key competencies including knowledge of essential ecological, social, institutional, and economic dimensions of fisheries management; skills in fisheries systems analysis, interview and social survey techniques, resource assessment and modeling, institutional analysis, participatory planning and reflection-in-action; and a repertoire of case studies. The course also aims to foster motivation for shared problem-solving in an interdisciplinary and participatory manner, critical thinking and innovation". Also, the description indicates that "students will develop a case study on a fishery of their choice, applying what they have learned, providing concrete examples for class discussions, and eventually providing an independent review and recommendations for the further management of the fishery". This is well-written in the course description. Nonetheless, it is not clear in the other components of the syllabus. The course developer is invited to be consistent with his description in the other parts of the syllabus- starting from the course objectives to the learning outcomes throughout all modules and activities.

- The course general overview seems thorough and it integrates ESD perspectives. However, the specific activities for each module are only sketched out. It is recommended to better contextualize the activities, defining and structuring their objectives and learning tasks in more details.

- The course outcomes do not match with the course objectives. It is important that learning objectives are consistent with the outcomes and the subsequent course schedule and modules. Even the titles of the units in the modules do not match with the course description.

ECTS Integration in Course Curriculum. Please add a summary table

Learning Components	No	Time Factor	Workload	Course Modules					Workload
				1	2	3	4	5	
Lectures (face-to-face)									
Online									
Lab work									
Reading articles (3 pages per hour)									
Reading book chapters (5 per/h)									
Preparing course activities									
Project work									
Preparation for exam									
Writing the exam									
Total									

CCSAFS Community-Based / Service Learning Activity

There are several modules and each module has the “Same” activity. None of the activities fit the community-based / service learning guidelines. The activities should be linked to the activity goals and learning outcomes, and of course to the mdules. The activity in the last module is the community-based activity you intend to do. But, it is not well-focused. What is the main objective and what methodology you will follow to do it?

Please keep in mind the following:

a) The activity should meet an actual need in the community.
b) The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
c) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society.
d) The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The activity should provide students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

Please try to redesign the activity to show the connections between academic achievement, civic engagement, and personal growth

Include the SDG table to show which SDG is addressed in the different modules.

Course activities should connect the 17 SDGs with the three key domains of the CCSAFS MSc

SDGs		CC	SA	FS	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions on all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS

Jerash University
Course Syllabus

Course Number ( )

Course Title

GIS Applications in Climate Change, Sustainable Agriculture and Food Security

Semester ( )

Instructor Information

Instructor: Prof. Jawad Al-Bakri
Office Location: Office 116, Faculty of Agriculture, The University of Jordan
Telephone: +962-6-5335000, ext 22449
Office Hours: 9-10 Mon., Wed.
E-mail: jbakri@ju.edu.jo
Website: http://eacademic.ju.edu.jo/jbakri/default.aspx

Course Identification

Course Number:
Course Name: GIS Applications in Climate Change, Sustainable Agriculture and Food Security
Course Location: Faculty of Agriculture,
Class Times: Will be identified for each semester
Prerequisites: Computer skills
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

This course aims at enriching the knowledge of the graduate students in the fields of GIS applications in the areas of climate change, sustainable agriculture, and food security (CCSAFS main themese). The approach ~~to achieve this objective~~ is based on both theory and applications of GIS needed to enable ~~the~~ students ~~to~~ understand both ~~of~~ GIS technology and methodology. Special attention is given to spatial analysis and its implementation in real world, particularly in land and water management issues that are directly linked to CCSAFS. The lectures and practical sessions include material from international textbook~~s~~, and web resources, ESRI manuals and GIS projects that have been implemented in Jordan by the course instructor. Both of lectures and practical activities are structured to complement each other. The practical exercises are based on ArcGIS software (v 10.5 and above) and include all aspects of data input, editing and analysis. It is also possible to use existing data from Jordan including soil maps, land use/cover maps, wildlife and vegetation and maps for irrigated areas in Jordan.

Course Learning Objectives:

The course is designed to provide MSc students with the knowledge and skills needed for the scientific use of GIS as an effective tool for data creation and analysis in the fields of CCSAFS. Specific objectives of the course are:

1. To provide the students with the scientific background on GIS, its functions and capabilities in managing land and water resources.

2. To empower the students with knowledge in spatial analysis and the functions needed for GIS application in CCSAFS research projects.

3. To enable the student to utilize GIS and to implement a GIS based analysis that includes the utilization of GIS functions.

Course Content Learning Outcomes:

A. Knowledge and Understanding:
A1- GIS technology and methodology.
A2- Spatial analysis and geoprocessing within GIS.
A3- Coordinates and projections in GIS.
A4- Concept and characteristics of land and water geodatabases.
A5- Main cartographic models and the use of models in GIS.

B. Intellectual, Analytical and Cognitive Skills:
B1- Main components of map and the options for map symbolization.
B2- Possible sources of errors in GIS data and analysis.
B3- Evaluation of GIS data related to CCSAFS and outputs from GIS.

C. Subject- Specific Skills:
C1- The use of spatial analysis to derive the main terrain components.
C2- Methods of interpolation implemented within GIS.
C3- Manipulation of attributes within GIS data.

C4- Main statistical functions used in GIS and map analysis to produce required outputs related to CCSAFS research areas.

D. Transferable Key Skills:
D1- Sources and formats of data used within GIS, with emphasis on data needed for CCSAFS.
D2- Basic and advanced capabilities of GIS software in providing information related to land and water management.
D3- Key areas for GIS applications in CCSAFS.

Course Resources

1. http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html

2. ESRI, 2013. ArcGIS II: Essential Workflows (Student Edition), ESRI Press, Redland, California.

Course Website(s)

Will be announced

Required Course Texts and Materials

Bolstad, P., 2012. *GIS Fundamentals: A first text on Geographic Information Systems* (4th edition), Eider Press, White Bear Lake, Minnesota. (http://www.paulbolstad.net/gisbook.html).

Optional Course Texts and Materials

Chang, K., 2013. *Introduction to Geographic Information Systems*, 7th edition, McGraw Hill, New York.

DeMers, M. N. 2009. *Fundamentals of Geographical Information Systems*, 4th Edition, John Wiley and Sons.

Gorr W.L. and Kurland, K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press.

Allen, D. W. 2010. GIS Tutorial 2: Spatial Analysis Workbook, 2nd Edition for ArcGIS 10. Redland, California, ESRI Press.

Foody, G. M. and PETER M. Atkinson P. M. 2002. Uncertainty in Remote Sensing and GIS. UK: Wiley and Sons.

Gorr, W.L. and Kurland, K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press.

Assignments and Grading Scheme

The course consists of 5 ECTS, each equivalent to 25 hours of teaching and work. The total teaching hours are 30 for lectures and 10 for Lab (40 out of 125). The remaining 85 hours will be divided into 35 hours work of tutorial applied in GIS lab. Therefore, 50 hours of work are expected from the student's side during the semester, distributed as 4 hours per week for 13 weeks.

Grading System

0 to 10 (where 5 is the least passing grade mark)

Grading Policy

Assignments	20%
Exams	60%
GIS project	20%
Total Points	100

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Late assignments are not accepted and their grade will be set to zero.

Classroom Protocol

The course will be structured in lectures, discussions, students' assignments lab reports, in addition to a project that will be implemented and presented by each student. Visual aids will include mobile GIS units, GPS, hardcopy maps and satellite images. Material of the practical sessions (Lab.) will be based on ESRI manuals (GIS Tutorials 1 and 2). The training data is provided with the manuals. All practical sessions will be introduced during the lectures; however students are required to finish the exercises on their own and to submit the required assignments and present case studies and their projects.

Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Course Schedule

Week	Subject
1	Introduction and definitions of GIS and its components, supporting technology and areas of applications.
2&3	Data models in GIS: Spatial data models, types of entities and attributes.
4	Attribute tables and geodatabases
5	Maps and their elements: Types of Maps, Map generalization, Cartographic symbolization, Map display and symbology
6	Coordinates and projections: earth geometry, geographic coordinates and projections, GPS technology and its applications.
7	Data input and editing: data for GIS, methods of data entry and editing in GIS
8	Midterm Exam and student presentations
9	Basic spatial analysis: vector data analysis, basic raster analysis
10	Advance spatial analysis: measurements, simple distance, functional distance,
11	Geo-processing and measuring geographic patterns
12&13	Terrain analysis: slope and aspect, hydrologic functions, viewsheds.
14&15	GIS project: identifying the application area (a case study for each student) problem, workflow of GIS analysis, student presentation
16	Final hour Exam

Course Modules

Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
Module 1	Introduction to GIS and its applications in CCSAFS
Key Concepts	GIS, GIS components, GIS applications
Overview	This module defines GIS and its components with the supporting technologies to GIS. The need for GIS in organization and the concept of modeling real world are also introduced. The module provides examples on GIS applications with emphasis on climate change and sustainable agriculture.
Aim	The overriding aim of this module is enable the students to understand the following: 1. GIS technology and its roles and areas of application in climate change and sustainable agriculture. 2. Basic and advanced capabilities of GIS software in providing information related to land and water management. 3. Provide a basic understanding of GIS layers and mapping of the real world.
Learning Outcomes	At the end of this module students will be able to: 1- Gain a general understanding of GIS and its components and the areas of applications 2- Understand the concept of GIS models and how data is combined to derive spatially based solutions.
Units	1- What is GIS? 2- GIS components 3- GIS in Organization 4- Mapping where things are 5- Mapping the most and Least 6- Mapping Density 7- Mapping Change
Readings	1- Bolstad P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapter 1 2- Chang K., 2013. Introduction to Geographic Information Systems, 7th edition-Chapter 1. 3- Mitchell, A., ESRI Guide to GIS Analysis, Volume 1: geographic patterns and relationships-Chapters 2-7 4- Gorr, W.L. and Kurland, K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press-Chapter 1.

Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
Activity	1. Four theoretical lectures given by the instructor. 2. Practical session 1: Introduction to ArcGIS, ArcGIS, working with map layers, Making Measurements, Work with feature attributes, selecting and labelling features. 3- Student assignment on mapping where things are? and working with categories and applications of GIS in areas of CCSAFS.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
~~ECTS~~ WORK LOAD	
Module 2	Data models and structure of data in GIS
Key Concepts	Vector, Raster, entity, attributes, geodatabase
Overview	The overall aim of this module is to enable the student to understand how features in the real world are presented in GIS and what is the most suitable data structure and model for representing the data. The types of features in GIS and the common spatial data models with entities and attribute types are discussed with the students with examples on sources of data for CCSAFS. The types of edits and data entry suitable for specific applications are also introduced. The module will include the geodatabase components and characteristics with functions and objectives of queries and joins in geodatabases.
Aim	The aim of this module is to provide a comprehensive understanding of GIS data models and their abilities to represent thereal world in different layers of information. The module has three objectives: 1- Characterizing the differences in GIS models 2- Introducing the geodatabase and its advantages 3- Identifying sources of data for GIS and types of data entry in GIS

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Commented [NK2]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
Learning Outcomes	At the end of this module students will be able to: 1- Understand the components of GIS models and the differences among them. 2- Identify the appropriate data entry method and the type of edits required for GIS data. 3- Know formats of data used within GIS and sources of these data, with emphasis on data needed for CCSAFS. 4- Understand the structure and advantages of geodatabases.
Units	1- GIS model structure 2- Vector data model 3- Raster data model 4- Data entry and editing 5- Geodatabases and GIS data representation
Readings	1. Bolstad, P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapters 2,4,8 2. Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition-Chapters 3, 5, 6, 8, 9. 3. Michael, Z., Modeling Our World: ESRI Guide to Geodatabase Design-Chapters 1, 3, 4. 4. Gorr, W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, Redland, California, ESRI Press-Chapters 4&5.
Activity	1- Theoretical lectures (6 to8) given by the instructor. 2- Practical sessions: File Geodatabases, Spatial data 3- Student assignment on spatial data sources, geodatabases and spatial edits.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	
~~Module 3~~	~~Coordinates and projections in GIS~~

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Commented [NK4]: It is suggested to provide details about these activities

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Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
Key Concepts	Longitude, Latitude, projections, UTM, GPS, KML, Track, Way point
Overview	The module will provide students with the background on map coordinates and projections used in GIS. The justifications and the use for local and universal projections are also explained. The use of GPS to record coordinates and plan for field surveys is also covered by this module with emphasis on the integration of GIS with open source data, topographic maps and high resolution satellite images for implementing field surveys.
Aim	To enable the students to deal with map coordinates and projection systems while achieving the following objectives: 1- differentiate between coordinates and projections. 2- identify~~ing~~ the roles and applications of GPS 3- distinguish~~ing~~ the different data formats that can be read and used with GPS 4- utiliz~~ing~~ GPS reading as data source for GIS
Learning Outcomes	At the end of this module students will be able to: 1- understand the differences between coordinates and projections. 2- use GPS units in recording waypoint coordinates and tracks. 3- identify the components of an informative map and its components with the most appropriate map symbolization 4- plan field surveys by utilizing GPS and Topographic maps
Units	1- Earth surface and geographic location, projections and datums 2- Coordinate Systems 3- Global Navigation Satellite Systems and Coordinate Surveying 4- Geocoding 5- Map basics 6- Maps, digital data and cartographic elements
Readings	1. Bolstad, P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapters 3&4. 2. Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition-Chapter 10. 3. DeMers, M. N. 2009. Fundamentals of Geographical Information Systems, 4th Edition-Chapter 3. Michael, Z.,A., Modeling Our World: ESRI Guide to Geodatabase Design-Chapters 1, 3, 4. 4. Mitchell, A., ESRI Guide to GIS Analysis, Volume 1: geographic patterns and relationships-Chapter 2. 5. Gorr, W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, California, ESRI Press-Chapter 2.
Activity	1- Theoretical lectures (2) given by the instructor. 2- Practical sessions: Map design, GPS for survey 3- Student assignment on the use of GPS for data collection and entry to GIS

Commented [NK6]: ?

Commented [NK7]: Elaborate on the activity by linking it to the CCSAFS project main themes… data on climate, on water….

Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	
Module 4	Spatial analysis and GIS capabilities
Key Concepts	Overlay, buffer, proximity, reclassification, intersection, attribute, selection, measurements
Overview	Spatial analysis is the heart of GIS methods and technology. The ultimate goal from the use of GIS in CCSAFS is to analyse data to obtain information and spatial patterns on most appropriate locations, environmental problems and trends. Therefore, this module will present and discuss the main functions that GIS can provide and the layers that can be produced when applying GIS models and operations. In addition, the module will provide the students with hands on experience needed for a GIS-project that will be implemented by each student enrolled in the course.
Aim	The overriding aim of this model is understand the capabilities of GIS and the functions that can be used to analyze data within GIS so that solutions are provided. The specific objectives for this module are to: 1- recognize the different terms of spatial analysis for vector and raster models. 2- identify the and types of geo-processing techniques needed for certain application in CCSAFS.
Learning Outcomes	At the end of this module students will be able to: 1- understand the concept of GIS technology and methodology. 2- implement the basic and advanced spatial analysis and geo-processing within GIS. 3- evaluate the GIS data and outputs related to CCSAFS. 4- identify the key areas for GIS applications in CCSAFS.
Units	1- Spatial analysis 2- Topics in raster analysis 3- Measurements 4- Spatial arrangements
Readings	1. Bolstad, P., 2012. GIS Fundamentals: A first text on Geographic

Commented [NK8]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
	Information Systems (4th edition)-Chapters 9&10. 2. Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition-Chapters 12&13. 3. DeMers, M. N. 2009. Fundamentals of Geographical Information Systems, 4th Edition-Chapter 3. 4. Michael, Z.,A., Modeling Our World: ESRI Guide to Geodatabase Design- Unit 4. 45. Mitchell A., ESRI Guide to GIS Analysis, Volume 1: geographic patterns and relationships-Chapters 3, 5, 6. 56. Gorr W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic ~~Workbook, 10.1 Edition, ESRI Press-Chapter 9.~~
Activity	1- Theoretical lectures given by the instructor. 2- Practical sessions: Spatial analysis from GIS Tutorial with assignments at end of chapter 3- Student presentation on a case study where spatial analysis is implemented.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
~~ECTS~~ WORK LOAD	
Module 5	GIS modeling
Key Concepts	DEM, Terrain, watershed, slope, aspect, hydrology, spatial analysis, curvature, stream, cartographic models
Overview	The goal behind the use of GIS is to provide means of analysis and solutions to problems related to environment. Therefore, this module intends to provide the student with the GIS tools and methods needed for modeling, particularly for devolving water resources. The module will be based on a student-project that will be based on a real data from Jordan. In this project, students are asked to analyse topographic and land use data to identify the borders of watersheds and its components needed for developing water and land resources within a study area. The other option for students is to apply cartographic modeling on real data to detect environmental changes.

Commented [NK9]: Explain the activity and practical sessions

Commented [NK10]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	GIS Applications in Climate Change, Sustainable Agriculture and Food Security
Aim	The model aims to provide students with modeling and terrain analysis functions needed in CCSAFS research areas. Other objectives for this module are to: 1- enable the student to apply hydrological functions and analysis within GIS. 2- characterize watershed components needed for developing surface water resources through water harvesting projects. 3- design and apply cartographic models needed for change detection.
Learning Outcomes	At the end of this module students will be able to: 1- understand the GIS functions deployed in modeling, particularly those related to terrain and watershed. 2- understand and utilize GIS capabilities in providing information related to CCSAFS. 3- identify the main hydrological and terrain functions analysed within GIS.
Units	1- Terrain mapping and analysis 2- Viewsheds and watershed 3- GIS models and modeling 4- GIS outputs
Readings	1. Bolstad, P., 2012. GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapters 11&13. 2. Chang, K., 2013. Introduction to Geographic Information Systems, 7th edition-Chapters 14&15. 3. Mitchell, A., ESRI Guide to GIS Analysis, Volume 1: geographic patterns and relationships-Chapters 1&7. 4. Gorr, W.L. and Kurland K. S. 2013. AGIS Tutorial 1: Basic Workbook, 10.1 Edition, ESRI Press-Chapter 11.
Activity	1- Theoretical lectures given by the instructor. 2- Practical sessions: Spatial analysis from GIS Tutorial (Chapter 11) 3- Student project on watershed and/or cartographic modeling.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	

Commented [NK11]: Explain in details. Is this the community-based activity?

Commented [NK12]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

1) Please make sure to add the ECTS Student Workload summary table

The ECTS Student Workload Rubric for Assessing ECTS Integration in Course Curriculum is missing. You should include an ECTS Student Workload Rubric for Assessing ECTS Integration in CCSAFS Course Curriculum

The workload is divided into a series of learning components, each involving an estimated number of hours of work (time factor). The total workload should match the learning hours indicated by the credit value of the course and be consistent with the rubric

- Reaching the learning outcomes of a course and course modules is directly linked with the *workload* of a course (based on ECTS).
- Workload refers to the expected time an average student might need to complete the required learning outcomes.
- Student workload covers all educational components of a study program (attending lectures, face-to-face and/or online, seminars, reflections, work placements, dissertations, projects, laboratory work, self-study and examinations). Student workload covers all aspects of learning and is not related solely to formal teaching hours.
- It is very critical to weight each component in line with the learning objectives and outcomes, in total and separately for each course module.

ECTS WORKLOAD RUBRIC

Learning Components	No	Time Factor	Workload	Course Modules					Workload
				1	2	3	4	5	
Lecture (face- to- face)									
Online									
Lab Work									
Reading									
Course activities									
Project Work									
Prepare exam									
Writing the exam									
Total									

Be careful on the following:

a) Alignment: The allocation of student workload should match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.

b) Balance: There should be strong evidence that the distribution of the working hours is done appropriately between the course modules.

c) Coverage: The allocation of student workload should match up well with course activities and assessments.
d) Communication: There should be strong evidence that the student workload allocation is clearly understood and communicated to students.
e) Monitoring: There should be strong evidence that the way student workload is allocated makes easier to monitor student progress and to assess whether workload is actually implemented.

2) SDGs RUBRIC

Commented [NK13]: It is suggested to add this rubric and mark in the table the corresponding info- to be consistent with all other syllabi submitted

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I have provided you with a summary table where you can do these connections. It is not clear in your modules. Please follow the same format.

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests,				

	combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

3) CCSAFS Community-Based / Service Learning Activity

There are different activities in the course, but none of them is carefully designed to reflect a community-based / service learning perspective. To improve the activities described:

a) The connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.
b) The activity should meet an actual need in the community and is coordinated through collaboration with the community.
c) The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
d) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

I have provided you with a clear checklist that summarizes all the above-mentioned points. Please try to re-think the activities as suggested.

GENERAL COMMENTS

Overall, the course is well structured.

At the end of each module, you should add the SD pillars, 21st ESD, SDG goals, vision 2030, and ECTS workload

Make sure to add the ECTS Workload Rubric and the SDG Rubric at the end of the syllabus

Make sure to explain the activities in details and elaborate more on what are the tasks the students will do. Activities should be stimulating and thought provoking and should match the learning outcomes in the corresponding module.

The community-based or service-learning activity goals and its expected learning outcomes are NOT clearly identified. It is preferable to highlight the community-based activity in a way to connect between academic achievement, civic engagement, and personal growth to support transformative learning. Based on a student-centred approach, the course and the activity should provide an active role for students, supporting opportunities for cooperative learning.



CCSAFS COURSE SYLLABUS

Jerash University

~~Course Syllabus~~

Course Number ( )

~~Course Title~~

Precision Farming

Semester ( )

Instructor Information

Instructor: Prof. Jawad Al-Bakri
Office Location: Office 116, Faculty of Agriculture, The University of Jordan
Telephone: +962-6-5335000, ext 22449
Office Hours: 9-10 Mon., Wed.
E-mail: jbakri@ju.edu.jo
Website: http://eacademic.ju.edu.jo/jbakri/default.aspx

Course Identification

Course Number:
Course Name: Precision Farming
Course Location: Faculty of Agriculture,
Class Times: Will be identified for each semester
Prerequisites: Geographic Information System (GIS)
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

Applying technology for agricultural production and monitoring has increased with time, particularly with developments in ICT and sensing technologies. The conventional methods of field surveys and census for forecasting agricultural production and monitoring agricultural lands are diminishing with time and became part of history. Alternatively, real time monitoring tools are used to provide agricultural institutions, researchers and decision makers with data and information pertaining to agricultural production and food security level. Therefore,, this course will provide the students with precision agriculture background, covering both the

applications and the different technologies including the use of geographic information systems (GIS), global positioning systems (GPS), multispectral and hyperspectral remote sensing systems for both large and small scale applications. The course will focus on application of precision farming for soil sampling, fertilizers need through sensing technologies, yield monitoring, pest monitoring with hyperspectral technology for ~~and~~ management of agricultural lands through the use of multispectral instruments. Students will work on case studies where UAV and Drone technologies area used, VRT for fertilizers and pesticides is applied, ICT is utilized for management and marketing of crops. Emphasis shall be placed on how the systems work, data is acquired, processed and analysed.

Course Learning Objectives:

The course aims to provide and explain the knowledge and techniques implemented in precision farming to achieve sustainable agricultural systems that contribute to food security. The objectives of the course are to:

- Enable the students to collect and critically analyse appropriate data, to define the plant development/growth problem.
- Develop an appropriate balance between didactic and self-directed learning, while encouraging a teaching approach which fosters lifelong learning skills and promotes critical thinking in problem-solving approach.
- Develop a learning atmosphere that encourages enthusiasm and professional behavior that improves competency in agricultural technology.
- Apply current technologies to access and utilization of information for managing agricultural areas.

Course Content Learning Outcomes:

- Increase~~d~~ awareness in the fields of precision agriculture and ICT deployed in the modern farming systems.
- Develop~~ed~~ knowledge and understanding of precision farming towards ~~the~~ sustainable agriculture.
- Enhance~~d~~ and empower~~ed~~ students in the field of sustainable agriculture.
- Utilize~~d~~ background in statistics and agronomy for the purpose of improved and sustainable agriculture.
- Improve~~d~~ abilities in the fields of monitoring and assessment of crop health and yield.
- Identify~~ied~~ means needed for integrating the fields of ICT and agriculture towards the development of digital farming.
- Develop~~ed~~a learning atmosphere that encourages enthusiasm and professional behaviour that improves competency in agricultural technology.

Course Resources

http://cema-agri.org/page/precision-farming-key-technologies-concepts

www.progis.com/

https://www.therobotreport.com/top-10-technologies-in-precision-agriculture/

https://earthobservatory.nasa.gov/Features/PrecisionFarming/

Commented [NK1]: Provide full references before the link- including author, year, titles, etc.

Course Website(s)

Will be announced

Required Course Texts and Materials

1- Ess D. R. and Morgan, M. T. (2010). The Precision-Farming Guide for Agriculturalists: An Agricultural Primer. Deere & Company: Moline, IL. 168 pp.

2- Tulsa, Kumar L.H., Singh, R. (2014(. Precision Farming: a New Approach. Daya Publishing House, 452 pp.

Optional Course Texts and Materials

1- Zhang, Q., (2016). Precision Agriculture Technology for Crop Farming, CRC Press

2- Jensen J. R., (2007,) Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Ed., Upper Saddle River, NJ: Prentice Hall, 592 pages.

3- Burrough, P. A., McDonnell, R. A. and Lloyd, C. D. (2015). Principles of Geographical Information Systems, 3rd ed., Oxford University Press, 352 pp.

4- Bolstad, P., (2012). GIS Fundamentals: A first text on Geographic Information Systems (4th edition), Eider Press, White Bear Lake, Minnesota.

5- Krishna, K.R. (2013). Precision farming: Soil fertility and productivity aspects. Apple Academic Press, 160 pp.

Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark).

Grading Policy

Assignments	20%
Exams	60%
GIS project	20%
Total Points	100

Course Policies

Late Assignments and Plagiarism

It is essential that papers and other assignments be completed and submitted on time. Late assignments are not accepted and their grade will be set to zero. Students who either intentionally or unintentionally practice plagiarism will receive a grade of zero for that assignment.

Classroom Protocols

The course will be structured in lectures, students' assignments and reports. Class attendance contributes significantly to academic success and student's learning outcomes. Therefore, university laws are applied to presence and absence. If a student is absent ~~from~~ for a class for any reason, the student is responsible for all

missed work and for promptly contacting his/her instructor. Class room conduct ~~shall not contradict~~follows ~~with the~~ university regulations.

Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Course Schedule

Week	Subject
1	Precision farming: definition, importance~~,~~ and current areas of application ~~at present~~
2	Precision farming and spatial variability of soil and water
3	Crop spatial variability: Yield Monitoring & Mapping
4	GIS and GP roles in precision farming
5	Spatial interpolation methods within GIS
6	GIS tools for guiding variable rate technology (VRT)
7	Automation and Telematics (Student assignment and presentations)
8	Midterm Exam
9	Space-based multispectral remote sensing technology
10	Spectral reflectance of vegetation, soil and water
11	Hyperspectral remote sensing
12	Unmanned air vehicles (UAVs) and Drone
13	Precision farming at large scale: improved water and crop management
14	Precision Farming Economics and Adoption
15	Developing digital farming (Student assignments and presentations)
16	Final hour Exam

Course Modules

Course	Precision Farming
Module 1	Precision farming applications, requirements and economy
Key Concepts	Precision farming, GIS, GPS, yield, fertilizers, crop maps, marketing, ICT
Overview	The module introduces the precision farming as a modern branch of science that aids in managing agricultural areas while ensuring their sustainability. The functions of precision farming, the main tools used and the importance of precision farming for decision making are emphasized.
Aim	The module aims to explain the functions of precision farming and how does it operate. Upon completion of this unit, the student will: 1. know the meaning of Precision Farming, GPS, and GIS 2. recognize GPS, GIS and VRT as tools for use in Precision Farming 3. recognize the technological tools of precision farming 4. Define precision agriculture from the managerial technological and social perspectives.
Learning Outcomes	At the end of this module students will be able to: 1- define and understand precision farming 2- develop a diagrammatic relationship between GIS, GPS, remote sensing and precision farming. 3- identify the cases that require application of precision farming
Units	1- What is Precision Farming? 2- Precision farming methodology and Components 3- Geographic and Economic aspects of precision farming
Readings	1- Krishna, K.R. (2013). Precision farming: Soil fertility and productivity aspects. Apple Academic Press, 160 pp. 2- Ess D. R. and Morgan, M. T. (2010). The Precision-Farming Guide for Agriculturalists: An Agricultural Primer. Deere & Company: Moline, IL. 168 pp. 3- Tulsa, Kumar L.H., Singh, R. (2014). Precision Farming: a New Approach. Daya Publishing House, 452 pp. 4- Different websites (student task)
Activity	1. Two theoretical lectures given by the instructor. 2. Interactive learning: instructor and students will discuss benefits of precision farming using and problems with adopting this technology. Students will apply what they learned about precision farming to develop a list of specific benefits of precision farming. 3- Student presentation: Some of the students will be asked to prepare multimedia files on the use and benefits of precision farming with examples that can be adopted in the Arab region.

Course	Precision Farming
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	
Module 2	Precision farming and spatial variability of soil and crop.
Key Concepts	Spatial variability, semi-variogram, kriging, interpolation, yield map, VRT
Overview	The module introduces the concept of spatial variability and the advantages of its use over the classical statistics. Soil spatial variability and its impacts on crop yield ~~is~~ are discussed. The maps of crop yield and their implications and usefulness are discussed with the students, who are required to create example maps to work on and to use for VRT of fertilization.
Aim	The module aims to enable the student to identify the soil and management factors that influence crop yield. The objectives are: 1. Understand the concept of spatial variability and soil sampling 2. Identify key issues affecting crop yield
Learning Outcomes	At the end of this module students will be able to: 1- Identify the various methods for sampling soils and mapping their spatial variability. 2- understand the yield maps and the potential benefits and limitations of these maps. 3- list objects or field data that can be mapped 4- describe benefits for farm management
Units	1. Soil Formation and Change Across Landscapes 2. Soil Mapping Technology 3. Sampling schemes and methods 4. Grid and Zone Soil Sampling 5. Crop Spatial Variability 6. Yield Monitor Technology

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<table>
<tr><th>Course</th><th>Precision Farming</th></tr>
<tr><td>Readings</td><td>1- Ess D. R. and Morgan, M. T. (2010). The Precision-Farming Guide for Agriculturalists: An Agricultural Primer. Deere & Company: Moline, IL. 168 pp.
2- Krishna, K.R. (2013). Precision farming: Soil fertility and productivity aspects. Apple Academic Press, 160 pp.
3- Zhang, Q., (2016). Precision Agriculture Technology for Crop Farming, CRC Press
4- Burrough, P. A., McDonnell, R. A. and Lloyd, C. D. (2015) Principles of Geographical Information Systems, 3rd ed., Oxford University Press, 352 pp.</td></tr>
<tr><td>Activity</td><td>1- Theoretical lectures given by the instructor.
2- Student assignment and activities:
I. Each group will complete a table and answer the question that follows.
<table><tr><th>Mapped Information or Type of Map</th><th>Benefits to Farm Management</th><th>Benefits to Record Keeping</th></tr><tr><td>Yield Map</td><td>Decide why some areas had low yield and adjust management</td><td>Know which varieties yielded the most</td></tr><tr><td>Soil fertility</td><td>Selective application of fertilizers</td><td>Establish cost per dunum</td></tr></table>
II. each student will prepare a grid a map and assumed points of sampling for soil and plants and a map for yield and will present it to the group showing advantages and limitations.</td></tr>
<tr><td>SD Pillars</td><td></td></tr>
<tr><td>21st ESD</td><td></td></tr>
<tr><td>SDGs
Sub goals</td><td></td></tr>
<tr><td>Vision 2030</td><td></td></tr>
<tr><td>ECTS WORK LOAD</td><td></td></tr>
<tr><td>~~Module 3~~</td><td>~~GIS and GPS roles in Precision Farming~~</td></tr>
<tr><td>Key Concepts</td><td>GIS, GPS, coordinates, interpolation, IDW, spatial statistics</td></tr>
<tr><td>Overview</td><td>Roles of GIS and GPS in precision farming will be explained, with emphasis on spatial interpolation. Students will utilize capabilities and functions of GIS to generate maps of soil and crop yield using spatial interpolation methods. The use of GPS to record coordinates for sampling points and to generate yield and soil map will be covered by this module.</td></tr>
</table>

Commented [NK3]: Not an activity

Commented [NK4]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	Precision Farming
Aim	To explain the roles of GIS and GPS as key corners in precision farming and to enable the students to use these tools produce crop and soil. Specific objectives are 1. Recognize and utilize the roles of GIS and GPS in precision farming and site-specific crop production. 2. Understand and implement the steps needed to generate maps of crops and soils by utilizing spatial interpolation techniques
Learning Outcomes	At the end of this module students will be able to: 1- use GPS units in recording point data needed for yield maps. 2- implement functions of spatial interpolation within GIS. 3- use GIS package to set grids and samples and transform these grids into maps.
Units	1- Spatial interpolation in GIS 2- GPS functions 3- Spatial statistics 4- Crop maps 5- Soil fertility maps 6- VRT
Readings	1. Bolstad P., (2012). GIS Fundamentals: A first text on Geographic Information Systems (4th edition)-Chapters 3&4. 2. Chang K., (2013). Introduction to Geographic Information Systems, 7th edition-Chapter 10. 3. Burrough, P. A., McDonnell, R. A. and Lloyd, C. D. (2015) Principles of Geographical Information Systems, 3rd ed., Oxford University Press, 352 pp. 4. Ess D. R. and Morgan, M. T. (2010). The Precision-Farming Guide for Agriculturalists: An Agricultural Primer. Deere & Company: Moline, IL. 168 pp.
Activity	1- Theoretical lectures (2) given by the instructor. 2- Practical sessions and student activities: each group of student is asked to prepare a project that is based on a real case for an agricultural area near Jarash. The crops yield shall be collected ~~on~~ in the form of point data, along with soil properties (analysed for main macro nutrients). Students are then required to enter the data in GIS and prepare maps for crop yields and soil properties using spatial analysis and interpolation techniques. Each group shall present its results to the class, with recommendations for VRT of fertilizer. A similar project for pesticide is also possible and encouraged.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	

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Course	Precision Farming
ECTS WORK LOAD	
Module 4	Multispectral remote sensing
Key Concepts	EOS, Landsat, Sentinel, World View, RapidEye, spectral reflectance, image processing, multispectral, NDVI, digital classification
Overview	The module explains the technology of remote sensing and its applications in precision farming. The progressive development in the field of digital image processing and the new earth observation systems (EOS) will be covered in this module, with possible application for the groups of sensors in precision farming at different scales.
Aim	The overall aim is to explain the parameters and information that can be derived from multispectral remote sensing data and its implications to precision farming. Specific objectives include: 1- providing the scientific background on quantities and indices that can be derived from multispectral data. 2- explaining the roles of remote sensing and possible uses of the technology in precision farming.
Learning Outcomes	At the end of this module students will be able to: 1- understand the structure of multispectral remote sensing data. 2- gain knowledge in the field of remote sensing and EOS. 3- identify the appropriate datasets and products of EOS needed for precision farming. 4- integrate remote sensing technology and GIS towards future digital farming
Units	1- Earth observation systems 2- Remote sensing dataflow and structure. 3- Spectral reflectance of vegetation, soil and water 4- Image transformations
Readings	1. Jensen J. R., (2007), Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Ed., Upper Saddle River, NJ: Prentice Hall, 592 pages. 2- Tulsa, Kumar L.H., Singh, R. (2014). Precision Farming: a New Approach. Daya Publishing House, 452 pp. 3- Bolstad, P., (2012). GIS Fundamentals: A first text on Geographic Information Systems (4th edition), Eider Press, White Bear Lake, Minnesota. 4- NASA Earth Observatory https://earthobservatory.nasa.gov/Features/PrecisionFarming/ 5- Weng Q. (2014) Remote Sensing of Natural Resources. CRC Press (Taylor & Francis Group). 6- Al-Metwali A. M. H. (2008). Remote Sensing as a Precision Farming Tool in the Nile Valley, Egypt. University of Stirling.

Commented [NK7]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	Precision Farming
Activity	1- Theoretical lectures given by the instructor, supported by handouts and short manuals for carrying out digital image processing functions that area relevant to precision farming. 2- Student assignment and presentation on a case study where remote sensing is implemented for precision farming. Multimedia files and presentations are encouraged and prioritized.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	
Module 5	Hyperspectral remote sensing for precision farming
Key Concepts	Hyperspectral, transformation, spectral libraries, UAV, Drones, radiometers, ASD
Overview	Advanced techniques of crop sensing have been developed with the use of hyperspectral technology on board drones and UAV. Hyperspectral scanners are currently used to detect crop diseases and pest and to assess plant health. These techniques are very advanced and required good infrastructure and financial resources to operate. Their costs, however, is justified by the benefits obtained and by the services they provide for decision makers and farmers. This module discusses the principles and the applications of hyperspectral technology in precision farming. Students will put hands on technology and will be familiar with services and products provided by the hyperspectral technology.
Aim	The model aims to introduce and discuss the applications of hyperspectral technology in precision farming, particularly at the farm level. Specific objectives of the module are: 1- to identify the components of operational hyperspectral technology needed for precision farming. 2- provide case studies and hyperspectral models that can be adopted and applied in developing countries.

Commented [NK8]: Elaborate on the activity

Commented [NK9]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	Precision Farming
Learning Outcomes	At the end of this module students will be able to: 1- understand the physical quantities and parameters that can be mapped by the hyperspectral instruments. 2- differentiate between multispectral and hyperspectral data and the cases suitable for the use of each or both. 3- gain knowledge on applications of hyperspectral technology and models that can work at low cost.
Units	1- Hyperspectral scanners 2- UAV and Drones 3- Hyperspectral data analysis. 4- Data handling and processing
Readings	1. Jensen J. R., (2007), Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Ed., Upper Saddle River, NJ: Prentice Hall, 592 pages. 2- Tulsa, Kumar L.H., Singh, R. (2014). Precision Farming: a New Approach. Daya Publishing House, 452 pp. 3- NASA Earth Observatory https://earthobservatory.nasa.gov/Features/PrecisionFarming/ 4- Adão T. et al. (2017). Hyperspectral Imaging: A Review on UAV-Based Sensors, Data Processing and Applications for Agriculture and Forestry." Remote Sensing, 9 (2): 1110. (doi:10.3390/rs9111110)
Activity	1- Theoretical lectures given by the instructor. 2- Student assignments and presentation on case studies where hyperspectral is used in precision farming. All presentation shall include multimedia files and demos.
SD Pillars	
21st ESD	
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	
~~Module 6~~	~~Automation, Telematics and Robotics in Precision Farming~~
Key Concepts	Telemetry, weather stations, robotics, automated system, steering, ISOBUS, VRT

Commented [NK10]: Explain, provide details about these activities

Commented [NK11]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

Course	Precision Farming
Overview	The use of different technology to manage crops at small and large scales is important and forms major component in precision farming. Thus, the module will subject the students to the high tech instruments and technology in precision farming, with field visits to institutions that use or provide these elements. At present, the use of telemetry has been growing in the area of agro-climatology and water information systems. Therefore, planned visits will be carried outs to the Meteorological Department and the Ministry of Water and Irrigation to discuss the data recorded by the telemetry systems. Also, visits to some farms and companies involved in the use and business of Automation and Robotics is also possible.
Aim	The model aims provide knowledge on the tools of technology used in precision farming. Specific objectives of the module are: 1- to identify the level of ICT use and contribution in precision farming. 2- gain knowledge on the telematics, robotics and automation technology in precision farming.
Learning Outcomes	At the end of this module students will be able to: 1- identify the types of technology tools used in precision faming. 2- build a comprehensive image on the components of precision farming at large and small scales. 3- select among options of technology for precision farming.
Units	1. Implement Steering 2.Implement Coordination 3.VRT for planter and Pesticides 4. Automatic Boom Leveling 5. Telematics Technology 6. ISOBUS Concept and Technology
Readings	11- Ess D. R. and Morgan, M. T. 2010. The Precision-Farming Guide for Agriculturalists: An Agricultural Primer. Deere & Company: Moline, IL. 168 pp. 2- Tulsa, Kumar L.H., Singh, R. 2014. Precision Farming: a New Approach. Daya Publishing House, 452 pp. 3- Zhang, Q., 2016. Precision Agriculture Technology for Crop Farming, CRC Press. 4- Different web resources
Activity	1- Field visits for farms, companies and institutions. 2- Case studies presented by students on the use of robotics and telematics. 3- Demonstration sessions prepared by students with models and products from markets
SD Pillars	
21st ESD	

Commented [NK12]: Explain, provide details about these activities

If this is the community-based activity. More information is needed to show its expected learning outcomes. The community-based activity should connect between academic achievement, civic engagement, and personal growth to support transformative learning. Based on a student-centred approach, the course and the activity should provide an active role for students, supporting opportunities for cooperative learning.

Course	Precision Farming
SDGs Sub goals	
Vision 2030	
ECTS WORK LOAD	

Commented [NK13]: These should be include at the end of every module. Please refer to the syllabus template provided by Professor Makrakis

1) Please make sure to add the ECTS Student Workload summary table

ECTS WORKLOAD RUBRIC

Learning Components	No	Time Factor	Workload	Course Modules					Workload
				1	2	3	4	5	
Lecture (face- to- face)									
Online									
Lab Work									
Reading									
Course activities									
Project Work									
Prepare exam									
Writing the exam									
Total									

The allocation of student workload should match up well with learning objectives, outcomes, so students learn what they intend to learn accurately.

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2) SDGs RUBRIC

Commented [NK14]: It is suggested to add this rubric and mark in the table the corresponding info- to be consistent with all other syllabi submitted

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I have provided you with a summary table where you can do these connections. It is not clear in your modules. Please follow the same format.

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

3) CCSAFS Community-Based / Service Learning Activity

There are different activities in the course, but none of them is carefully designed to reflect a community-based / service learning perspective. You should highlight the connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.

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GENERAL COMMENTS

Overall, the course is well structured.

At the end of each module, you should add the SD pillars, 21st ESD, SDG goals, vision 2030, and ECTS workload

Make sure to add the ECTS Workload Rubric and the SDG Rubric at the end of the syllabus

Make sure to explain the activities in details and elaborate more on what are the tasks the students will do.

The community-based or service-learning activity goals and its expected learning outcomes are NOT clearly identified.



CCSAFS COURSE SYLLABUS

Jerash University
Course Syllabus

Course Number (????????)

Course Title
Sustainable and Ethical livestock Management

Semester ()

Instructor Information

Instructor: Hani A. M. Talafha
Office Location:Faculty of Agriculture Building
Telephone: 0096226350521
Office Hours ( ).
E-mail: hanit@just.edu.jo

Course Identification

Course Number:
Course Name: Sustainable and ethical livestock management (Sustainable Livestock System)
Course Location: Faculty of Agriculture
Class Times: Not Now
Prerequisites:
Faculty Web Page:

Course Description/Overview

Introducing sustainability in livestock production systems has been very important recently. Such production systems will emphasize~~e~~s production resources conservation by regeneration and substitution of increasingly rare resources. In addition, sustainable production systems will ~~insure~~ ensure functional integrity of production

parameters such as animal welfare and animal ethics. Theses parameters are associated with the five freedoms inputs or factors of animal welfare such as animal survival, reproduction, health, mental status and naturalness.

The course aims to help students develop key competencies including knowledge of essential ecological, social, institutional, and economic dimensions as part of a an ethical sustainable farming system. Topics included are animal welfare and animal use ethics concept, animal welfare inputs, livestock production systems and resources, animal welfare to improve production and assessment of livestock production systems using the welfare concept. Upon completion, students should demonstrate an understanding of the role of livestock production in a sustainable production system under the umbrella of welfare. Field trips are an essential part of this course; students are expected to pay attention to where class meetings will be held based on the syllabus.

Course Learning Objectives:

1) Define terminology and concepts related to sustainable farming practices.
2) Describe the ecological, economical, and social implications of agricultural practices.
3) Define the concept of welfare and ethical livestock production.
4) Apply best welfare practices in livestock management to maximize animal productivity.
5) Utilize a systems approach to analyze agriculture in your own backyard and/or community.
6) Identify resources for solving problems facing farmers, in order to reduce waste and energy consumption in agriculture.
7) Expand consumer awareness and support of ethical alternatives.
8) Describe strategies to increase profit and efficiency for sustainable producers.
9) Strengthen group work, communication, facilitation and reporting skills
10) Reflect on the wider management or conservation context of their research problem (or another issue of their choice)

Course Content Learning Outcomes:

Animal products requirement is increasing due to the enormous increase in global population. Such demand on animal product result in direct or indirect influence towards~~ered~~ animal's quality of life and environment. This can either be utilizing production resources or livestock production plan and management. The overall aim with the course is to give the students the necessary basic information about sustainable livestock production and the effect of good practises of welfare on productivity. This should be set in overall view so the students are able to critically evaluate the factors which are important for a sustainable growth in the ethical livestock production systems.

Upon completion of this course, students should demonstrate competency in:

- Selection of appropriate livestock production system to ~~insure~~ ensure sustainable and ethical plan.

- Selecting appropriate environment for livestock production to maintain best animal welfare.
- Evaluating animal welfare to maintain ethical livestock use and increase productivity.

Teaching and learning approach

The course is designed to foster multi-disciplinary and integrative problem-solving skills in ethical livestock production management. It starts off with structured lectures, homework, assignments and field visits, but progresses towards ~~are~~ a more open-ended, student-driven and often group-based learning.
From you as a student, the course requires enthusiasm for grappling with complex and poorly defined ethical livestock production management issues ("messes"). From graduate students, it further requires initiative and a willingness and ability to work in groups (you will receive a substantial share of your grade based on group work).
~~Many students enjoy these challenges but some don't.~~
If you want to be told what to do at all times, are uncomfortable engaging with problems that don't have a right or wrong answer, or dislike group work then this course may not be for you. The course is taught in mixed mode for both on-campus and distance students. On-campus and distance students will interact directly through a variety of electronic means and work collaboratively throughout the course. In addition, as a student you should be able to evaluate, analyze and improve livestock production systems.

Course Resources:

1) Taylor, Robert E and Thomas G. Field. Scientific Farm Animal Production: An Induction to Animal Science. Prentice-Hall: Upper Saddle River, NJ. 2004.
2) *Understanding Animal Welfare: The Science in its Cultural Context*, by David Fraser, Wiley-Blackwell, Oxford, 2008
3) Appleby, M.C. and Hughes. B.O. Animal Welfare CAB International ISBN 0-85199-180-7 1997
4) Farm Animal Welfare Council (FAWC) Reports
5) *The Animal Ethics Reader*, edited by Susan J. Armstrong & Richard G. Botzler, 2nd edition (NY: Routledge, 2008).
6) *Animal Law: Welfare, Interests, and Rights*, 2nd edition, David Favre (Aspen Elective, 2011).
7) *Animal Rights: Current Debates and New Directions*, edited by Cass R. Sunstein and Martha C. Nussbaum (Oxford University Press, 2004).
8) Dawkins, M.S. From an animal's point of view: motivation, fitness and animal welfare. Behav. Brain Sci. 13:1-9 1990
9) Dawkins, M.S. Animal Suffering: the Science of Animal Welfare. London, Chapman and Hall 1992
10) Fraser, A.F. & Broom, D.M. Farm Animal Behaviour and Welfare. London, Boiler Tindall 3rd Ed. 1990
11) Grandin, T. (ed) Livestock handling and transport. CAB International 1993 (New edition due out in 2000)
12) Gregory, N.G. & Temple Grandin Animal Welfare and Meat Science. CAB International ISBN 0-851-9929-6 1999

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Course Website(s)

Required Course Texts and Materials

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Optional Course Texts and Materials

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Assignments and Grading Scheme

Grading System

0 to 10 (where 5 is the least pass mark)

Grading Policy

Component	Grade
Assignments	80%
Exams	?
Class Attendance/ Participation	20%
Total Points	100%
Field trip	Up to 5% bonus

Course Policies

Late Assignments

It is essential that papers and other assignments be completed and submitted on time. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

This is a seminar type of course, which means that students are expected to all classes. You cannot pass the class under any circumstances if you miss more than three classes. Students are expected to arrive on time and stay until the class period ends. If you know that you have to leave early, you should notify me early before class starts. You are expected to treat faculty and other students with respect. During class students are obliged to not disrupt class by making noise and /or leaving and re-entering during class. Students who violate these minimal expectations will be asked to leave and counted as absent. You are expected to have read and thought about the assignment materials before you come to class. I expect active class participation, which counts for 20% of the grade.

Dis~~s~~ability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Important Dates to Remember

Course Schedule

Week	SUBJECT	Date
1	General Introduction: Introduction to the course. Introduction~~s~~ and discussion of student's interests and research Initial discussion on possible topics, interests, tasks, timeline	
2	Discussion I:Livestock products and human animals relationship history Understanding livestock productions systems	
3	Animal welfare and ethics the concept	
4	Qualitative interview studies Stakeholders as individuals: values, attitudes, assets and drivers of behavior	
5	Case study	
6	Minor exam	
7+8	Animal Welfare Assessment I: Livestock production systems Animal Welfare Assessment II: solving problems	
9	Communication strategies for working with stakeholders	
10	Field trip: Visit to livestock production plan	
11	Livestock plan management skills	
12	Sustainability certification of animal products managing small-scale livestock production systems in developing countries	
13	Student Presentations	
14	Final exam	

Commented [NK2]: Where is this in your modules?

Commented [NK3]: Where is this in the modules and designed activity?

Commented [NK4]: Not found in the modules

Course	*Sustainable and Ethical livestock Management*
Module 1	Introduction
Key Concepts	Animal welfare, ethics, sustainable domestication
Overview	
Aim	
Learning	At the end of this module students will be able to: -

Outcomes	To understand the terminology of animal ethics and welfare
Units	Introducing the Course Terminology History of Animal Use Human - Animal Bond Animal Domestication Animal Products
Readings	Diamond, Jared (2012). "1". In Gepts, Paul. Biodiversity in Agriculture: Domestication, Evolution, and Sustainability. Cambridge University Press. p. 13. Driscoll, C. A.; MacDonald, D. W.; O'Brien, S. J. (2009). "From wild animals to domestic pets, an evolutionary view of domestication". Proceedings of the National Academy of Sciences. 106: 99719978. doi:10.1073/pnas.0901586106. PMC 2702791 PMID 19528637 Meyer, Rachel S.; Purugganan, Michael D. (2013). "Evolution of crop species: Genetics of domestication and diversification". Nature Reviews Genetics. 14 (12): 840-52. doi:10.1038/nrg3605. PMID 24240513. Price, Edward O. (2008). Principles and Applications of Domestic Animal Behavior: An Introductory Text. Cambridge University Press. ISBN 9781780640556. Retrieved January 21, 2016. Larson, G. (2014). "The Evolution of Animal Domestication". Annual Review of Ecology, Evolution, and Systematics. 45: 115 -36. doi:10.1146/annurev-ecolsys-110512-135813.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 Learning Goals	
SDGs	
ECTS WORK LOAD	
Module 2	Animal Production Systems
Key Concepts	
Overview	
Aim	
Learning Outcomes	At the end of this module students will be able to: - Understand Animal production systems plans and management
Units	Animal Production Practices Livestock Systems Produce for Purpose Farm Management Risk analysis Economic of Livestock Systems Market Supply and Demand Case Studies: Risk Analysis of a Dairy Farm Exercise: Designing an Economically Efficient and Environmentally sustainable Dairy Farm
Readings	Banerjee, G. (2015). A textbook of animal husbandry (8th edition). Oxford & IBH Publishing Cheeke, Peter R. (year). Contemporary Issues in Animal Agriculture (3rd

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	Edition). Pearson Prentice Hall.C. Cottle, D. and Kahn, L. (2014). Beef Cattle: Production and Trade. CSIRO Publishing, Collingwood Gillespie, J. and Flanders, F. (2016). Modern Livestock and Poultry Production, 9th edition. Cengage Learning, Boston. Pingali, P. (2006). Westernization of Asian diets and the transformation of food systems: Implications for research and policy. *Food Policy, 32*, 281-298 Plachter, H. and Hampicke, U. (2010). Large-scale Livestock Grazing. Springer-Verlag, Berlin Sejian, V., Naqvi, S., Ezeji, T., Lakritz, J and Lal, R. (2012). Environmental Stress and Amelioration in Livestock Production. Springer-Verlag, Berlin Webster, A. J. F. (2001). Farm animal welfare: The Five Freedoms and the free market. *The Veterinary Journal, 161*, 229-237. World Bank (2006). Creating business opportunity through improved animal welfare. Good Practice Note no. 6. Washington, DC: International Finance Corporation, World Bank Group. One Health Initiative (2011). One Health Initiative will unite human and veterinary medicine. Retrieved from www.onehealthinitiative.com/
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 Learning Goals	
SDGs	
ECTS WORK LOAD	
Module 3	Ethics of Animal Use in Food Production
Key Concepts	
Overview	
Aim	
Learning Outcomes	At the end of this module students will be able to: - ~~U~~understand~~ing~~ the integrity and ethics of using animals for food production Elaborate on the learning outcomes
Units	Participatory Approach The New era of Animal Ethics Our duties to Animal Community Organization Advisory Committees Use of Traditional Knowledge Case Studies: Examples of Community Small Livestock Holding Management Exercise: Develop Plan for Winning Argument for Using Animal in Food Production.
Readings	Anthony, R. (2003). The ethical implications of the human□animal bond on the farm. *Animal Welfare, 12*, 505-512. Cohen, C. (2003). Reply to Tom Regan. In S. Armstrong & R. Botzler (Eds.), *The animal ethics reader* (pp. 25-29). London: Routledge. Douglas-Hamilton, I., Bhalla, S., Wittemyer, G., & Vollrath, F. (2006). Behavioural reactions of elephants towards a dying and deceased matriarch. *Applied Animal Behaviour, 100*, 87-102. Heleski, C. R., & Anthony, R. (2012). Science alone is not always enough: The

	importance of ethical assessment for a more comprehensive view of equine welfare. *Journal of Veterinary Behaviour, 7*, 169-178. Langford, D., Crager, S., Shehzad, Z., Smith, S., Sotocinal, S., Levenstadt, J., Chanda, M. L., Letivin, D. J., & Mogil, J. S. (2006). Social modulation of pain as evidence for empathy in mice. *Science, 312*, 1967-1970. Regan, T. (1984). *The case for animal rights*. London: Routledge. Rollin, B. (2006). *An introduction to veterinary medical ethics: Theory and cases* (2nd ed., pp. 1-41). Oxford: Blackwell. Sandøe, P., & Christiansen, S. B. (2008). *Ethics of animal use* (pp. 15-31). Chichester, UK: Wiley-Blackwell. Schneider, B. (2001). A study in animal ethics in New Brunswick. *Canadian Veterinary Journal, 42*, 540-547. Taylor, A. (1999). *Magpies, monkeys and morals. What philosophers say about animal liberation* (pp. 25-66). Peterborough, UK: Broadview.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 ~~Learning~~ ~~Goals~~ SDGs	
ECTS WORK ~~LOAD~~	
~~Module 4~~ Key ~~Concepts~~ ~~Overview~~ ~~Aim~~	~~Introduction to Animal Welfare and Assessment~~
Learning Outcomes	At the end of this module students will be able to understand: Which animals we are concerned about and why • Sentience • Suffering • Anthropomorphism • Death and animal welfare Why animal welfare is complex • Different scientific definitions of animal welfare • Why animal welfare science involves more than veterinary medicine The roles of science, ethics and law The theory behind the Five Freedoms How they have influenced the development of modern assessment tools How to assess the animal's experience in terms of welfare (inputs) and actual welfare performance (outcomes)
Units	Animal welfare: the concept Animal welfare approaches The importance of animal welfare The Five Freedoms Problems with the Five Freedoms Welfare inputs and outputs Welfare assessment ~~Welfare validation how and why?~~

Commented [NK5]: Design an activity

Readings	Farm Animal Welfare Council. (2009). *Farm animal welfare in Great Britain: Past, present and future* (p. 1). London: FAWC. Farm Animal Welfare Council. (1992). FAWC updates the Five Freedoms. *Veterinary Record 131*, 357. Fraser, D. (2008). *Understanding Animal Welfare. The science in its cultural context*. (pp. 262-266).Oxford: Wiley Blackwell Jongman, E. C. (2007). Adaptation of domestic cats to confinement. *Journal of Veterinary Behavior, 2*, 193-196. Laven, R. A., & Holmes, C. W. (2008). A review of the potential impact of increased use of housing on the health and welfare of dairy cattle in New Zealand. *New Zealand Veterinary Journal, 56*, 151-157. Rollin, B. (1993). Animal welfare, science and value. *Journal of Agricultural and Environmental Ethics* (Special Supplement 2), 8-14. Scholtz, M. M., McManus, C., Okeyo, A. O., & Theunissen, A. (2011). Opportunities for beef production in developing countries of the southern hemisphere. *Livestock Science, 142*, 195-202. Taylor, A. (1999). *Magpies, Monkeys and Morals. What philosophers say about animal liberation*. Broadview, Peterborough. p 24 Templar, D. & Leith, B. (2010) *Human Planet*. BBC Books. London. p180-181 Viñuela-Fernández, I., Jones. E., Welsh, E. M., & Fleetwood-Walker, S. M. (2007). Pain mechanisms and their implication for the management of pain in farm and companion animals. *The Veterinary Journal, 174*, 227-239. Webster, J. (2011). Zoomorphism and anthropomorphism: fruitful fallacies? *Animal Welfare, 20*, 29-36 Widowski, T. (2010). Why are behavioural needs important? In T. Grandin (Ed.) *Improving animal welfare. A practical approach* (pp. 290-307). Wallingford, UK: CABI. Yeates, J. W. & Main, D. C. J., (2008). Assessment of positive welfare: A review. *The Veterinary Journal* 175: 293-300
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
~~10Cs/6~~ ~~Learning~~ Goals	
SDGs	
ECTS ~~WORK LOAD~~	
Module 5	The Application of Animal Welfare Ethics
~~Key~~ Concepts	
Overview Aim	
Learning Outcomes	At the end of this module students will be able to: ~~U~~understand~~ing of~~ the advantage~~s~~ of practicing animal welfare ethics Please design clear and specific learning outcomes for all the modules
Units	Ethical Animal Breeding ~~Farming and Animal Nutrition~~ Animal Housing Animal Welfare Impact on Productivity and Economics Utilitarianism

Commented [NK6]: Design an activity according to the guidelines sent to you

	Introduction to Environmental Ethics Controlling infectious diseases The Concept of One Health
Readings	Dawkins, M. S., & Layton, R. (2012). Breeding for better welfare: genetic goals for broiler chickens and their parents. Animal Welfare , 21: 147-155. D'Silva, J., & Webster, J. (eds) (2010). The Meat Crisis. Developing more sustainable production and consumption. London: Earthscan. Desjardins, J. R. (2012). Environmental Ethics: An Introduction to Environmental Philosophy. 5th edition. Kentucky: Wadsworth Publishing. Helelski, C. R., & Anthony, R. (2012). Science alone is not always enough: The importance of ethical assessment for a more comprehensive view of equine welfare. Journal of Veterinary Behaviour, 7: 169-178. Mepham, B. (1996). Food Ethics. London: Routledge. Mullan, S., & Main, D. (2001). Principles of ethical decision-making in veterinary practice. In Practice, 23: 394-401. Palmer, C. (2012). Does breeding a bulldog harm it? Breeding, ethics and harm to animals. Animal Welfare, 21: 157-166. Rollin, B. (2006). An Introduction to Veterinary Medical Ethics. Theory and Cases. Second edition, pp.34-37. Oxford: Blackwell. Sandøe, P., & Christiansen, S. B. (2008). Ethics of Animal Use, pp.67-153.
Activity	Chichester: Blackwell 1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content.
~~10Cs/6~~ Learning Goals SDGs ECTS WORK LOAD	4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
Module 6	Sustainable Livestock Planning Management
~~Key~~ Concepts	
Overview ~~Aim~~	
Learning Outcomes	At the end of this module students will be able to: ~~U~~understand~~ing of~~ the steps to develop a sustainable Livestock plan
Units	Introduction to Sustainable Livestock Production Whole Farm Planning: with Livestock Pasture Systems Livestock Breeds and Rare Breeds Meat and Dairy Goats/forages Poultry Organic Farming Climate Change
Readings	Beck, U. (1986). Risk Society: Towards a New Modernity. London: Sage Publications Ltd. Berkhout, Frans, Adrian Smith, and Andy Stirling (2004). Socio-technical regimes and transition contexts. In B. Elzen, F. W. Geels and K. Green.(eds.) System Innovation and the Transition to Sustainability: Theory, Evidence and Policy. Cheltenham: Edward Elgar, pp.48-75.

Commented [NK7]: Design an activity according to the guidelines sent to you

	Bos B., and John Grin J., (2008). "Doing" Reflexive Modernization in Pig Husbandry: The Hard Work of Changing the Course of a River. Science, Technology, & Human Values 33(4): 480-507. Bos B. ,(2009). "Concepts and objects as boundary objects for sustainable animal husbandry: Anticipating regime transformations by design." Paper for 1st European Conference on Sustainability Transitions, Amsterdam, 4-6 June 2009 Geels, F.W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. Research Policy 31 (8/9): 1257-1274. Geels, F.W. (2005). Technological Transitions and System Innovations: A co-evolutionary and socio-technical analysis. Edward Elgar Publishing Ltd., Cheltenham. Groot, Koerkamp, P.W.G, and A.P. Bos (2008). Designing complex and sustainable Agricultural production systems: an integrated and reflexive approach for the case of table egg production in the Netherlands. Neth. J. agric. Sci., 55: 113-138. Hirsch Hadorn, G., H. Hoffmann-Riem, S. Biber-Klemm, W. Gossenbacher-Mansuy, D. Joye, C. Pohl, U. Wiesmann, and E. Zemp (2008). Handbook of transdisciplinary research. Springer Verlag. Hoogma, R., R. Kemp, J. Schot and B. Truffer (2002). Experimenting with Sustainable Transport: the approach of Strategic Niche Management. London: Spon Press. Quist, J. (2007). Backcasting for a sustainable future. The impact after 10 years. PhD thesis. Technical University Delft. Rip, A., and R. Kemp (1998). Technological Change. In S. Rayner and E.L. Malone (eds). Human Choice and Climate Change. Columbus, Ohio: Battelle Press. Volume 2: 327-399. Roep D, Van der Ploeg J.D. and Wiskerke J.S.C.,(2003). Managing technical-institutional design processes: some strategic lessons from environmental cooperatives in the Netherlands. Neth. J. agric. Sci. 51: 95-217. Schot, J., and F.W. Geels (2008). Strategic niche management and sustainable innovation journeys: theory, findings, research agenda and policy. Technology Analysis & Strategic Management. 20: 537-554. Smith A., Stirling A. and Berkhout F., (2005). The governance of sustainable sociotechnical transitions. Research Policy. 34: 1491-1510.
Activity	1. Seminars / Lectures; a series of lectures and seminars. 2. Group exam task with presentation; with the acquired understanding achieved through the course. 3. The students will also be asked to write critical summaries on the lectures content. 4. For each unit the students will submit an individual reflection paper of approximately 1000 words.
10Cs/6 Learning Goals SDGs	
ECTS WORK LOAD	

Commented [NK8]: Check the guidelines to better design a community-service learning activity

ECTS Workload

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)										
Online										
Lab work										
Reading articles (3 pages per hour)										
Reading book chapters (5 per/h)										
Preparing course activities										
Project work										
Preparation for exam										
Writing the exam										
Total										





Add the table for SDGs

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				

13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

Comments on the overall course:

- The course outcomes are not fully described in the learning objectives. It is important that learning objectives are consistent with the outcomes and the subsequent course schedule
- The description of the course schedule does not seem to be consistent with the description of the modules and with the course schedule. You need to write a brief description referring to the contents described in the modules, also key words and aims of the modules in a way to reflect what is in the course schedule.
- I would advise returning to the Learning Outcomes and grounding the modules in these outcomes. More work on the methodologies used and the assessment procedures would support such learning.
- The course shows evidence of insights but these are at a basic level and need to be developed to show a well- focused intent in relation to the sustainable and ethical livestock management and climate change. I suggest going back to the Pillars of SDGs to map these insights.

- ECTS Integration in Course Curriculum

It is very critical to weight each component in line with the learning objectives and outcomes, in total and separately for each course module. It is not clear how you allocate the workload.
Please fill the ECTS table.

- CCSAFS Community-Based / Service Learning Activity

There are several activities, but none show the community-based / service learning perspective. The activities should be linked to the activity goals and learning

outcomes. The activity in the last module should be the community-based activity you intend to do.

Please keep in mind the following when designing the course activities:

a) The activity should meet an actual need in the community.
b) The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
c) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society.
d) The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The activity should provide students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

Please try to redesign the activities to show the connections between academic achievement, civic engagement, and personal growth

- SDG Rubric

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). I provided a summary table where you can do these connections. It is not clear in your modules. Make sure to target the SDGs in all modules and fill the SDG rubric.



CCSAFS COURSE SYLLABUS

Jerash University
Course Syllabus

Course Number ()

Course Title

Climate Change, Sustainable Agriculture, and Food Security

First Semester

Instructor Information

Instructor: Prof Nezar Samarah
Office Location: Faculty of Agriculture.
Telephone: 962797368144.
Office Hours: Sun and Monday: 10:00-11:00.
E-mail: nsamarah@just.edu.jo.
Website: http://www.just.edu.jo/Pages/Default.aspx

Course Identification

Course Number:
Course Name: Climate change, sustainable agriculture, and food security.
Course Location: Faculty of Agriculture
Class Times:
Prerequisites:
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

This course aims to address climate change and global warming and how climate change has an impact on crop production, food supply, and food security. The course ~~also~~ describes the issue ~~related with the increase in~~of increasing world population and the ~~how this increase adds~~growing pressure on food~~the~~ demand ~~on food~~. The course also describes the best cultural practices for sustainable crop production to meet the

rising demand on food. The course covers the principles of sustainable agriculture including soil, crop, and pest managements.

Course Learning Objectives:

1) Provide students with the knowledge related with the predictions and trends in human population, food supply, and food security [related to Sustainable Development Goal (SDG 2)].
2) Explain the terminology and concepts of food security and how to measure food insecurity (SDG 2).
3) Explore the concepts, trends, and impacts of climate change and global warming on crop production (SDG 13).
4) Describe the concepts of sustainable agriculture (SDG 2, 5, 6, 13, 15).
5) Explain how sustainable agriculture practices needed to maintain agriculture production to cope with the increase in human population and climate change (SDG 2, 5, 6, 15).
6) Study different practices related to community, marketing, soil, water, animal husbandry (SDG 2, 5, 6, 15).

Course Content Learning Outcomes

Upon the completion of this course, students will be able to:

1) Connect the rise in human population and the change in climate with less ability to supply food and food insecurity (SDG 2).
2) Discuss the impact of climate change on food production of agricultural crops (SDG 13).
3) Use sustainable food production practices that help maintain soil, improve land and soil quality, reduce soil degradation, strengthen capacity for adaptation to climate change (extreme weather, drought, and flooding), and consequently improve food production and supply (SDG 6, 13, 15).
4) Demonstrate how sustainable agriculture help ends hungers by improving food production and incomes of small farmers and ensure access by all people to safe, nutritious, and sufficient food (SDG 2, 5, 15).
5) Use sustainable practices in managing nutrients and controlling insects, weeds, and diseases (SDG 15).
6) Integrate the genetic resources and diversity of crop species in sustainable management (SDG 15).

Teaching and Learning Approach

The teaching and learning methods for this course will include:

- A typical lecture using PowerPoint presentation and the backboard to present the teaching materials and highlight essentials topics and points for discussion. The lecture usually starts with a short review of the previous lecture then delivers the new materials. During the lecture, questions are initiated to induce the students' thinking and to trigger classroom discussion. Fifteen minutes before the end of the class, the lecture will be summarized to highlight the main objectives of this lecture and the outcomes of the learning.

- Collaborative or active learning, where students should be active and involved in the learning process inside the classroom, will be emphasized in the delivery of this course using different approaches such as: engaged learning, project-based learning, cooperative learning, and problem-based learning.
- Classroom discussion is an essential part of the collaborative method of teaching where students are given the opportunity to interact and give their point views. The classroom discussion will be achieved by addressing questions to students during the lectures and by rephrasing the information received and trigger the critical thinking of the students to ask more questions and get engaged in the teaching process.

Course Resources:

Course Website(s)

Required Course Texts and Materials:

1) Magdoff, F., & Van Es, H. (2000). *Building soils for better crops* (pp. 80-82). Beltsville: Sustainable Agriculture Network.
2) Wuebbles, D. J. (2012). Introduction to Modern Climate Change. *Physics Today*, *65*(11), 59.
3) Farmer, G. T., & Cook, J. (2013). *Climate Change Science: A Modern Synthesis: Volume 1-The Physical Climate* (Vol. 1). Springer Science & Business Media.
4) Villalobos, F. J. (2016). *Principles of agronomy for sustainable agriculture*. E. Fereres (Ed.). Springer.
5) Bellon, S., & Penvern, S. (2014). *Organic farming, prototype for sustainable agricultures*. Springer.

Optional Course Texts and Materials:

Assignments and Grading Scheme

Grading System

0 to 100% (where 70% is the least pass mark)

Grading Policy:

Component	Grade
Assignments	10%
Midterm Exam	30%
Term paper	10%
Class Attendance/ Participation	10%
Final exam	40%
Total Points	100%

Course Policies

Late Assignments

Homework assignments will be given during this course. The due date for the students to submit their homework is a week from the assignment date. Students who fail to submit their homework on the due date will be not given extra time to do so and their grade on the homework will be "zero". The homework solution will be discussed in classroom.

Quizzes will be used in this course. A quiz can be given at any time during the class. No makeup will be conducted for the quizzes in case of student absence.

Students are required to conduct one term paper during the class. Students should work on group of five on their term paper. The students have a chance to select a specific topic for their term paper in coordination with the course instructor. The topic should be related to the contents of this course and should be approved by the instructor. At the end of the semester, the students should submit their term paper and make an oral presentation. All students should be involved in the term paper and in the presentation. The term paper should be typed and hand-written term papers are not accepted. The maximum number of pages for the term paper is 8 pages with time New Roman Font and double space.

Classroom Protocol

Attendance will be checked at the beginning of each class. University regulations will be strictly followed for students exceeding the maximum number of absences.

Students must follow University rules and regulations during the classroom and in all activities of this course. Some examples of student's misconduct which are not allowed in this class include (not limited to):

- Students engagement in any behaviour that disrupts classroom such as talking while other students speaking, offensive language, using cell phones or other electronic devices, eating, sleeping, playing games, moving in the classroom, entering the classroom late, leaving the classroom early.
- Cheating in exams, homework, and term papers is not allowed. Students who conduct cheating will be subjected to University rules and regulations.
- Plagiarism is not acceptable in any means when students work on their term paper, or oral presentation.

Dissability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Important Dates to Remember

Course Schedule

Week	SUBJECT	Date
1	Course overview: Discussion of syllabus and assignments	
2	General introduction about world population and food supply	
3	Food security	
4	Climate change: Principles and impacts	
5	Concepts and practices of sustainable agriculture	
6	Sustainable marketing and community vitality	
7	Rotational grazing	
10	Conservational tillage Cover crops	
11	Crop rotation	
12	Sustainable management of nutrients and water	
13	Organic farming	
14	Sustainability at the whole-farm	

CCSAFS COURSE MODULE

Course	Climate Change, Sustainable Agriculture, and Food Security
Module 1	Introduction: World population, food supply and food security.
Key Concepts	World population and food demand.
Overview	World population is the total number of humans currently living. Current World Population (December 2017) is 7.6 billion. World population is projected to rise to 9.1 billion by 2050 and 11.2 billion by 2100. With the rise in world population, food supply and security is becoming susceptible to perturbations in demographic growth. The increased world population rises hunger on Earth. The world food production should increase by 70% to meet the demand on food. Ninety percent of the growth in crop production globally is expected to come from higher yields and increased cropping intensity, with the remainder coming from land expansion. To achieve 70% increase in food production we have to overcome the: • Rising energy prices. • Growing depletion of underground aquifers. • Continuing loss of farmland to urbanization. • Increased drought and flooding resulting from climate change. • Increased in the greenhouse gas emission. Agriculture has to produce more food and adopt more efficient and sustainable production methods (Sustainable Agriculture).
Aim	To provide students with knowledge about the trends and predictions of the rise in world population and how this puts pressure on food supply and security.
Learning Outcomes	At the end of this module students will be able to: • Explain the trends and predictions in human population on Earth. • Demonstrate how the rise in human population puts pressure on food supplies, threatens food security, and enhances hunger. • Describe how the increase in agriculture production and the adoption of sustainable agriculture practices are needed to increase food supply and security to meet the increase in the world population's demand.
Units	Unit 1.2: Trends in world population. Unit 1.2: World population distribution. Unit 1.3: The rise in world population. Unit 1.4: Global state of agriculture. Unit 1.5: The rise of hunger and factors related to it. Unit 1.6: Multiple challenges to agriculture.

Commented [NK1]: Update the info

Readings	1) Dyson, T. (1996). *Population and food: global trends and future prospects*. Routledge. 2) Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., ... & Toulmin, C. (2010). Food security: the challenge of feeding 9 billion people. S*cience*, *327*(5967), 812-818. 3) www.fao.org/docrep/U3550t/u3550t02.htm.
Activity	Assignment 1.1: Reflecting upon world population: 1) Provide statistical data about the renewable resources of Earth, number of people on Earth, population growth, availability of land per person, demand for natural resources and energy by 2050. 2) Suggest some solutions to solve the problem of world population.

SD Pillars	Environment	Economy	Social	Culture

21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Module 2	Food Security
Key concepts	Food security perspectives
Overview	Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life; otherwise, food insecurity exists. There are four pillars for food security including food availability, access, utilization, and stability. In this module, we will show students how to measure food insecurity. The concepts of transitory food insecurity will be presented to students. Risks factors related to availability of food will be discussed.
Aim	To provide students with concepts of food security and measurements of food insecurity.
Learning Outcomes	At the end of this module students will be able to: • To describe the concepts of food security and how to use different tools to measure food insecurity.
Units	Unit 2.1: Definition of food insecurity. Unit 2.2: Pillars of food security.

	Unit 2.3: Measurements of food insecurity. Unit 2.4: Transitory food insecurity. Unit 2.5: Liberalization and transitory food insecurity. Unit 2.6: Risks factors to unavailability of critical food supply. Unit 2.7: The world's food scarcity and malnutrition.
Readings	1) Pinstrup-Andersen, P. (2009). Food security: definition and measurement. *Food security*, *1*(1), 5-7. 2) Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., ... & Toulmin, C. (2010). Food security: the challenge of feeding 9 billion people. *science*, *327*(5967), 812-818. 3) Porter, J. R., Xie, L., Challinor, A. J., Cochrane, K., Howden, S. M., Iqbal, M. M., ... & Ingram, J. (2014). Food security and food production systems. 4) Ingram, J., Ericksen, P., & Liverman, D. (2012). *Food security and global environmental change*. Routledge. 5) Ericksen, P. J., Ingram, J. S., & Liverman, D. M. (2009). Food security and global environmental change: emerging challenges. 6) Ingram, J. (2011). A food systems approach to researching food security and its interactions with global environmental change. *Food Security*, *3*(4), 417-431.
Activity	Assignment 2.1: Reflecting upon measurements of food insecurity: Prepare a short presentation about food security status in Jordan. Students have to make a short presentation in class using PowerPoint. The due date to submit this activity is week 2.

SD Pillars	Environment	Economy	Social	Culture

21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Module 3	Climate change: Perspectives and impacts
Key concepts	Climate change concepts, global warming, impacts
Overview	With the change in climate, there ~~are~~ is an increase in CO2 level in the atmosphere as well as an increase in air temperature, which results in ~~a phenomenon of~~ global warming. These changes can lead to melting the glaciers in the poles and consequently lead to an increase in sea level and threatens the coastal cities. The changes in the climate has also a great impact on agriculture production and food supply. Model scenarios related to climate change can predict crop yield for a specific region or country. The reduction in food

	production due to climate change has an impact on food supply and prices and consequently increases the number of people at risks of hunger. In this module, we will explore the concepts of climate and weather change and describe the predictions and trends in climate. We will also discuss how climate change affecting food production and supply.
Aim	The aim of this module is to describe the change in climate and how this change has an impact on food production and supply.
Learning Outcomes	At the end of this module students will be able to: • Describe the change in the climate and how this change affects on agriculture and food supply.
Units	Unit 3.1: General terminology of climate and weather. Unit 3.2: Causes of climate change. Unit 3.3: Climate change trends: Rising temperature. Rising CO2. Emission of greenhouse gases. Extreme weather events (drought and flooding). Rising in sea level. Unit 3.4: Global warming and greenhouse effect. Unit 3.5: Impact of climate change on food production and security. Unit 3.6: Impact of climate change on hunger and poverty. Unit 3.7: Measures to slow the rise in human population and to reduce the emission of greenhouse gases.
Readings	1) Wuebbles, D. J. (2012). Introduction to Modern Climate Change. *Physics Today*, *65*(11), 59. 2) Farmer, G. T., & Cook, J. (2013). *Climate Change Science: A Modern Synthesis: Volume 1-The Physical Climate* (Vol. 1). Springer Science & Business Media. 3) Rosenzweig, C., & Parry, M. L. (1994). Potential impact of climate change on world food supply. *Nature*, *367*(6459), 133-138. 4) Lobell, D. B., Schlenker, W., & Costa-Roberts, J. (2011). Climate trends and global crop production since 1980. *Science*, *333*(6042), 616-620. 5) Lobell, D. B., & Asner, G. P. (2003). Climate and management contributions to recent trends in US agricultural yields. *Science*, *299*(5609), 1032-1032. 6) Lobell, D. B., Burke, M. B., Tebaldi, C., Mastrandrea, M. D., Falcon, W. P., & Naylor, R. L. (2008). Prioritizing climate change adaptation needs for food security in 2030. *Science*, *319*(5863), 607-610. 7) Nelson, G. C., Rosegrant, M. W., Koo, J., Robertson, R., Sulser, T., Zhu, T., ... & Magalhaes, M. (2009). *Climate change: Impact on agriculture and costs of adaptation* (Vol. 21). Intl Food Policy Res Inst. 8) Fischer, G., Shah, M. M., & Van Velthuizen, H. T. (2002).

<table>
<tr><td></td><td>Climate change and agricultural vulnerability.
9) Schlenker, W., & Roberts, M. J. (2009). Nonlinear temperature effects indicate severe damages to US crop yields under climate change. Proceedings of the National Academy of sciences, 106(37), 15594-15598.</td></tr>
<tr><td>Activity</td><td>Assignment 3.1: Student presentation for a selected Journal article: Students have to present a Journal article related to climate change. The presentation should not exceed 5 minutes and an extra 10 minutes for discussion. Students should use PowerPoint and submit a short summary for the article (one paragraph). The due date is the week 3.</td></tr>
<tr><td>SD Pillars</td><td>Environment | Economy | Social | Culture</td></tr>
<tr><td></td><td>☐ | ☐ | ☐ | ☐</td></tr>
<tr><td>21st ESD</td><td>Learning to know | Learning to be | Learning to do | Learning to live together | Learning to transform oneself and society | Learning to give and share</td></tr>
<tr><td></td><td>☐ | ☐ | ☐ | ☐ | ☐ | ☐</td></tr>
<tr><td>SDGs</td><td>1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17</td></tr>
<tr><td></td><td>☐</td></tr>
<tr><td>Module 4</td><td>Concepts and practices of sustainable agriculture.</td></tr>
<tr><td>Keys</td><td>Sustainable agriculture concepts and practices</td></tr>
<tr><td>Overview</td><td>Sustainable agriculture is the production of food, fiber, or other plant or animal products using new, innovative strategies or techniques that protect the environment, public health, human communities, and animal welfare. The three pillars of agriculture sustainability are financial sustainability, environmental sustainability, and social sustainability. Sustainable farms produce crops or animals without relying on toxic pesticides and chemicals, genetic modified crops, or agricultural practices that degrade soil, water, and other natural resources. The sustainable agricultural practices are essential to protect human from exposure to toxic chemicals. The sustainable agriculture should also provide farmers and other workers with fair wages and working conditions and enhance marketing their products locally and regionally in order to build a strong and vibrant community. In this module, we will address numerous aspects and practices related with sustainable agriculture including marketing, community vitality, ecological insect and weed management, rotational grazing, conservation tillage, cover crops, livestock and landscape diversity, nutrient management, and on-farm energy conservation and production.</td></tr>
<tr><td>Aim</td><td>The aim of this module is to provide students with the knowledge and skills related to sustainable agriculture practices.</td></tr>
</table>

Learning Outcomes	At the end of this module students will be able to: • Implement agricultural practices to protect soil from erosion and degradation. • Describe the practices that prevent water from pollution and how to reuse the wastewater in agriculture. • Integrate ecological management for insects, weeds, and diseases. • Introduce sustainable management of nutrients. • Conserve and produce on-farm energy.
Units	Unit 4.1: Sustainable marketing and community vitality. Unit 4.2: Ecological insects, weeds, and disease management. Unit 4.3: Rotational grazing. Unit 4.4: Conservational tillage Unit 4.5: Cover crops. Unit 4.6: Crop, livestock, and landscape diversity. Unit 4.7: Crop rotation. Unit 4.8: Sustainable management of nutrients. Unit 4.9: Sustainable management of water: Irrigation and drainage. Unit 4.10: On-farm energy conservation and production.
Readings	1) Magdoff, F., & Van Es, H. (2000). *Building soils for better crops* (pp. 80-82). Beltsville: Sustainable Agriculture Network. 2) Villalobos, F. J. (2016). *Principles of agronomy for sustainable agriculture*. E. Fereres (Ed.). Springer. 3) Pretty, J. N. (1995). Participatory learning for sustainable agriculture. *World development*, *23*(8), 1247-1263. 4) Gliessman, S. R. (1990). Agroecology: researching the ecological basis for sustainable agriculture. In *Agroecology* (pp. 3-10). Springer, New York, NY. 5) Horrigan, L., Lawrence, R. S., & Walker, P. (2002). How sustainable agriculture can address the environmental and human health harms of industrial agriculture. *Environmental health perspectives*, *110*(5), 445. 6) Altieri, M. A. (2018). *Agroecology: the science of sustainable agriculture*. CRC Press. 7) Lichtfouse, E., Navarrete, M., Debaeke, P., Souchère, V., Alberola, C., & Ménassieu, J. (2009). Agronomy for sustainable agriculture: a review. In *Sustainable agriculture* (pp. 1-7). Springer, Dordrecht. 8) Roling, N. G., & Wagemakers, M. A. E. (Eds.). (2000). *Facilitating sustainable agriculture: participatory learning and adaptive management in times of environmental uncertainty*. Cambridge University Press. 9) Lal, R. (2009). Soils and sustainable agriculture: A review. In *Sustainable agriculture* (pp. 15-23). Springer Netherlands. 10) Dordas, C. (2009). Role of nutrients in controlling plant diseases in sustainable agriculture: a review. In *Sustainable agriculture* (pp. 443-460). Springer, Dordrecht.

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Activity	Assignment 4.1: Student presentation for a selected Journal article: Students have to present a Journal article related to sustainable agriculture practices. The presentation should not exceed 5 minutes and an extra 10 minutes for discussion. Students should use PowerPoint and submit a short summary for the article (one paragraph). The due date is week 4-10. Assignment 4.2: Applying a community-service learning methodology to a local farm: Students should select a local farm and apply one of the sustainable agricultural practices that had been taught in this module to the farm. Examples of these practices: • Using chisel plow as a conservation tillage implement to do primary tillage instead of using traditional conventional tillage implements (moldboard or disc plow). • Integrate a legume crop (vetch), which are capable of fixing a atmospheric N2 into ammonia, in a crop rotation before planting wheat and barley. • Including a cover crop in cropping system to reduce soil erosion and enhance soil fertility and organic matter.
SD Pillars	Environment Economy Social Culture
	☐ ☐ ☐ ☐
21st ESD	Learning to know Learning to be Learning to do Learning to live together Learning to transform oneself and society Learning to give and share
	☐ ☐ ☐ ☐ ☐ ☐
SDGs	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
	☐ ☐ ☐ ☐ ☐ ☐ ☐
Module 5	Organic farming
Keys	Aspects of organic farming as a sustainable agriculture practice
Overview	There are many approaches to enhance agriculture sustainability by integrating sustainable practices highlighted in module 4. The focus of this module is on organic farming as one approach for agriculture sustainability. Organic farming is an agriculture system to produce food in a natural way using organic sources of fertilizers and biological control of pests while preventing the synthetic use of fertilizers and other chemicals. Crop rotation, cover crop, diversity of species, and including livestock in the farming system are practices used in the organic farming. There are many benefits for the expansion of organic farming. We will highlight these benefits and explore sources for organic fertilizers and the biological control of pests in the organic farming system.
Aim	The aim of this module is to highlight the organic farming as an approach for sustainable agriculture.
Learning	At the end of this module students will be able to:

Outcomes	• Use manure and other organic sources of fertilizers and integrate the biological control of pests in organic farming system.
Units	Unit 5.1: Definition Unit 5.2: Benefits. Unit 5.3: Organic sources of fertilizers Unit 5.4: Biological control of pests.
Readings	1) Bellon, S., & Penvern, S. (2014). *Organic farming, prototype for sustainable agricultures*. Springer. 2) Lampkin, N. (1990). *Organic farming*. Farming press books. 3) Rigby, D., & Cáceres, D. (2001). Organic farming and the sustainability of agricultural systems. *Agricultural systems*, *68*(1), 21-40.
Activity	Assignment 5.1: Reflecting upon organic farming: Q.1) List organic farming practices~~?~~ Q.2) How do organic farming practices have less impact on environment? In other words, "how do organic farmers respect environment"? Q.3) How do organic practices have less impact on animals? Q.4) What are the principles of organic farming in food processing? Assignment 5.2: Students require to find videos about organic farming practices from an authentic scientific source and share them with the rest of the students. Videos should be 5 minutes in length to highlight one or two organic farming practices. For longer-videos, students are required to shorten these videos by using an online-free video processing software.

SD Pillars	Environment	Economy	Social	Culture

21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Module 6	Sustainability for A whole-farm
Keys	A whole-farm approach
Overview	A whole-farm approach combines all sustainable agriculture practices into one integrated management system that works with nature: • Reducing tillage and careful application of on-farm nutrient sources build soil organic matter. • Reducing c~~E~~nergy costs ~~are reduced~~ when fuel is produced from waste or renewable sources. • Controlling ~~P~~pests are ~~controlled~~ by plant and landscape

	diversity. • Boosting Iincome ~~is boosted~~ by more efficient use of on-farm resources.
Aim	The aim of this module is to demonstrate to students how to integrate all sustainable practices into an integrated farm management system.
Learning Outcomes	At the end of this module students will be able to: Combine all sustainable practices in an farm integrated management system.
Units	Unit 6.1: General approach. Unit 6.2: What make sense on your farm?~~.~~ Unit 6.3: Practices to help remedies specific constraints.
Readings	1) Magdoff, F., & Van Es, H. (2000). *Building soils for better crops* (pp. 80-82). Beltsville: Sustainable Agriculture Network. 2) http://nisa.cals.wisc.edu/download/general/WholeFarmChecklist_DRAFT_3.pdf 3) file:///C:/Users/User/Downloads/A_Whole-Farm_Approach_to_Managing_Pests.pdf. 4) file:///C:/Users/User/Downloads/What_is_Sustainable_Agriculture.pdf
Activity	Assignment 6.1: Visit a local farm and use the checklist in the document No. 2 (Readings of the module) to check the issues and principles for all aspects of sustainability that growers encounter on their farms for: • Environmental sustainability. • Economic sustainability. • Social sustainability. Submit a short report for the sustainability practices in the farm.

SD Pillars	Environment	Economy	Social	Culture

21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

SDGs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Table 1. A 10 ECTS workload allocation for the course "Climate Change, Sustainable Agriculture, and Food Security".

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	26	1.5	39	3	6	9	13	4.5	4.5	39
Online	5	2.2	11	-	1	2	5	1.5	1.5	11
Lab work										
Reading articles (3 pages per hour)	200	0.3	60	10	8	10	12	11	9	60
Reading book chapters (5 per/h)	135	0.2	27	3	5	6	4	5	4	27
Preparing course activities	6	9.5	58	3	5	10	20	10	10	58
Project work	6	8.5	50	6	3	9	20	5	7	50
Preparation for exam	2	23	45					20	25	45
Writing the exam	2	1.5	3						3	3
Total				25	28	46	74	57	64	294

Add the table for SDGs

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
~~2~~	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
~~3~~	Ensure healthy lives and promote well-being for all at all ages				
~~4~~	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
~~5~~	Achieve gender equality & empower all women and girls				
~~6~~	Ensure availability and sustainable management of water and sanitation for all				
~~7~~	Ensure access to affordable, reliable, sustainable, and modern energy for all				
~~8~~	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work				

	for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				



CCSAFS COURSE SYLLABUS

Jerash University

~~Course Syllabus~~

Course Number (?)

Course Title

"Sustainable Soil and Water Management"

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First Semester

Instructor Information

Instructor: Prof Saeb Khresat
Office Location: Faculty of Agriculture.
Telephone: 962799900222.
Office Hours: Sun and Monday: 10:00-11:00.
E-mail: skhresat@just.edu.jo.

Website: http://www.just.edu.jo/Pages/Default.aspx

Course Identification

Course Number: ??
Course Name: Sustainable Soil and Water Management.
Course Location: Faculty of Agriculture
Class Times:
Prerequisites:
Faculty Web Page: http://www.jpu.edu.jo/jpu/fac-about.php?id=13

Course Description/Overview

Soil impacts our way of life in many aspects (e.g., food and fiber production, resources for building shelter and infrastructure, water supplies, etc.). Adverse impacts to soil and water affect the well-being of humans and other living organisms. It is essential that students (majors and non-majors alike) understand soil and water systems, and strategies to mitigate or manage these issues. Effective soil and water

management are essential in order to optimize crop yields and maintain soil functionality for sustainable, profitable food production.

Soil and water are fundamental resources in the environment. This course aims to provide an understanding of important soil physical, chemical and biological properties and of water quality. Topics include: soil water retention, storage and movement, salinity, chemical fertility, the role of biology in soil processes, soil conservation and management, water quality factors and the impact of land management on these factors. The course covers topics in soil and water management and conservation important to students of agricultural, and environmental sciences. Processes that degrade the soil- and water-resources (e.g. erosion, salinity, alkalinity and sodicity, as well as degradation of soil structure) are examined, and their measurement, avoidance and management discussed.

The course will be of interest to students who are concerned with protecting land resources from inappropriate use and the restoration of these resources through sustainable management practices.

Course Learning Objectives:

The course is designed to foster multi-disciplinary and integrative problem-solving skills in soil and water management. It starts off with structured lectures and labs/homework assignments, but progresses towards more open-ended, student-driven and often group-based learning.

This course is designed to promote critical thinking about agricultural production practices, agricultural sustainability, limitations to agricultural production and agricultural impacts on the environment. These topics are especially relevant with increased public awareness and criticism of agricultural and food production practices and their environmental impacts.

At the completion of this course, the student should be able to:

~~a)~~1. Explain relationships among soil, water and air as they relate to environmental quality and agriculture

~~b)~~2. Interpret soil, landscape and climate data for the purpose of identifying potential environmental impacts of agricultural practices.

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Learning Objectives:

Students mastering class material will be able to:

- ~~-~~ Understand terminology used in soil & water conservation & management.
- ~~-~~ Demonstrate knowledge within soil science at advanced level, which is relevant to various types of soil and water use, geographic areas and soil types.

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- Understand how soil and water is used and handled in the landscape and about the dependence of soil and water use on the interaction between natural factors and societal factors.
- Understand how climate, soil type and land use impact on the water supply and the movement of water and its function as carrier substance for mineral substances.
- Evaluate the connections that exist between soil, water management, climate, production and environmental impact.
- Have insights about current research and development work within soil and water use.
- Investigate the methodology specifically relevant to soil and water use.
- Analyse soil and water problems, and develop methods to solve soil and water management & conservation problems.

Course Content Learning Outcomes:

These are complex systems and productions that may interfere with each other and the surrounding environment. The overall aim with the course is to give the students the necessary basic information about soil and water management. This should be set in an overall view so the students are able to critically evaluate the factors which are important for a sustainable use of these resources.
A student who has met the objectives of the course will be able to:

1. Examine and critically appraise the application of the fundamentals of soil management and hydrology in sustainable resource management.
2. Evaluate the sustainability of systems for managing the soil and water resources.
3. Evaluate water resource use within the environment.
4. Discuss important factors for performing a sustainable soil and water management.

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Teaching and Learning Approach

- Active learning, where students should be active and involved in the learning process inside the classroom, will be emphasized in the delivery of this course. Different active learning methods/approaches such as: Engaged Learning, Project-Based Learning, Cooperative Learning, Problem-based Learning, Structured Problem-solving, will be used.
- A typical lecture would start with a short review (~ 5 minutes) using both PowerPoint presentations and the blackboard. This review will also depend on discussions which will gauge the students' digestion of the previous material. Then, the students would have a lecture on new materials using PowerPoint presentations and blackboard. The lecture presentation will be paused every 15 - 20 minutes with brainstorming questions and discussions that will allow the students to reflect and think in more depth about what they learned in that presentation. Then, some example problems will be presented and discussed with the students to illustrate the appropriate problem solving skills that the students should learn. The lecture will be continued for another 15 - 20 minutes, followed by examples and/or a quiz covering the materials taught in the previous two weeks.

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- Assigned readings and activities are an integral component of the course. In addition to attending lecture, students are expected to read the required portions of the text and any supplementary materials, complete class assignments, and participate in class activities. Class assignments may include quizzes, problem sets, and summaries of science news articles. Class activities will include interactive critical thinking exercises which may be based on homework assignments. Assignments should be typed and proofed.

Course Resources:

Course Website(s)

Required Course Texts and Materials:

Frederick R. Troeh, J. Arthur Hobbs, and Roy L. Donahue. 2003. Soil and Water Conservation for Productivity and Environmental Protection Fourth Edition.

Optional Course Texts and Materials:

Assignments and Grading Scheme

Grading System
0 to 100% (where 70% is the least pass mark)

Grading Policy

Component	Grade
Assignments and exams	80%
Class Attendance/ Participation	20%
Total Points	100%

Course Policies

Attendance

Attendance will be checked at the beginning of each class. University regulations will be strictly followed for students exceeding the maximum number of absences.

Homework

Working homework problems is an essential part of this course and they represent a key opportunity to learn the subjects discussed. All homework problems assigned during a given week are due at the beginning of class on the second meeting of the following week unless otherwise stated. Late homework will not be accepted. Failure to turn in this particular homework on time will result in a grade of 0 (zero) for the homework contribution to your final grade. Team work is encouraged; however, the

work one hands in must represent his/her own effort. Homework solutions will be discussed in class. There will be no handouts of homework solutions.

Quizzes

Quizzes will be part of this course. No make-up quizzes will be conducted except in the case of a documented emergency

Term projects

Term projects will be conducted by a group of four students. Each group will select a project from a list of projects suggested by the instructor. The team should share and distribute responsibility. The group will submit a professional report and make an oral presentation. Making use of all resources, e.g., patents, journal publications, internet, labs, etc., is encouraged. The report must be typed. Hand-written reports are not accepted.

Student Conduct

It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavours. Cheating will not be tolerated in this course. University regulations will be pursued and enforced on any cheating student.

Dis~~s~~ability

Students who have disabilities should have a confidential appointment to discuss their needs for accommodations. Establishing reasonable accommodations should be considered on a case- by- case basis.

Important Dates to Remember

Course Schedule

Modules	SUBJECT	Date
1	Soil and Water Conservation	
2	Soil Resilience and Conservation	
3	Erosion Control and Soil Quality	
4	Integrated Water Resources Management	
5	Processes in the Soil Environment: Soil Formation	
6	Soil Quality and Sustainable Land Management.	

Commented [NK1]: The course schedule should be by week / not by module



CCSAFS COURSE MODULE

Course	Sustainable Soil and Water Management					
Module 1	Soil and Water Conservation					
Key Concepts	Soil, water, and conservation					
Overview	There a high link between soil conservation and water conservation. The improvement in soil conversation by reducing run-off, soil erosion, formation of crusts, and the breakdown of soil structure, can ultimately lead to an improvement in water infiltration to soil and water conservation.					
Aim	To provide students with knowledge about soil and water conservation.					
Learning Outcomes	At the end of this module students will be able to: ~~1.~~• Understand ~~C~~concepts related to soil and water conservation.					
Units	~~1.~~ Why conserve soil and water? ~~2.~~ Agents that degrade soil and water resources. ~~3.~~ Soil erosion. ~~4.~~ Consequences of soil erosion (on-site problems , off-site problems) ~~5.~~ Drivers of soil erosion. ~~6.~~ Restoration of eroded and degraded soils.					
Readings	~~1.~~1) Barr N. & Cary J. (1992) *Greening a Brown Land. The Australian Search for Sustainable Land Use*. Macmillan, Melbourne. ~~1.~~2) Roberts B. (1995) *The Quest for Sustainable Agriculture and Land Use*. University of New South Wales Press, Sydney. ~~1.~~3) Sposito G. & Zabel A. (Eds) (2003) The assessment of soil quality. *Geoderma* 114, Nos. 3-4.					
Activity	Assignment 1.1: Reflecting upon soil and water conservation: 1) Provide statistical data about soil and water conservation. 2) Suggest some solutions to solve the problem of soil and water conservation.					
SD Pillars	Environment		Economy	Social	Culture	
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform	Learning to give and share

Commented [NK2]: Explain more… Example:

This module will cover the information to understand the main features of the global water/hydrologic cycle, the link between science of water and climate. This module will also cover the effect of climate change on water cycle and by association the natural and human systems.

Commented [NK3]: Elaborate… examples:

At the end of this module students will be able to:
- Understand the water/hydrological cycle and its connection to climate.
- Understand how variability and changes in climate affect/will affect water supply/availability on land.
- Understand how water impacts ecosystems.
- Learn how to critically evaluate a scientific article and write a review.
- Diagnose the cause of a climate-related water problem and develop solutions to address

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					oneself and society	
Module 2	Soil Resilience and Conservation					
Key concepts	Soil resilience and conservation					
Overview	This chapter will cover the capacity of the soil to restore from the degradative processes. Soils are exposed to many degradative processes including erosion, compaction, salinization, and acidifications. The severity of these degradative processes depends on the severity and duration of the degradative processes and the capacity of soil to resist these processes and the ability to regain and recover. The capacity of the soil to recover from the degradative processes is an inherent attribute of soil. With the interaction with proper management, most soils are capable to reverse soil degradation.					
Aim	To provide students with concepts of soil resilience and conservation					
Learning Outcomes	At the end of this module students will be able to: ~~1.~~ To describe the concepts of soil resilience and conservation.					
Units	~~1.~~ Concepts of soil resilience ~~2.~~ Soil erosion and resilience ~~3.~~ Soil resilience and erodibility ~~4.~~ Management strategies to promote soil resilience					
Readings	~~1.~~1) Blanco-Canqui H., Lal R. (2010). Soil Resilience and Conservation. In: Principles of Soil Conservation and Management. Springer, Dordrecht. ~~1.~~2) Seybold CA, Herrick JE, Brejda JJ (1999). Soil resilience: A fundamental component of soil quality. Soil Sci 164:224-234 ~~1.~~3) Papendick RI (1994). Maintaining soil physical conditions. In: Greenland DJ, Szabolcs I (eds) Soil resilience and sustainable land use. CAB Int. Wallingford, Oxon UK, pp 215-234					
Activity	Assignment 2.1: Reflecting upon measurements of soil resilience: Prepare a short presentation about resilience. Students have to make a short presentation in class using PowerPoint. The due date to submit this activity is week 2.					
~~SD Pillars~~	~~Environment~~		~~Economy~~	~~Social~~	~~Culture~~	
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself	Learning to give and share

Commented [NK4]: Elaborate… example

This module will explain soil fertility, looking into nutrients needed for the growth of plants, and briefing the processes that cause a loss of soil fertility and the degradation effects

Commented [NK5]: More details

At the end of this module, the students will be able to:
- To identify basic soil fertility processes
- Describe the natural factors influencing soil organic matter decomposition and accumulation rate.
- Explain the relationship between climate change and carbon sequestration.
- identify the different processes leading to the stabilization of soil organic matter.
- Understand SOM decomposition.
- Explain why soil organic matter is important for soil resilience.

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					and society	
Module 3	Erosion Control and Soil Quality					
Key concepts	Erosion control and soil quality					
Overview	The concept of soil quality emerged to define the ability of soil to perform a specified function. This concept is associated with the ability of the soil to: 1) Sustain plant and animal productivity; 2) Maintain environmental quality (maintain and enhance air and water quality); 3) Promote plant, animal, and human health; 4) Promote plant growth and productivity without reducing soil erosion and degradation; 5) Hold and release nutrients to plants; 6) Hold and release water to plant and recharge; 7) Promote root growth; 8) Maintain abiotic habitat; 8) Resist degradation. This module will cover the conservation and management practices that improve the soil function to address the growing concerns about the depletion of natural resources, soil pollution, and the global climate change.					
Aim	The aim of this module is to know the principles of controlling soil erosion and to understand soil quality attributes.					
Learning Outcomes	At the end of this module students will be able to: • Describe the change in soil quality. • Describe the methods to control soil erosion.					
Units	1. Definitions of soil and water quality 2. Indicators of soil and water quality 3. The soil and water management assessment framework 4. Management of soil and water quality					
Readings	1) Blanco-Canqui H., Lal R. (2010). Erosion Control and Soil Quality. In: Principles of Soil Conservation and Management. Springer, Dordrecht 2) FAO. 2019. Soil erosion: the greatest challenge to sustainable soil management. Rome. 100 pp. Licence: CC BY-NC-SA 3.0 IGO. 3) Doran, J. W., & Parkin, T. B. (1994). Defining and assessing soil quality. Defining soil quality for a sustainable environment, (definingsoilqua), 1-21.					
Activity	Assignment 3.1: Student presentation for a selected Journal article: Students have to present a Journal article related to soil quality. The presentation should not exceed 5 minutes and an extra 10 minutes for discussion. Students should use PowerPoint and submit a short summary for the article (one paragraph). The due date is the week 3.					
~~SD Pillars~~	~~Environment~~	~~Economy~~		~~Social~~	~~Culture~~	
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transfor	Learning to give and

Commented [NK6]: The aim of this module is to present best management practices for managing erosion on agricultural soils for preventing and resolving erosion processes.

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					m oneself and society	share
Module 4	Integrated Water Resources Management					
Keys	Water resources management					
Overview	The Global Water Partnership's definition of Integrated Water Resources Management (IWRM) is “a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”. The concept is based on three principles: social equity, economic efficiency and environmental sustainability. So the IWRM is a comprehensive tool for managing water resources to balance social and economic needs and to ensure the protection of ecosystems. Water is used for many purposes including agriculture, ecosystem, and people. Therefore, the IWRM is a flexible way to manage water use between sectors.					
Aim	The aim of this module is to provide students with the knowledge and skills related to integrated water resources management.					
Learning Outcomes	At the end of this module students will be able to: ~~1.~~ Mange water resources in integrated methodology.					
Units	~~1.~~ Groundwater resources and protection. ~~2.~~ Catchment protection. ~~3.~~ Modelling environmental processes. ~~4.~~ Catchment hydrology and assessment. ~~5.~~ Integrated systems for sustainable surface water management. ~~6.~~ Forecasting and extreme event response.					
Readings	~~1.~~1) Rahaman, M. M., & Varis, O. (2005). Integrated water resources management: evolution, prospects and future challenges. Sustainability: science, practice and policy, 1(1), 15-21. ~~1.~~2) Savenije, H. H., & Van der Zaag, P. (2008). Integrated water resources management: Concepts and issues. Physics and Chemistry of the Earth, Parts A/B/C, 33(5), 290-297.					
Activity	Assignment 4.1: Student presentation for a selected Journal article: Students have to present a Journal article related to integrated water resources management. The presentation should not exceed 5 minutes and an extra 10 minutes for discussion. Students should use PowerPoint and submit a short summary for the article (one paragraph). The due date is week 4-10. Assignment 4.2: Applying a community-service learning methodology to a local farm: ~~Students should select a local farm and apply one of the integrated~~					

Commented [NK7]: Explain in a way to match course objectives and link to the themes of the project

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	water resources that had been taught in this module to the farm.					
SD Pillars	Environment		Economy	Social	Culture	
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share
Module 5	Processes in the Soil Environment					
Keys Overview	Soil environment This module addresses factors that affect on soil formation. There are several factors contribute to soil formation, stability, and sustainability. Climate factors such as temperature, moisture, and wind play a major role in soil formation and sustainability.					
Aim	The aim of this module is to highlight the processes in soil environment.					
Learning Outcomes	At the end of this module students will be able to: 1. Understand factors related to soil formation and sustainability.					
Units	1. Soil formation. 2. The soil-forming factors. 3. Parent material. 4. Climate. 5. Organisms. 6. Relief. 7. Time.					
Readings Activity	???? Assignment 5.1: Reflecting upon soil processes environment: Q.1) List factors affecting soil formation and sustainability? Q.2) How do soil environment have an impact on soil processes? Assignment 5.2: Students require to find videos about soil formation and sustainability from an authentic scientific source and share them with the rest of the students. Videos should be 5 minutes in length to highlight soil formation and sustainability. For longer-videos, students are required to shorten these videos by using an online-free video processing software.					
SD Pillars	Environment		Economy	Social	Culture	

Commented [NK8]: Explain using the guidelines provided for community based activity

Commented [NK9]: More learning outcomes

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21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share
Module 6	Soil Quality and Sustainable Land Management					
Keys	Soil quality and land management					
Overview	Soil quality concepts was highlighted in module 3, indication the ability of soil to perform a specified function. Human activities degrade natural resources including soil. Therefore, international agencies have responded by promoting ecologically sustainable development (ESD). There is a need for more sustainable land management (SLM) to assess soil (land) resources.					
Aim	The aim of this module is to demonstrate to students how to integrate all sustainable practices into an integrated management system (SLM).					
Learning Outcomes	At the end of this module students will be able to: 1. Combine all sustainable practices in an integrated management system.					
Units	1. What is soil quality? 2. Concepts of sustainability. 3. Sustainable land management. 4. Summary					
Readings	1) Magdoff, F., & Van Es, H. (2000). *Building soils for better crops* (pp. 80-82). Beltsville: Sustainable Agriculture Network. 2) Robert E. White. Principles and Practice of Soil Science: The Soil as a Natural Resource, Fourth Edition, Blackwell.					
Activity	Assignment 6.1: Visit a local farm and use the checklist to check the issues and principles for all aspects of sustainability that growers encounter on their farms.					
SD Pillars	Environment	Economy		Social	Culture	
21st ESD	Learning to know	Learning to be	Learning to do	Learning to live together	Learning to transform oneself and society	Learning to give and share

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Commented [NK10]: Link to course objectives and project themes

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Table 1. A 10 ECTS workload allocation for the course "Sustainable Soil and Water Management".

Learning Components	No	Time Factor	Workload	Course Modules						Workload
				1	2	3	4	5	6	
Lectures (face-to-face)	26	1.6	42	4	6	10	13	5.5	4.5	43
Online	5	2	10	-	1	2	4	1.5	1.5	10
Lab work										
Reading articles (3 pages per hour)	200	0.3	58	9	8	10	11	11	9	58
Reading book chapters (5 per/h)	135	0.2	28	4	5	6	4	5	4	28
Preparing course activities	6	9.7	58	3	5	10	20	10	10	58
Project work	6	8.3	50	6	3	9	20	5	7	50
Preparation for exam	2	23	45					20	25	45
Writing the exam	2	1.5	3						3	3
Total				26	26	47	72	58	64	295

Table 2. Connection of the 17 SDGs with the 3 key domains of the CCSAFS MSc.

No.	SDGs	Climate Change	Sustainable Agriculture	Food Security	Course Module

1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				1, 2, 3, 4, 5, 6
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality and empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				1, 4
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change				

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	and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				1, 2, 3, 5, 6
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				6

Comments on the overall course:

The course outcomes are not clear especially in the description of the modules.

The course schedule should cover 15-16 weeks to focus and effectively understand all topics. The integration of various disciplinary insights should lead to innovative insights revolving around the human-environment interactions. I am not particularly seeing a module linking the interdisciplinary concepts (climate change, agriculture, and food altogether)

- Learning objectives should be consistent with the learning outcomes and the course schedule
- I would advise returning to the Learning Outcomes and grounding the modules in these outcomes. More work on the methodologies used and the assessment procedures is needed.
- I suggest going back to the Pillars of SDGs to map these insights in the modules.

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- CCSAFS Community-Based / Service Learning Activity

Please try to redesign the activities to show the connections between academic achievement, civic engagement, and personal growth

There are several activities, but none show the community-based / service learning perspective. The activities should be linked to the activity goals and learning outcomes.

Please keep in mind the following when designing the course activities:

a) The activity should meet an actual need in the community.
b) The activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting.
c) The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their role in society.
d) The activity should help students reflect on their learning experiences and should lead to personal and societal transformation.
e) The activity should provide students with the opportunity to develop learning to give and share: solve a real-life problem, meet a need or address an issue in the community served.
f) It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved

- SDG Rubric

The course activities should connect the 17 SDGs with the three key domains of the CCSAFS Master program (climate change, sustainable agriculture, as well as food security). Make sure to target the SDGs in all modules and fill the SDG rubric appropriately.

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Course Syllabus

Course Name: Climate Change Mitigation and Adaptation

Fall Semester, 2018

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Instructor information

Instructor: Professor Abbas Al-Omari

Office location: Water, Energy and Environment Center

Telephone: 5355000 ext. 23903

Office hours:

E-mail: abbas.alomari@ymail.com

Web site: http://centers.ju.edu.jo/en/weec/Home.aspx

Course Identification

Course Name: Climate Change Mitigation and Adaptation

Course Location:

Class Times:

Lecturer:

Practical Session:

Prerequisites:

Faculty Web Page:

Course Description/Overview

Course Learning Objectives

Course Content Learning Outcomes

Course Resources

Required Course Texts and Materials:

Optional Course Texts and Materials

Grading Policy

Assignments	
Practical Exam	
Oral Exam	
Final Exam	
Total Points	

Course Schedule

Week	Date	Topics
1		
2		
3		
4		
5		
6		
7		
8		
9		

10		
11		
12		
13		
14		
15		

Course	Climate Change Mitigation and adaptation
Module 1	Introduction to climatology and climate history
Key concepts	Climate physics and basics
Overview	Basics of climatology; weather, climate, variables, elements, relationships, climate properties (Normal, extremes and frequencies), climate history at different time scales, i.e. hundreds, thousands and millions of years, evidence of climate change.
Aim	Introduce the students to the basics of climatology and climate history showing evidence of climate change over the last hundred fifty years.
Learning outcomes	Students gain relevant knowledge of the basics of climatology, ~~Students are aware of climate~~ and climate change history,
Units	Chapter 1: Global warning and climate change~~,~~ Chapter 4: Climates of the past.~~-~~
Readings	None
Activity	The students will be introduced to the following concepts through regular classroom lecturing: - The basics of climatology will be presented to the students including basic terminology, elements, variables and their interdependencies, - The students will be introduced to the climate history taking into consideration different time scales, i.e. hundreds, thousands and millions of years leading to evidence of climate change over the past hundred fifty years, Videos that introduce the students to the main global climate elements and to the main concepts in climatology and meteorology will be played

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	in the class room to enhance the students comprehension of the main concepts of climatology and its global nature, Videos that show the occurrence of certain climatological events, i.e. hurricanes and tornados in the twentieth and twenty first centuries will be played in the class room as an evidence of climate change, Documentaries that show evidence of climate change and the rising concerns of the international community; scientists, politicians and regular people, to mitigate and adapt to it will be played in the class room, The students will be encouraged to engage in discussions during regular lecturing and videos playing, The students will given one homework to reflect on the concepts they have learned in this module, One quiz will be given to the students during this module to measure their understanding of the main concepts of this module.
10Cs/6 LEARNING GOALS	
SDGs	13
ECTS workload	
Module 2	Physics of climate change
Key concepts	Drivers of global warming, how it is happening and why?
Overview	Evidence of global warming and climate change, fossil fuel fingerprint, energy balance, natural and anthropogenic global warming, greenhouse effect, greenhouse gases, sources and sinks of Green House Gases, their relative roles in global warming.
Aim	Introduce the students to the concept of climate change, its drivers and physics,
Learning outcomes	Students are familiar with the natural and anthropogenic climate change drivers, Students have thorough understanding of the physics of climate change,
Units	Chapter 1: Global warming and climate change, Chapter 2: The greenhouse effect, Chapter 3: The greenhouse gas
Readings	Chapter 3: The physics of climate change, Chapter 10: Climate change, Chapter 14: Climate change,
Activity	The students will be introduced to the following concepts through regular classroom lecturing: □ The electromagnetic spectrum, □ The greenhouse effect that causes global warming, □ Global energy balance,

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	The occurrence of the different greenhouse gases in the atmosphere, their sources and sinks, and their relative contribution to climate change, History of greenhouse gases in the atmosphere, Videos that enhance the students' understanding of the main concepts in module will be played in the classroom, The students will be given two homework to enhance their understanding of the concept they have learned in this module, One quiz will be given to the students during this module to measure their understanding of the main concepts of this module.
10Cs/6 LEARNING GOALS	
SDGs	13
ECTS	
Module 3	Climate modeling and climate change scenarios
Key concepts	Modeling theory and implementation to climate change
Overview	Introduction to modeling theory, climate models, inputs and outputs, limitations and uncertainties, Verification and validation of climate models, Climate change projections for the 21st century,
Aim	Introduce the students to climate models, modeling and projections
Learning outcomes	The students are familiar with the modelling theory, ~~The students are familiar with the~~ climate modelling, ~~The students are familiar with~~ climate change models, ~~The students are aware of~~ climate change projections for the 21st century, The students understand the models limitations' and the associated uncertainties~~,~~
Units	Chapter 5: Modeling the climate Chapter 6: Climate change in the twenty first century and beyond, Chapter 9: Weighing the uncertainty,
Readings	?????
Activity	The students will be introduced to the following concepts through regular classroom lecturing: Modeling theory, Climate modeling, Climate models, their projections, limitations and uncertainties, Climate projections (scenarios) for the twenty first century, Videos that enhance the students' understanding of the main concepts in module will be played in the classroom,

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	The students will be encouraged to engage in discussions during regular lecturing and videos playing, One quiz will be given to the students during this module to measure their understanding of the main concepts of this module. The students will given one homework to enhance their understanding of the concept they have learned in this module,
10Cs/6 LEARNING GOALS	
SDGs	13
ECTS	
Module 4	Climate change impacts and Mitigation
Key concepts	Impacts of climate change, mitigation measures
Overview	Basic concepts: sensitivity, adaptive capacity and vulnerability, Impacts: sea level rising, global average surface temperature, impact on fresh water resources, impact on agriculture and food supply, impact on ecosystems, and health impacts, Carbon dioxide capture and storage (CCS), renewable energy (solar, wind, geothermal, bio-energy, hydro), land use change and management, traditional regulatory approach, emission trading, carbon taxes, information based approaches, investment and technology approaches, mitigation measures at the sector level, effect of water management policies and measures on Green House Gases (GHG) emission and mitigation, benefits and costs of climate mitigation.
Aim	Introduce the students to the mitigation measures to reduce the negative climate change impacts.
Learning outcomes	Students have thorough understanding of climate change impacts and consequences, i.e. economic, environmental, social, health, and political. Students understand thoroughly the different measures to reduce the negative climate change impacts.
Units	Chapter 7: The impacts of climate change Chapter 10: Strategy for action to slow and stabilize climate change Chapter 11: Energy and transport for the future
Readings	Chapter 2: Responding to climate change: Mitigation *CHRIS WOLD, DAVID HUNTER & MELISSA POWERS, CLIMATE CHANGE AND THE LAW (Lexis-Nexis, 2d ed., 2013,* Climate change mitigation measures and water
Activity	The students will be introduced to the following concepts through regular classroom lecturing: - Basic concepts: sensitivity, adaptive capacity and vulnerability,

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	• Climate change impacts: sea level rising, impact on global average surface temperature, impact on fresh water resources, impact on agriculture and food supply, impact on ecosystems, and health impacts, • Mitigation measures: Carbon dioxide capture and storage (CCS), renewable energy (solar, wind, geothermal, bio-energy, hydro), land use change and management, traditional regulatory approach, emission trading, carbon taxes, information based approaches, investment and technology approaches, mitigation measures at the sector level, effect of water management policies and measures on Green House Gases (GHG) emission and mitigation, benefits and costs of climate mitigation. Documentaries that enhance the students' understanding of the different mitigation measures presented in this module will be played in the classroom, The students will be encouraged to engage in discussions during regular lecturing and documentaries playing, One quiz will be given to the students during this module to measure their understanding of the main concepts of this module. The students will given two homework to enhance their understanding of the concept they have learned in this module,
10Cs/6 LEARNING GOALS	
SDGs	1, 3, 6, 7, 9, 12, 13, 15
ECTS	
Module 5	Adaptation to climate change
Key concepts	Adaption measures to lower the impacts of climate change
Overview	Impact assessment, regional impacts, adaptation strategies, funding adaptation, sustainable development, adaptation integration into policy, Capacity building, education and training, public awareness, cooperation and synergies, implementing adaptation,
Aim	Introduce the students to adaptation measure that help adapt to the negative climate change impacts.
Learning outcomes	Students are aware of the different adaptation measures to adapt to the negative climate change impacts: Integrate climate change into national policies, strategies and planning, Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and

Commented [NK6]: activities should be specific

	early warning, Sustainable management and efficient use of natural resources, Knowledge and awareness for sustainable development and life style in harmony with nature.
Units	Chapter 10: Strategy for action to slow and stabilize climate change
Readings	United Nations Framework Convention on Climate Change: Impacts, vulnerabilities and adaptation in developing countries,
Activity	The students will be introduced to the following concepts through regular classroom lecturing: - Impact assessment, regional impacts, adaptation strategies, funding adaptation, sustainable development, adaptation integration into policy, - Capacity building, education and training, public awareness, cooperation and synergies, implementing adaptation, Documentaries that enhance the students' understanding of the different adaptation measures presented in this module will be played in the classroom, The students will be encouraged to engage in discussions during regular lecturing and documentaries playing, One quiz will be given to the students during this module to measure their understanding of the main concepts of this module. The students will given one homework to enhance their understanding of the concept they have learned in this module,
10Cs/6 LEARNING GOALS	
SDGs	2, 3, 4, 6, 8, 9, 11, 12, 15
ECTS	
Module 6	International Agencies and conventions on climate change
Key concepts Overview	International agencies and conventions on climate change Intergovernmental Panel on Climate Change (IPCC), United Nations Environmental Program (UNEP), World Meteorological Organization (WMO). United Nations Framework Convention on Climate Change (UNFCCC), 1992 Earth Summit in Rio de Janiero, The 1998 Kyoto Protocol, Paris Climate Agreement,
Aim	Familiarize the students with international agencies and international conventions on climate change.
Learning outcomes	Students are familiar with the international agencies and international conventions on climate change.
Units	Chapter 10: Strategy for action to slow and stabilize climate change
Readings	United Nations Framework Convention on Climate Change, 1992

Commented [NK7]: these are not learning outcomes. You need to change the format

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Commented [NK9]: activities need to be more specific

	Koyoto protocol to the United Nations Framework Convention on Climate Change, 1998 Paris agreement, 2015
Activity	The students will be introduced to the following international agencies and conventions through regular classroom lecturing: • Intergovernmental Panel on Climate Change (IPCC), United Nations Environmental Program (UNEP), World Meteorological Organization (WMO). • United Nations Framework Convention on Climate Change (UNFCCC), 1992 Earth Summit in Rio de Janiero, The 1998 Kyoto Protocol, Paris Climate Agreement, Documentaries that enhance the students' knowledge about the international agencies and conventions will be played in the classroom, The students will be encouraged to engage in discussions during regular lecturing and documentaries playing, One quiz will be given to the students during this module to measure their understanding of the main concepts of this module. The students will given one homework to enhance their understanding of the concept they have learned in this module,
10Cs/6 LEARNING GOALS	
SDGs	17
ECTS	

Commented [NK10]: where is the community based / service learning activity

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The Community-Based / Service Learning Activity needs to be more elaborate. Please take the following points into consideration to improve the Community-Based activity

The community-based activity goals, purpose and expected learning outcomes should be identified clearly in a way that connect between academic achievement, civic engagement, and personal growth. The goals of the activity should link to the course objectives. Through the community-based activity, students will have the opportunities to apply new knowledge and skills in a real life context and shows a strong connection to the whole course. They should actively reflect on their learning experiences that can eventually lead to personal and societal transformation. Also, this is not clear in this activity.

1) **Define Activity Goals, Objectives and Outcomes.** The activity should clearly define clearly the goals, the purpose of community or service learning component and the expected learning outcomes. Also, the connections between academic achievement, civic engagement, and personal growth supporting transformative learning should be linked to the activity goals and learning outcomes.

2) **Meet Actual Community Needs Collaboratively.** The activity should meet an actual need in the community and is coordinated through collaboration with the community.
3) **Merge Theory with Practice & Course Curriculum Connection.** The community-based activity should provide students with an opportunity to use existing skills, develop new ones, and use skills in a real world setting. It should be structured in a way that provides opportunities to students apply new knowledge and skills in a real life context and shows a strong connection to the whole course.
4) **Enhance Active Student Reflection**. The activity should be designed in a way to challenge students to make meaning of their community service experience, and should provide them with an opportunity to reflect upon their own learning and their role in society. It should be made clear how the activity can help students actively reflect on their learning experiences and can lead to personal and societal transformation.
5) **Develop Learning to give and share**. The community-based or service learning activity should provide the student with the opportunity to develop learning to give and share. It should help solve a real-life problem, meet a need or address an issue in community served.
6) **Make a Difference in Community.** The activity should provide students the opportunity to contribute in solving a real community need. It should include specific actions that empower students to make a difference, in relation to the community problem or issue to be solved.

ECTS Workload Allocation for the climate change mitigation and adaptation course

Learning Components	No	Time Factor	Work load	Course Modules						Work load
				1	2	3	4	5	6	
Lectures (face-to-face)	39	1	39	6	9	3	9	6	6	39
Online	9	1	9	0	3	2	2	2	0	9
Reading book chapters and reports	48	2	96	12	24	10	22	16	12	96
Homework	8	5	40	5	10	5	10	5	5	40
Project work	1	60	60	0	12	12	12	12	12	60
Preparation for exams	2	25	50	8	8	8	9	9	8	50
Writing the exam	2	2	4			1	1	1	1	4
Total			298	31	66	41	65	51	44	298

Include the SDG table

SDGs		CLIMATE CHANGE	SUSTAINABLE AGRICULTURE	FOOD SECURITY	COURSE MODULE
1	End poverty in all its forms everywhere				
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture				
3	Ensure healthy lives and promote well-being for all at all ages				
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
5	Achieve gender equality & empower all women and girls				
6	Ensure availability and sustainable management of water and sanitation for all				
7	Ensure access to affordable, reliable, sustainable, and modern energy for all				

8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all				
9	Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation				
10	Reduce inequality within and among countries				
11	Make cities and human settlements inclusive, safe, resilient, and sustainable				
12	Ensure sustainable consumption and production patterns				
13	Take urgent action to combat climate change and its impacts				
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development				
15	Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss				
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, & build effective, accountable, and inclusive institutions at all levels				
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development				

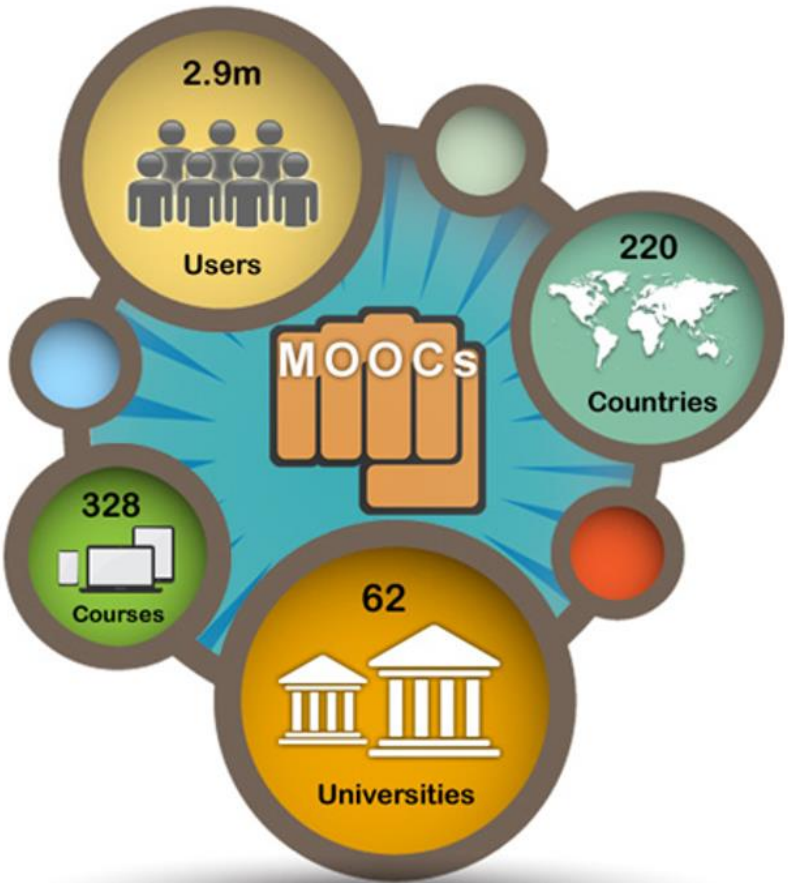
External Evaluation

MOOCs and Blended Learning Management System

Dr. Khaleel Al-Said

Introduction

In just a few years since their emergence, Massive Open Online Courses (MOOCs) have attracted a large number of institutions to offer courses free of charge. The provision of MOOCs allows an institution to reach a much wider range of students from different backgrounds rather than using a traditional mode of teaching. As a relatively new mode of education, assessment of such initiatives, are very important both for the design and the quality of the finally produced MOOCs.



It is therefore important for institutions and academics who intend to offer MOOCs to be aware of how teaching can be best delivered in this new learning environment for effective student learning. This evaluation addresses this issue by investigating the factors conducive to the effective teaching of MOOCs; and an empirical evaluation is conducted to find out to what extent these factors can be identified in CCSAFS developed MOOCs.

The CCSAFS MOOCs

In the context of CCSAFS, MOOCs were designed, developed and piloted during the implementation process.

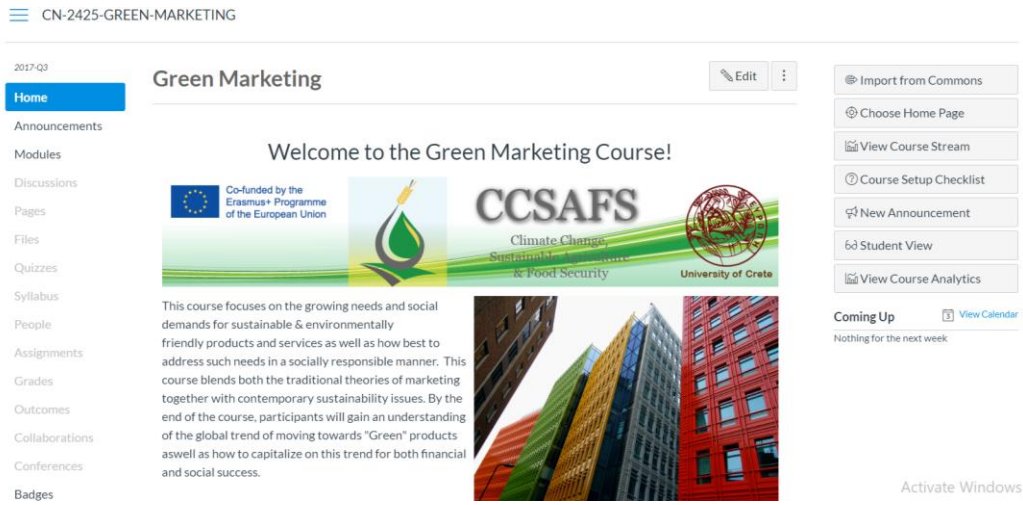


Components of a MOOC

The First MOOC delivered focused on teaching Green Marketing within the context of sustainability, sustainable development, and sustainability justice. The MOOC ran for approximately 5 weeks and was open to an international audience In total 264 students registered for the course with about 25% active users.

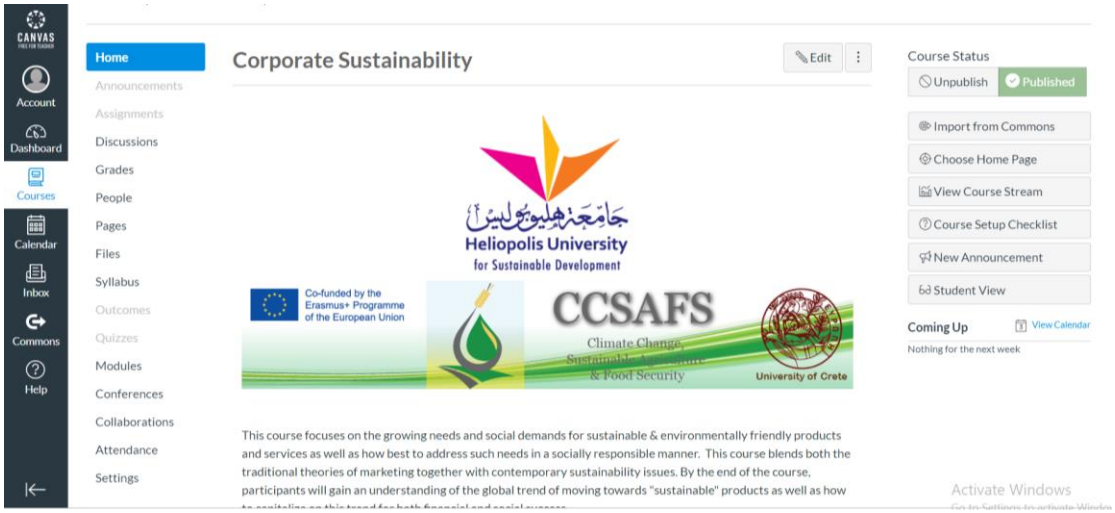
Green Marketing

- The First MOOC delivered focused on teaching Green Marketing within the context of sustainability, sustainable development, and sustainability justice.
- The MOOC ran for approximately 5 weeks and was open to an international audience
- In total 264 students registered for the course with about 25% active users



Corporate Sustainability

- In order to transform the course, the name and focus of it was changed from Green Marketing to "Corporate Sustainability", this is to better capture the focus and essence of the course and its relationship to CCSAFS
- The material and teaching methods were also developed in a way to better focus on a constructivist pedagogical approach and by engaging more in student led learning and reflection
- The Course of Corporate Sustainability will not be as open as the Green Marketing Course, however, it will be more focused on the Project participants, faculty staff members, and students of the CCSAFS program.
- An invitation was just sent out to all CCSAFS partners, and if you are interested in joining the course, please send us your email.
- The course will officially start on the 15th of September with a basic introduction, but it will really begin with the content on the 22nd of September and end on the 10th of October



Assessment Methods

- **Course overview**
- **Learning objectives**
- **Instructional materials**
- **Learner interaction and engagement**
- **Course technology**
- **Learner support**
- **Accessibility**
- **Dissemination and promotion**

Each of these general standards has a number of related and more specific sub-standards. The process of assessment involved taking each course that has been taught to see if each standard has been met and provide suggestions for further improvement. The process is not perfect, but it is a widely accepted model for designing quality MOOCs

Results

As pointed earlier, the factors leading to effective teaching of MOOCs revolve around six areas according to the stages of course delivery, namely, preparation, attraction, participation, interaction, consolidation and post-course support. They address the application of technology to achieve educational purposes, while coping with the potentials and constraints of the MOOC environment. In practice, however, existing MOOCs show varying degrees of the implementation of the factors.

- The results of the MOOC were mostly positive, with student giving general good feedback
- However, in order to further develop the course online with sustainability trends, modern pedagogical techniques, and the CCSAFS Program, the MOOC needed to be transformed.

Summary of strengths and weaknesses

The main points of this analysis of the strengths and weaknesses of MOOCs can be summarised as follows:

Strengths

- CCSAFS MOOCs deliver high quality content that can be further elaborated for free to anyone with a computer and an Internet connection;
- CCSAFS MOOCs can be useful not only in the MENA region but also globally provided that there is proper maintenance and support. It will also require local support and partnerships;
- CCSAFS MOOCs are valuable for developing generic learning in the field of climate change, sustainable agriculture and food security as well for creating large online communities of interest or practice;
- CCSAFS MOOCs can be valuable as a means for lifelong learning and continuing education;

Weaknesses

- CCSAFS MOOCs need further enrichment in terms of communication tools used among participants;
- CCSAFS MOOCs need to be wider marketing to attract more users and provide them with longer time for successfully complete the course;
- CCSAFS MOOCs tend to attract those with a high level of education, rather than widen access;
- CCSAFS MOOC materials may be limited by copyright or time restrictions for re-use as open educational resources.

Recommendations

- Marketing and promotion:
Take initiatives to market and promote the MOOCs using the various networks such as RCE Global Network as well as other universities both in Egypt and Jordan as well as in the MENA region.
- Practice and application:
Encourage students to collaborate and exchange ideas through the course of the learning experience. Develop student-driven learning activities or assignments, including case studies, labs, or discussion forums. Tt is important to ensure that the MOOCs are not linear but interactive.
- Learner support:
When further implementing the developed MOOCs, it is important to have the help desk procedures clearly mapped out and communicated to the prospective participants.
- Rewards and incentives:
As the MOOCs developed are clearly related to the learners' path careers, think of issuing a certificate.
- Take into consideration students' familiarity with MOOCs delivery technologies.

It could be that some users might not be accustomed with a Web platform, so provide some guidelines or an overview of the tools used.

- Encourage learning partnerships.

Students participating in MOOCs need to stay motivated and engaged to ensure the learning is sustained. This much depends on the kind of learning activities developed and the flexibility offered to complete the courses.

Ensure that your design and development strategy allow for strong collaboration.

Encourage strong collaboration among participants. Incorporate multiple opportunities for learners to collaborate and learn from each other.

- Incorporate multiple deliverable/ asset types (for example, discussion forums, provide flexibility in terms of learner-activity completion timing.

- Don't forget to plan for a maintenance strategy.

One benefit of a MOOC is that it can live on over time and continue to be a reference for learners even after they have participated. So, consider a plan for keeping the MOOCs on board.

- Create in-demand content.

When possible think over the expected demands of the participants and respond accordingly.

- Provide engaging content.

In the future, provide Webinars and think about how to make the content you build exciting as well as tailor the content to them.

- Make the course accessible for everyone,

Take measures to increase accessing your courses using various communication means.

- Provide rubrics and other means for self- and peer assessment
for peer review.

Take into consideration that:

- Effective teaching of MOOCs starts from a thorough understanding of the MOOC environment, before engaging in course design.

- Effective teaching is not possible without understanding the perspectives of MOOC learners. To this end, collecting the profiles of participants is necessary.

- It is assumed that not all existing pedagogies are suitable. So, there is need for proper selection.

- An effective introduction at the beginning of a course is crucial for drawing students' attention and arousing their interest.

- After drawing learners into enrolling on a course, measures should be taken to maintain their attention, participation in the course and interaction with others.

- Measures should be taken to encourage active in online interaction among instructors and participants, although this is not one of the practices of MOOCs. For example, relevant discussion threads could be linked to the corresponding sections in a MOOC to help learners identify easily the threads related to a specific course section

- However, bringing MOOCs participants together online is a challenge in MOOCs because of the possible massive number and wide range of students.

In further updating the CCSAFS MOOCs, consider that:

- Although the platform adopted appears to justify its status by promoting curricula that are equivalent to campus-based courses, a strong focus should be on content delivery and an emphasis on the rigor and formality of their assessment methods.
- The promotion of self-assessment seems to be an advantage that has to be taken more in consideration.
- There is need to disassociate conventional teaching from MOOCs design and build the role of the teacher in a more flexible modality.
- There is also need after the intervention to explore how a MOOC pedagogy might work with a construction of the teacher that has an immediacy that can succeed at scale.
- It would be important to see whether MOOC teaching might take place *in conjunction* with established teaching practices. In the case of CCSAFS, for example, you could explore how MOOC cohorts might actively engage with 'conventional' students.

Assessing the CCSAFS Blended Learning Environment and the Searching Literature Machine

The CCSAFS Blended Learning Environment is based on a modification of the Moodle Learning System (LMS) that provides learners with instant access to their learning materials wherever they are and whenever they need them. This is because a number of learning materials are given as Open Education Resources accessible online. Due to that students can learn at their own pace and acquire the necessary knowledge and skills in the way that fits their own needs and learning styles.

The CCSAFS Blended Learning Environment is efficient because learners can get more done in less time, probably with less supervision. They could also be challenged to apply multiple ways of knowing.

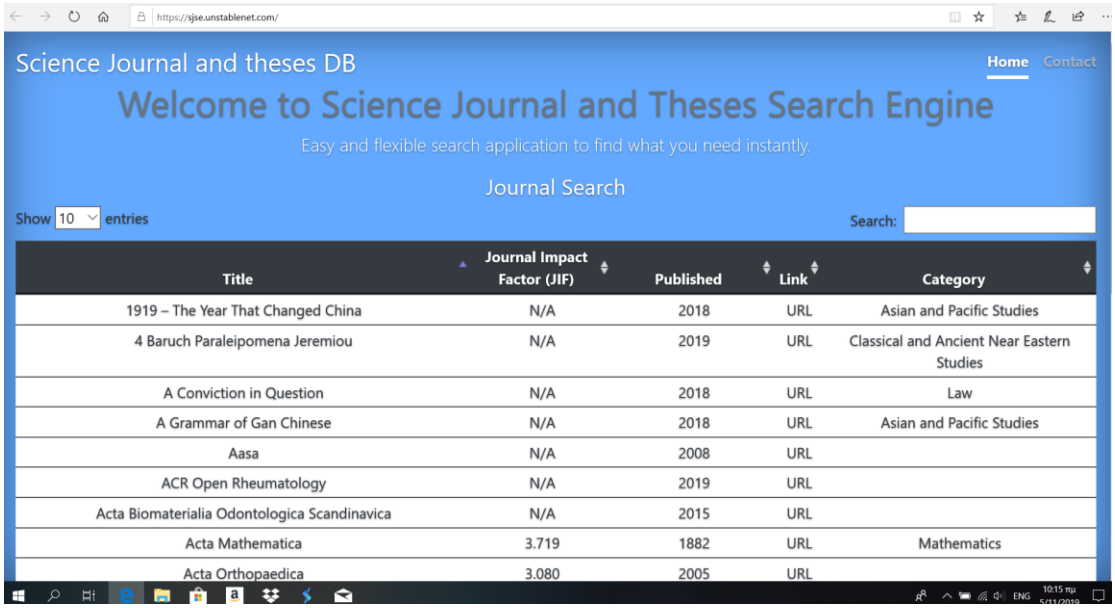
The CCSAFS course modules are properly presented and easily accessible with concrete guidelines for assignments.

One of the biggest challenges that the CCSAFS Blended Learning Environment offers is engaging the students through the tools and activities provided. Added to that, the LMS offers opportunities to further the engagement process through the assessment functions installed in the LMS.

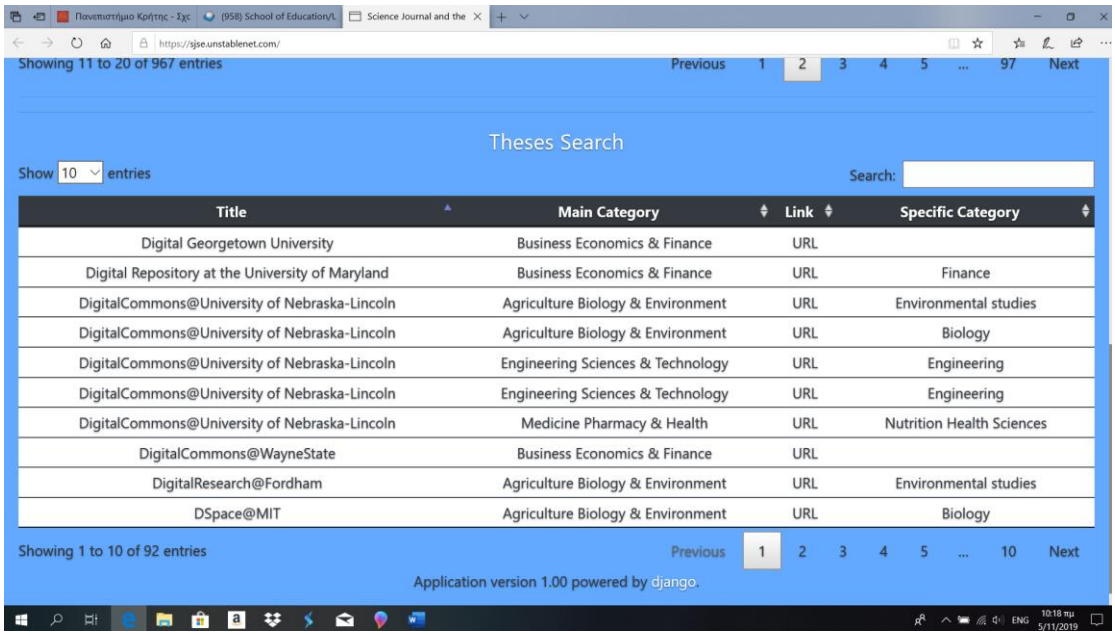
It seems that through the CCSAFS blended learning, the CCSAFS Master students can easily be reached using the announcements function. Encouraging collaboration is one of the key factors necessary for effective learning in a blended learning environment.

Through the CCSAFS Blended Learning Environment enables course participants are able to work together, engage in discussions, and provide useful feedback to one another. Encouraging dynamic online discussions and peer feedback can significantly improve learners' knowledge and skills, especially when it comes to the students' practicums.

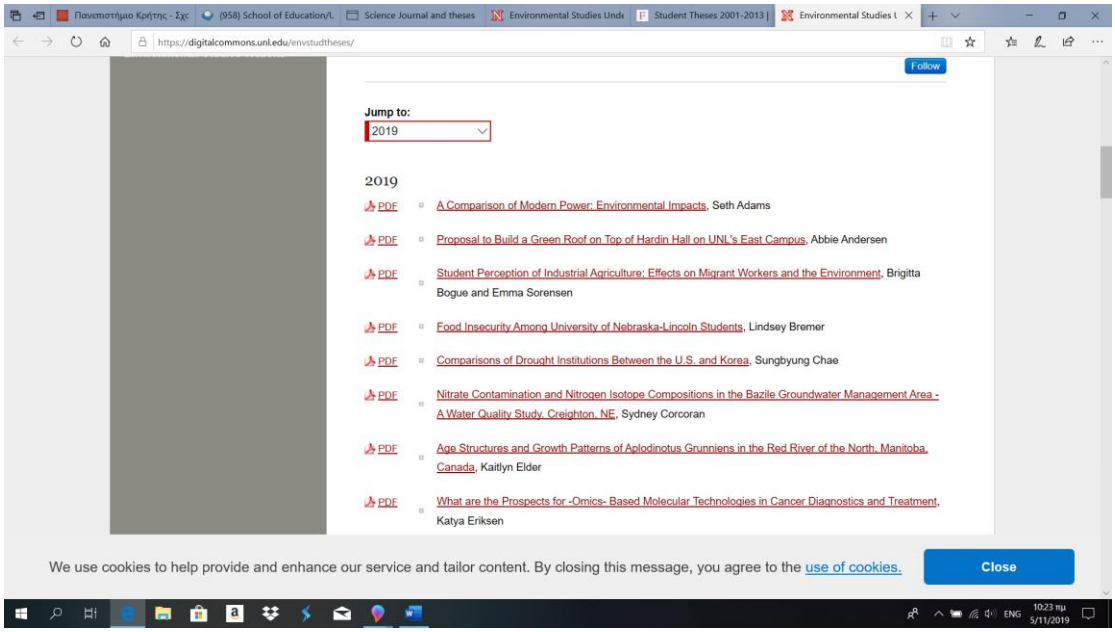
Another functionality provided by the CCSAFS LMS is tracking the progress of students which is considered very important. Instructors are able to view reports of online tests and identify areas where learners need help so that they can help them improve and reach their full potential.

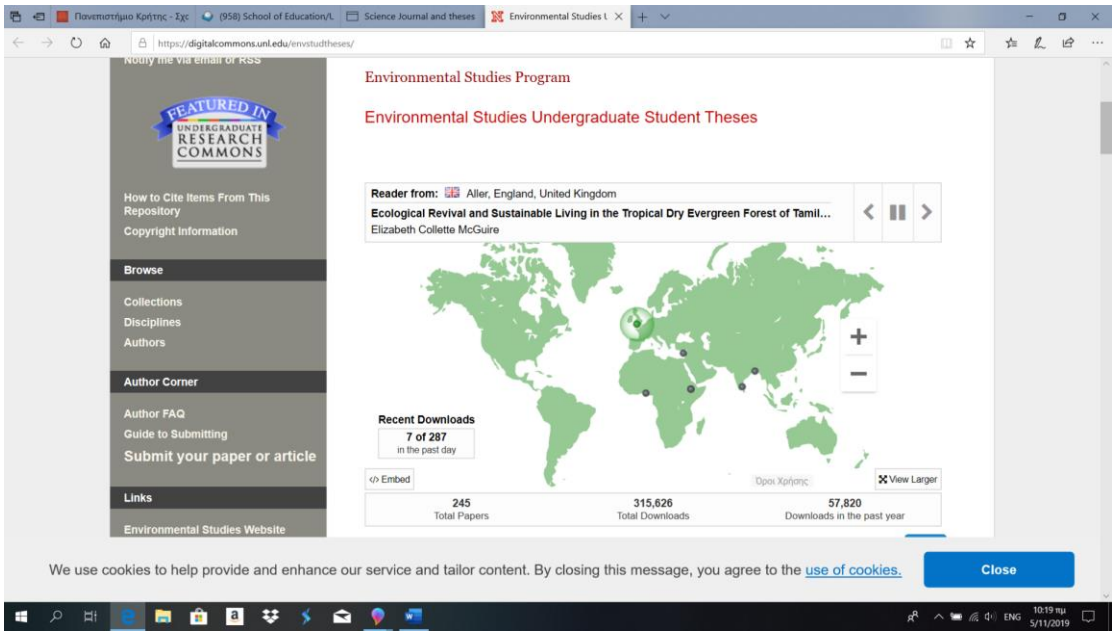


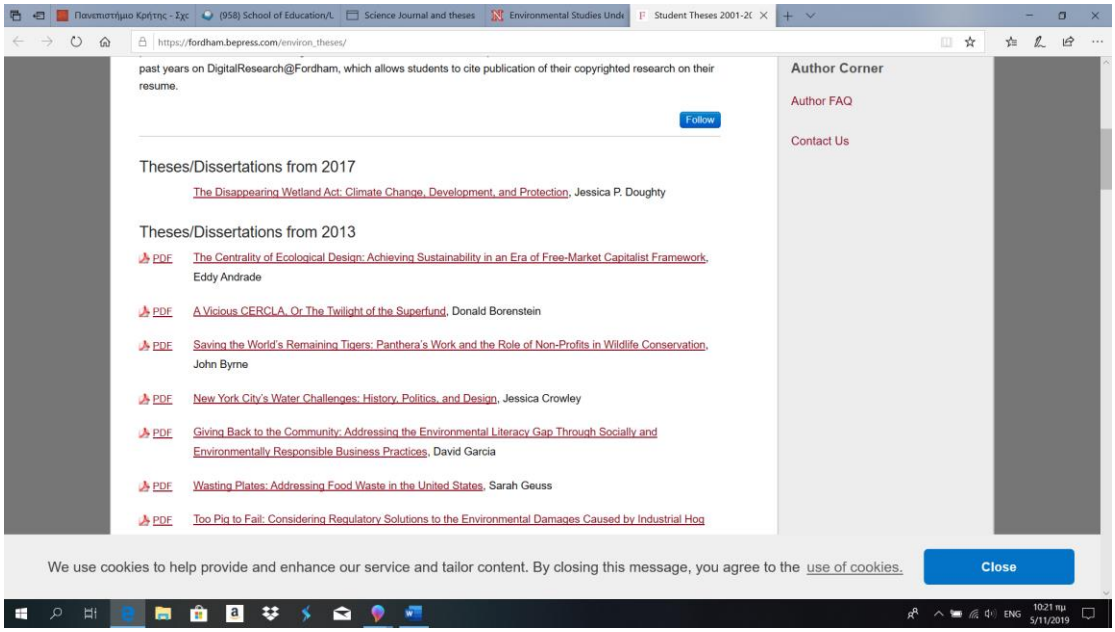
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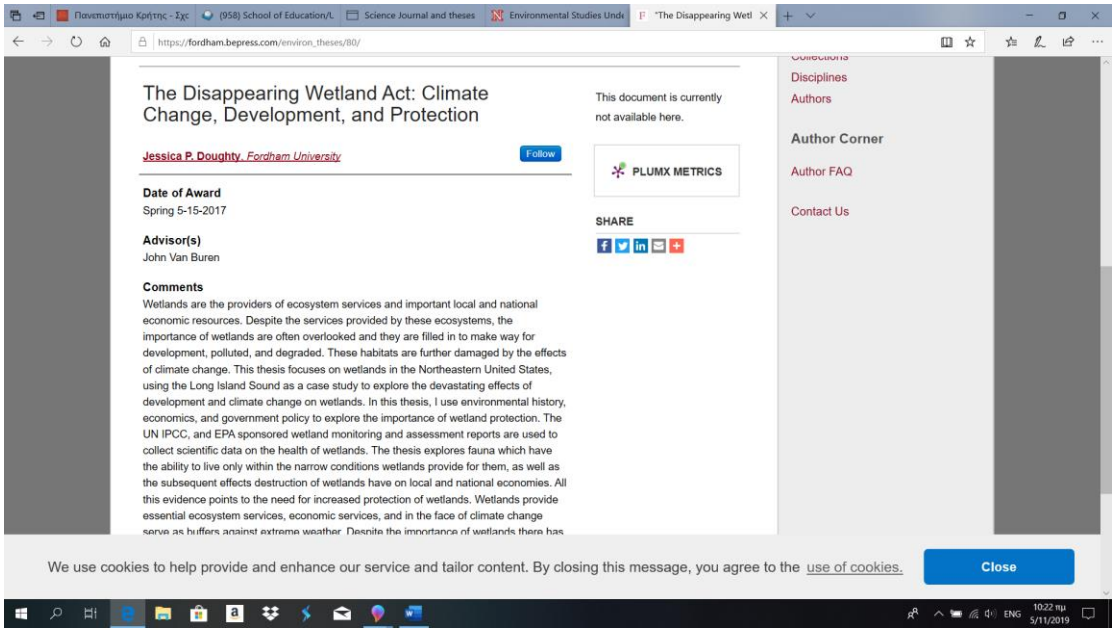


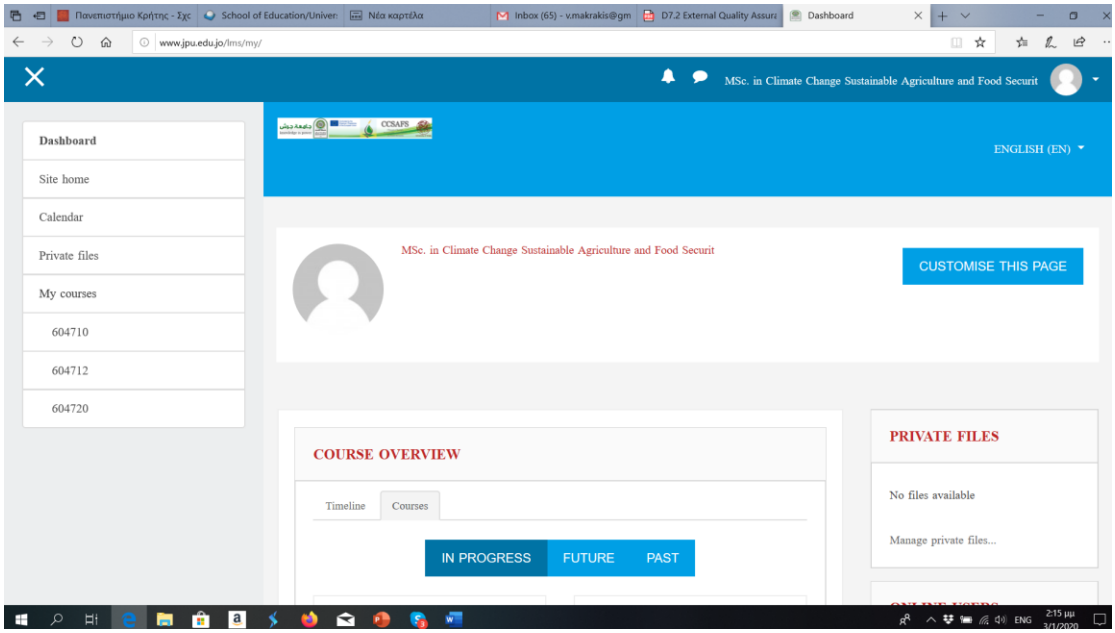
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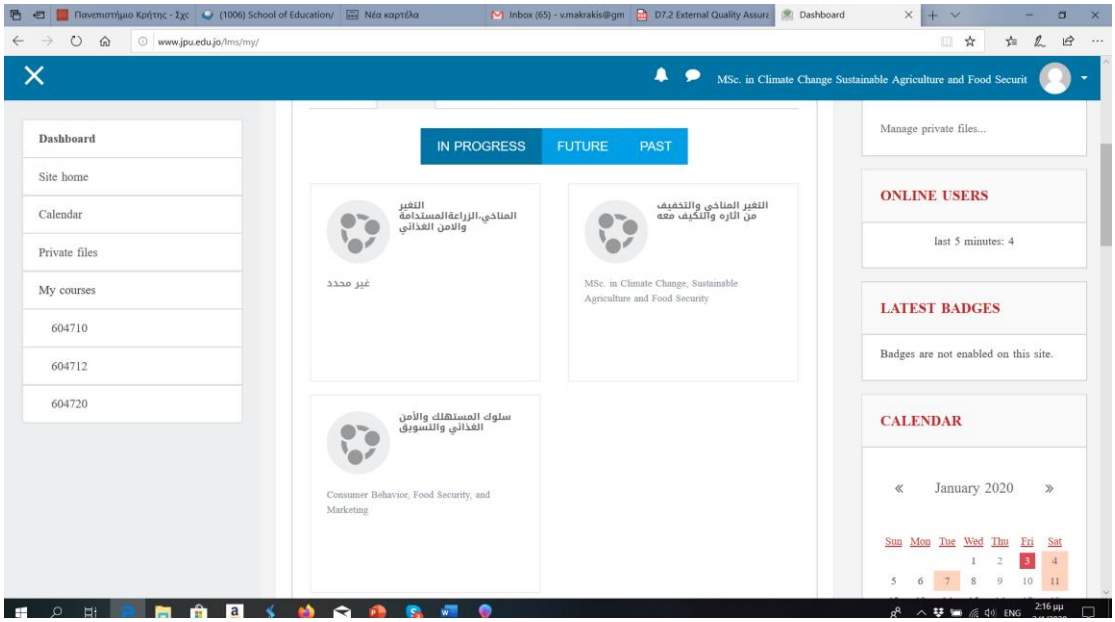

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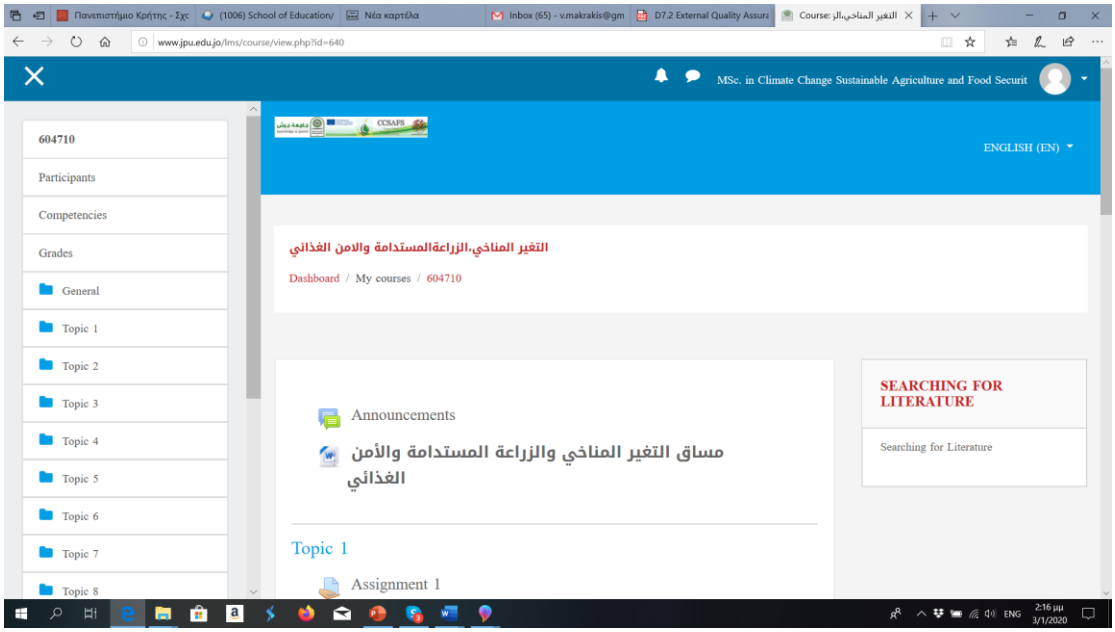

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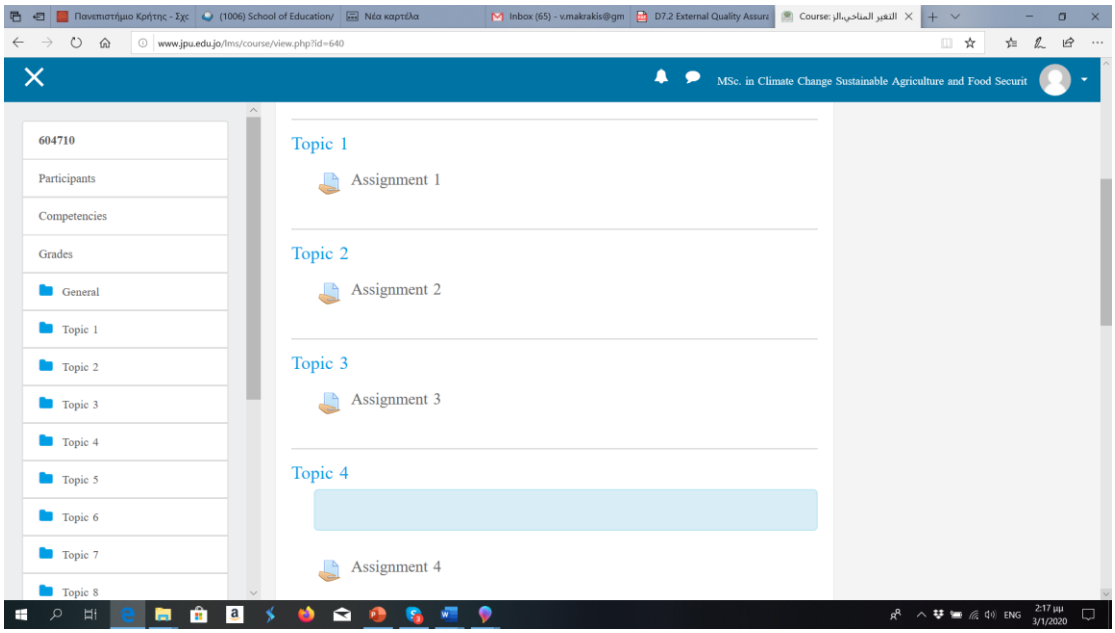

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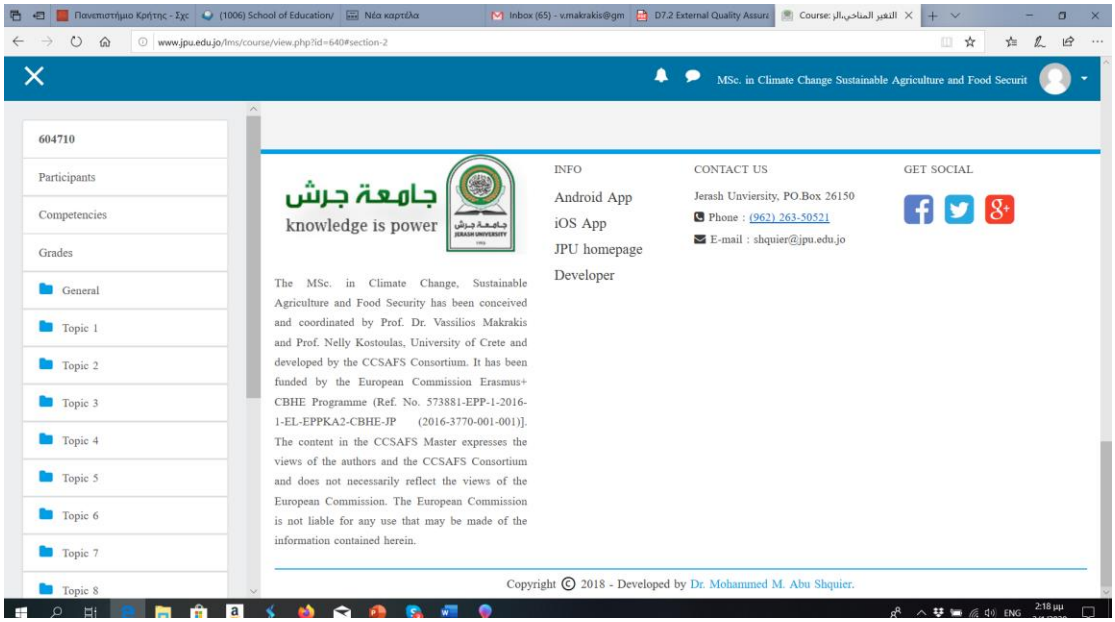

The Disappearing Wetland Act: Climate Change, Development, and Protection
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Wetlands are the providers of ecosystem services and important local and national economic resources. Despite the services provided by these ecosystems, the importance of wetlands are often overlooked and they are filled in to make way for development, polluted, and degraded. These habitats are further damaged by the effects of climate change. This thesis focuses on wetlands in the Northeastern United States, using the Long Island Sound as a case study to explore the devastating effects of development and climate change on wetlands. In this thesis, I use environmental history, economics, and government policy to explore the importance of wetland protection. The UN IPCC, and EPA sponsored wetland monitoring and assessment reports are used to collect scientific data on the health of wetlands. The thesis explores fauna which have the ability to live only within the narrow conditions wetlands provide for them, as well as the subsequent effects destruction of wetlands have on local and national economies. All this evidence points to the need for increased protection of wetlands. Wetlands provide essential ecosystem services, economic services, and in the face of climate change
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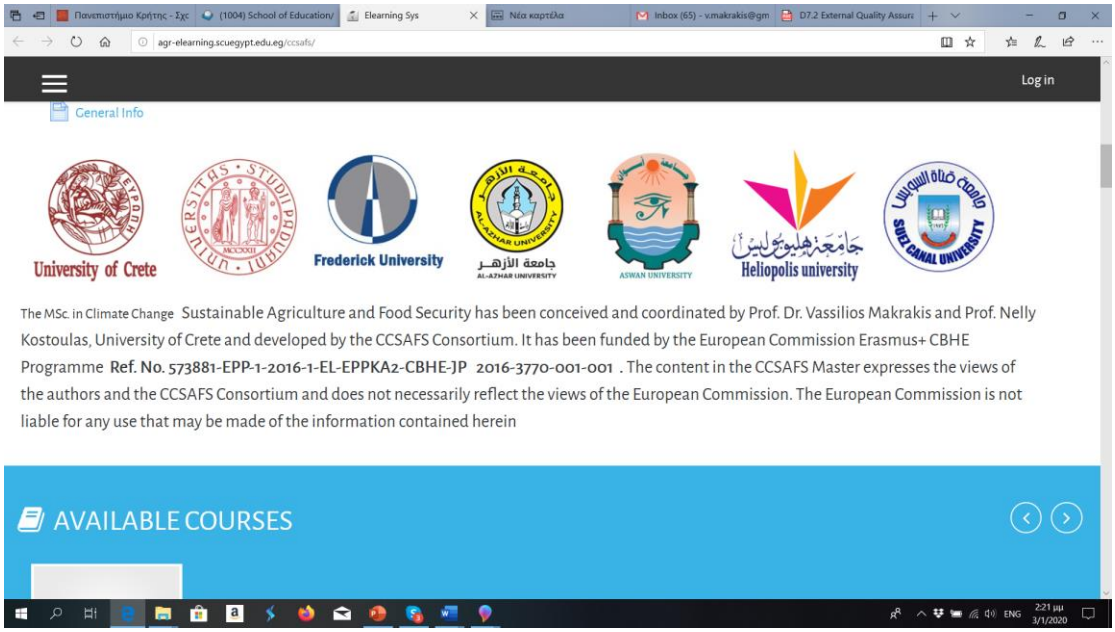

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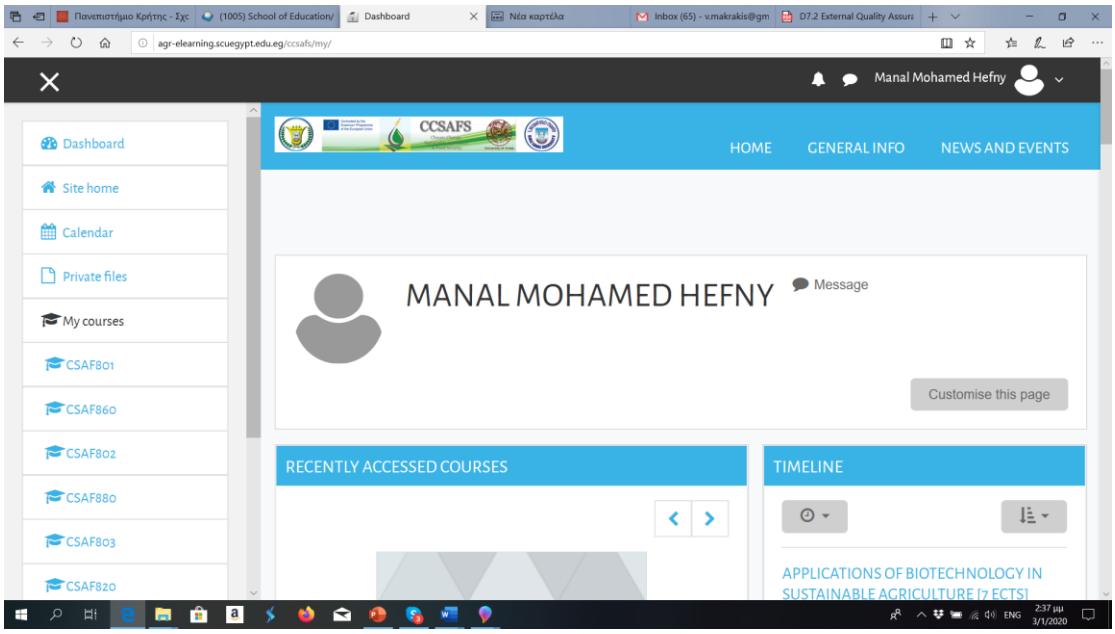


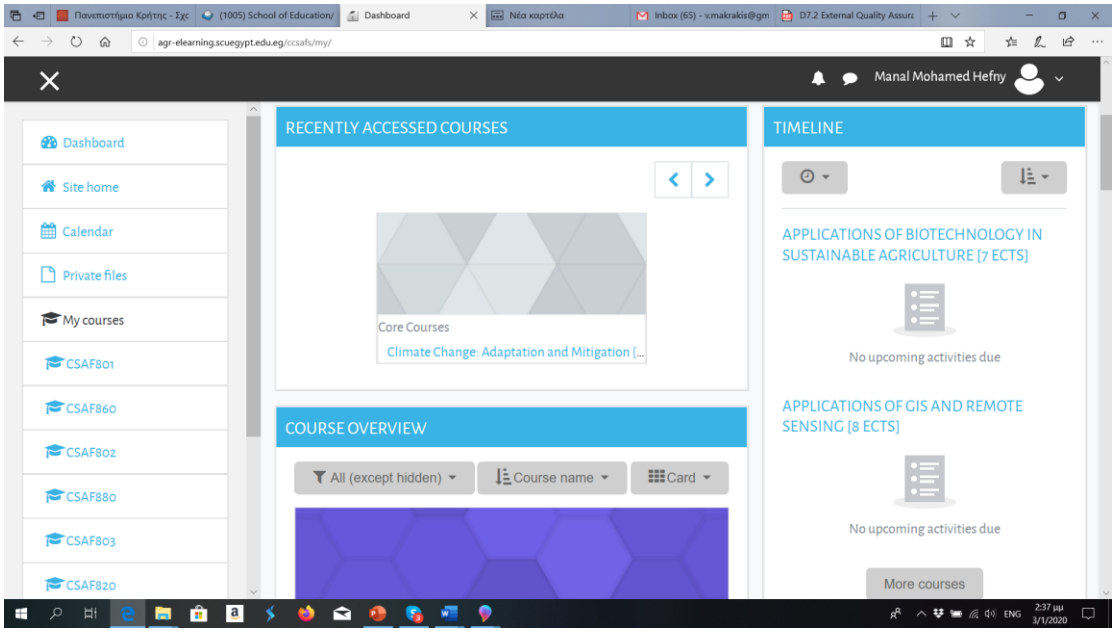
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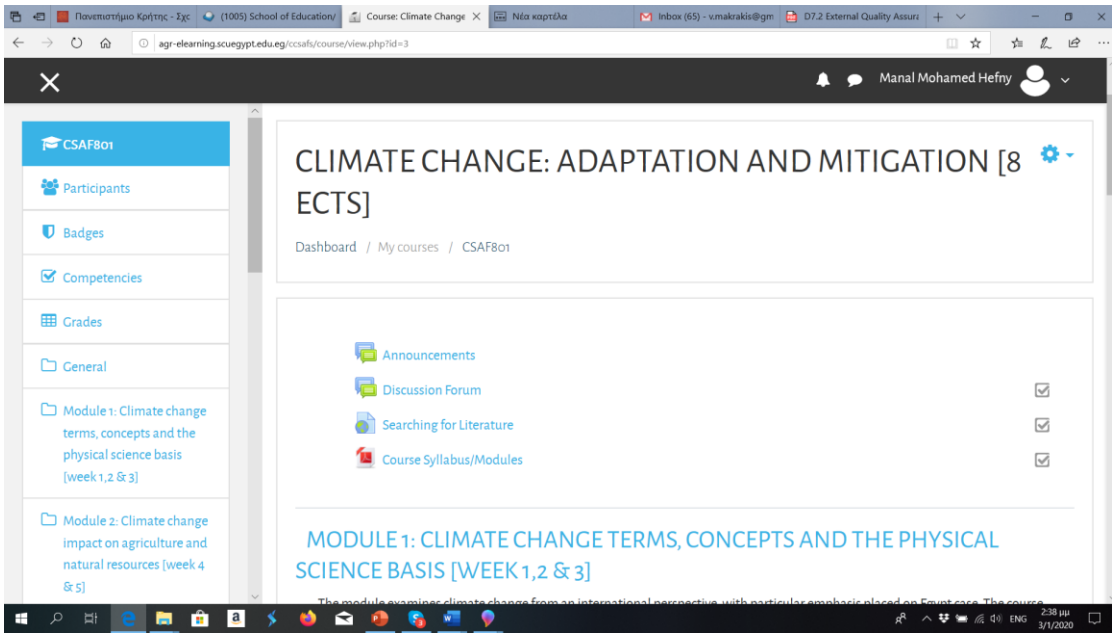
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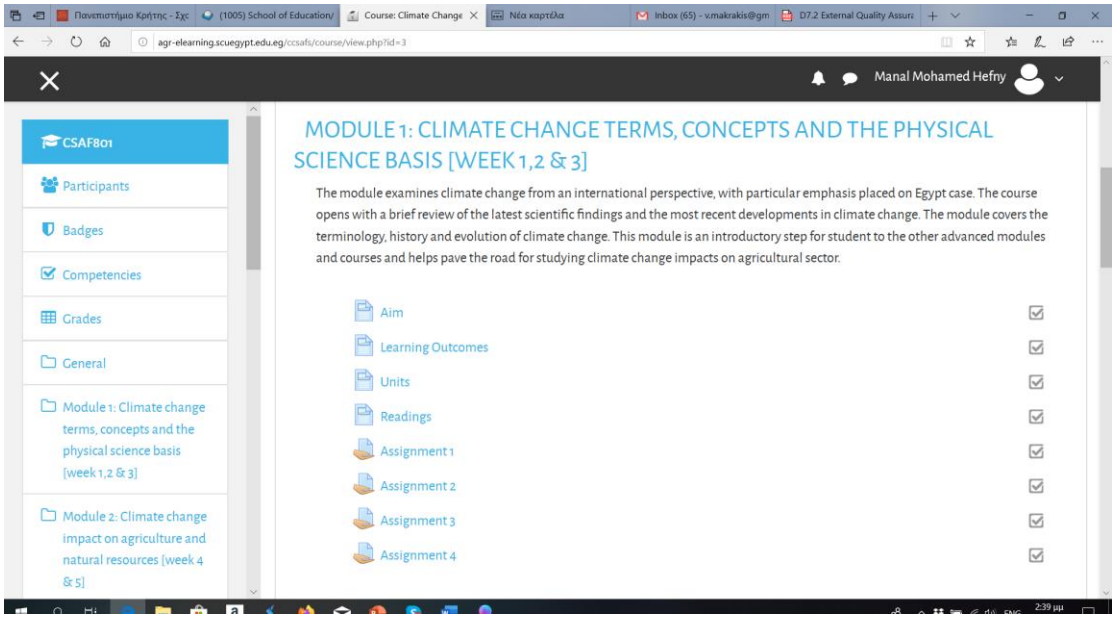



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MODULE 1: CLIMATE CHANGE TERMS, CONCEPTS AND THE PHYSICAL SCIENCE BASIS [WEEK 1,2 & 3]
The module examines climate change from an international perspective, with particular emphasis placed on Egypt case. The course opens with a brief review of the latest scientific findings and the most recent developments in climate change. The module covers the terminology, history and evolution of climate change. This module is an introductory step for student to the other advanced modules and courses and helps pave the road for studying climate change impacts on agricultural sector.
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