ALS 5905: CLIMATE CHANGE IMPACTS ON AGRICULTURE AND FOOD SECURITY

Agronomy Department – University of Florida
Fall 2020

INSTRUCTOR:

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Office hours: by appointment

INTERNATIONAL COLLABORATOR:

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LOCATION AND TIME

Online via Teams on Tuesday periods 9 & 10 (4:05-6:00pm) and Thursday period 9 (4:05-4:55pm).

COURSE DESCRIPTION

The impacts of global climate change on food systems are expected to be complex, widespread, and spatially and temporally variable. This graduate level course provides an overview of current and future anthropogenic climate change impacts on food production. The first half of the course will focus on holistic perspectives of current and future climate scenarios and their impact on food production. The second half will explore case studies from around the world to compare and contrast mitigation and adaptation measures used to reduce negative impacts caused by climate change. This course directly collaborates with faculty from our partner institution, Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agriculture Research and Higher Education Center—CATIE) in Costa Rica, that will provide first-hand case studies and an international perspective.

Course prerequisite: PLS 3004C (Principles of Plant Science), or equivalent, or approval by the instructor.

COURSE OBJECTIVES

Upon successful completion of this course the student should be able to:

- Explain and interpret the causes, impacts, and tendencies of anthropogenic climate change in terms of food production, at global and local scales.
- Describe and evaluate examples of mitigation and adaptation measures of the impacts of climate change in food security.
- Analyze current agriculture and food production systems and provide inputs and recommendations on increasing their resilience to climate change, and their role as GHG sinks.

COURSE TOPICS

Global Climate Change Causes and Future Scenarios

Global Change and agriculture
Climate Change science
Global climate system and the human influence
Future climate scenarios

- Global thresholds/tipping points
- Land-Climate interactions
  - *Food systems impacts*
  - *Land use change - cropland expansion*
  - *Plant-soil processes*
  - *Projections*

Mitigation and Adaptations

- Sustainable integrated agricultural systems
  - *Agroecology*
  - *Climate-Smart agriculture*
  - *Climate smart territories/villages*
  - *Conservation agriculture*
  - *Sustainable intensification*
  - *Urban agriculture*
- Food supply management
- Demand changes **-** diet changes
- Food waste
- Role of gender in adaptation
- Crop yield gaps

SCHEDULE

Week	Topic	Readings	Assignment
1	**Introduction to course**		
Sep. 1	T: Class introductions & Course outline		
Sep. 3	R: Case study report		
2	**Global Change Science**		
Sep. 8	T: Global change & Anthropocene	(Rockström et al., 2009; Sage, 2019; Steffen et al., 2015)	
Sep. 10	R: Discussion or presentation	(Lewis & Maslin, 2015)	
3	**Climate Change Science**		**Case study selection due**
Sep. 15	T: Global climate system & human influence Future climate & global threshold/tipping points	(Berdugo et al., 2020; Lenton, 2020; Steffen et al., 2018; Trisos, Merow, & Pigot, 2020; Turner et al., 2020)	
Sep. 17	R: Discussion or presentation	(Xu, Kohler, Lenton, Svenning, & Scheffer, 2020)	
4	**Land-Climate interactions**		
Sep. 22	T: Plant & soil processes & projections	(Jansson & Hofmockel, 2020; Oldfield, Bradford, & Wood, 2019; Savary et al., 2019)	
Sep. 24	R: Discussion or presentation	**TBD**	
5	**Land-Climate interactions**		**Case study outline**
Sep. 29	T: Food systems impacts & Land use change	(R. B. Jackson et al., 2020; Pelletier et al., 2011; Ramankutty et al., 2018; Schramski, Woodson, & Brown, 2020; Springmann et al., 2018; Vermeulen, Campbell, & Ingram, 2012)	
Oct. 1	R: Discussion or presentation	**TBD**	
6	**Mitigation and Adaptations**		
Oct. 6	T: Crop yield gaps	(Arata, Fabrizi, & Sckokai, 2020; Balmford et al., 2019; Bin Peng et al., 2020; Cassman & Grassini, 2020; Ewel, Schreeg, & Sinclair, 2019; Molotoks et al., 2020; Sloat et al., 2020; Suh et al., 2020; Tilman, Balzer, Hill, & Befort, 2011; Toensmeier, Ferguson, & Mehra, 2020; Vogel et al., 2019)	
Oct. 8	R: Discussion or presentation	**TBD**	

7	**Mitigation and Adaptations**		
Oct.13	T: Demand changes, diets	(Adesogan, Havelaar, McKune, Eilittä, & Dahl, 2020; Mazac & Tuomisto, 2020; Pradhan & Kropp, 2020; Theurl et al., 2020)	
Oct.15	R: Discussion or presentation	**TBD**	
8	**Mitigation and Adaptations**		
Oct. 20	T: Food security – supply and food waste	(Campbell et al., 2016; Fanzo et al., 2020; Kipkoech, Kipkosgei, & Murgor, 2013; Tscharntke et al., 2012)	
Oct. 22	R: Discussion or presentation	**TBD**	
9	**Mitigation and Adaptations**		**Case study draft**
Oct. 27	T: Gender role	(Chanana-Nag & Aggarwal, 2018; Nyasimi & Huyer, 2017)	
Oct. 29	R: Discussion or presentation	**TBD**	
10	**Mitigation and Adaptations**		
Nov. 3	T: Sustainable integrated agricultural systems	(De Pinto, Cenacchi, Kwon, Koo, & Dunston, 2020; Fanzo et al., 2020; Harvey et al., 2013; Hellin & Fisher, 2019; Hufford, Berny Mier y Teran, & Gepts, 2019; L. E. Jackson, Pascual, & Hodgkin, 2007; Louman, Campos-Arce, Climate-Smart, 2014, n.d.; Neil Adger, Arnell, & Tompkins, 2005; Paustian et al., 2016; Tamburino, Bravo, Clough, & Nicholas, 2020; Totin et al., 2018; Wezel et al., 2013; Whitfield, Challinor, & Rees, 2018)	
Nov. 5	R: Discussion or presentation	**TBD**	
11	**Exam**		**Exam**
Nov. 10	T: OFF (Exam)		
Nov. 12	R: OFF (Exam)		
12	**COVID-19 – Anthropause?**		
Nov. 17	T: COVID impacts	(Altieri & Nicholls, 2020; IPES-Food, 2020; Naidoo & Fisher, 2020)	
Nov. 19	R: Discussion or presentation	**TBD**	
13	**Case study**		
Nov. 24	T: TBD		
Nov. 26	R: OFF (Thanksgiving)		

14	**Case study**		
Dec. 1	T: TBD		
Dec. 3	R: Discussion or presentation	**TBD**	
15	**Case study**		
Dec. 8	T: Student presentation		**Case study presentation**
Dec. 9	R: Discussion or presentation		
16	**No class exam week**		
Dec.	TBD		**Submit final case study report**

SUGGESTED TEXT

There are no required textbooks for this course. Students will be provided with assigned readings prior to each lecture from various sources including journal articles, websites, and reports. Suggested resources are listed below and will be available via CANVAS (E-Learning). You can find a list of resources at the end of this syllabus. Please read it in its entirety to get a better understanding of the theories and cases that informed this course.

GRADING AND ASSIGNMENTS

Your grade will be based on one exam, in-class participation-discussions, and the written and oral presentation of the case study report.

IN-CLASS PARTICIPATION AND DISCUSSIONS

We will spend a good portion of the class reading and discussing primary scientific literature. Students will be randomly assigned to lead discussions and will be required to prepare questions based on the literature for discussion.

EXAM

There will be one mid-term exam that cover the general concepts and discussions that we explore in class. The focus will be on understanding mechanisms and theory.

CASE STUDY REPORT

Each student will choose two countries from different regions of the world and develop a report comparing the current and future climate change impacts on agriculture and adaptation and mitigation strategies. The document should be not greater than 12 pages (1.5 pts space) and should have at least 10 peer-reviewed references. You are required to setup an in-person meeting with Dr. Celis during week 3 (September 14th-18th) to discuss and approve your case study selection. In-person meeting will one-to-one in his office following Center for Disease Control and Prevention (CDC) guidelines.

PRESENTATION

Each student will present their findings of the case study report to the class. The presentation should be 20 minutes followed by 15 minutes of discussion.

SUPPORT RESOURCES

World Bank Group – Climate Knowledge Portal (https://climateknowledgeportal.worldbank.org)

The Global Carbon Project (https://www.globalcarbonproject.org)

Food and Agriculture Organization of the United Nations (http://www.fao.org/climate-change/en/)

International Food Policy Research Institute (https://www.ifpri.org)

Consultative Group on International Agriculture Research (https://www.cgiar.org)

Climate Change, Agriculture and Food Security (https://ccafs.cgiar.org)

International Center for Tropical Agriculture (https://ciat.cgiar.org)

EcoAgriculture Partners (https://ecoagriculture.org)

Institute for Agriculture and Trade Policy (https://www.iatp.org)

The Intergovernmental Panel on Climate Change (https://www.ipcc.ch)

International Panel of Experts on Sustainable Food Systems (http://www.ipes-food.org)

National Oceanic and Atmospheric Administration – National Centers For Environmental Information (https://www.ncdc.noaa.gov/cag/)

CLASS GRADE DISTRIBUTION

Requirement	Percent of final grade
Exam	25%
Participation - Discussions	25%
Case study selection	5%
Case study outline	5%
Case study draft	10%
Case study report	30%
Case study report presentation	25%
Total Points	

GRADING SCALE

Percent	Grade	Grade Points
100-94	A	4.00
<94-90	A-	3.67
<90-87	B+	3.33
<87-84	B+	3.00
<84-80	B-	2.67
<80-77	C+	2.33
<77-74	C	2.00
<74-70	C-	1.67
<70-67	D+	1.33
<67-64	D	1.00
<64-61	D-	0.67
<61	E	0.00

Note: Grade less than C is a failing grade.

CLASS ATTENDANCE AND PARTICIPATION

Your active participation is critical to your success and the quality of your experience in this course. Class participation will be graded (25% of final grade), therefore, your absence during class will directly impact your participation grade.

CLASS DEMEANOR

Students are expected to arrive to class on time and behave in a manner that is respectful and collegial to the instructor and to fellow students. Avoid the use of cell phones during class sessions. Diverse opinions held by other students should be respected in discussions, and, if appropriate, elevated. Conversations that do not contribute to the discussion should be avoided.

MATERIALS AND SUPPLIES FEES

There are no material fees for this course

ONLINE COURSE EVALUATION PROCESS

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

SYLLABUS CHANGES

This syllabus is subject to change. Any changes will be announced in advance of deadlines.

ACADEMIC HONESTY

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity*." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment*."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

SOFTWARE USE

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use, which can be found here: https://it.ufl.edu/policies/intellectual-property/copyright/. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

SERVICES FOR STUDENTS WITH DISABILITIES

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students accommodations must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

GETTING HELP

For issues with technical difficulties for e-Learning in Canvas, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor or TA within 24 hours of the technical difficulty if you wish to request a make-up.

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* www.counseling.ufl.edu
  Counseling Services

Groups and Workshops
Outreach and Consultation
Self-Help Library
Wellness Coaching

- U Matter We Care, www.umatter.ufl.edu/
- *Career Resource Center,* First Floor JWRU, 392-1601, www.crc.ufl.edu/next-level

- Student Complaints:
  - Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

HARASSMENT

UF provides an educational and working environment that is free from sex discrimination and sexual harassment for its students, staff, and faculty. http://www.hr.ufl.edu/eeo/sexharassment.htm

DISRUPTIVE BEHAVIOR

Faculty, students, administrative and professional staff members, and other employees (hereinafter referred to as 'member(s)' of the university), who intentionally act to impair, interfere with, or obstruct the mission, purposes, order, operations, processes, and functions of the university shall be subject to appropriate disciplinary action by university authorities for misconduct, as set forth in the applicable rules of the Board of Regents and the university and state law governing such actions. Be advised that you can and will be dismissed from class if you engage in disruptive behavior. For more information: http://regulations.ufl.edu/wp-content/uploads/2012/09/1008.pdf

TWELVE-DAY RULE

Students who participate in official athletic or scholastic extracurricular activities are permitted twelve (12) scholastic day absences per semester without penalty. In any case, it is the student's responsibility to maintain satisfactory academic performance and attendance.

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