

## **BSC 2862**

### **Global Change Ecology and Sustainability**

**Class Periods:** Tuesday Period 3 (9:35-10:25); Thursday Period 3-4 (09:35-11:25)

**Location:** FLG 0285

**Academic Term:** spring 2020

#### ***Instructor***

Stephen Mulkey, PhD

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*Please contact through the Canvas website*

Office Hours: Wednesday and Friday 2 – 3 pm and by appointment

Phone: 352.294.6313

#### ***Teaching Assistant***

Caitlin Campbell, MS

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Office Carr 318

*Please contact through the Canvas website.* Use regular email for personal questions such as grades, special circumstances, and needed accommodations.

#### ***Course Website***

<http://elearning.ufl.edu/> Class material including the syllabus, weekly comprehension quizzes, exam results, lecture slides, and other information related to the course will be posted on the course e-Learning website. You are responsible for all announcements made in lecture and those posted on the course website. For help with e-Learning, call the UF Computing Help Desk at 352.392.4357, or visit the e-Learning support website: <https://lss.at.ufl.edu/help.shtml>

#### ***Course Communications***

Please use the Canvas Inbox Tool. Inquiries received Mondays through Fridays will usually receive a reply with 24 hours of receipt; however, if you have not received a reply within 48 hours, please resend your inquiry.

#### ***Required Textbook***

*Environment and You*. 2018. Christensen. Edition 3. Pearson. ISBN-13: 978-0134646053

The text by Christensen et al. is recommended for those who would like a more detailed development of the principles of ecology and sustainability. I have posted this to the textbook adoption page and it is suggested for its high quality. Affordable used copies are available. Exams will be based primarily on the lectures, but you should read carefully those parts of the text that are covered in the lectures.

### **Optional Text**

*Environment: The Science Behind the Stories*. 2018. Withgott and Laposata. Edition 6. Pearson. ISBN 9780134873633

Either a paperback or *etext* version (any vendor) of the text may be used, depending on what is most accessible for each student. The text can be used for readings and clarification.

### **Additional Resources**

Additional readings and media are included through the Canvas pages for each week through the [UF Library](#). For resources unavailable through the UF Library, PDF documents have been provided. If alternative versions of these resources are needed for any reason, please contact your instructor and accommodations will be provided.

### **Course Description and Objectives**

This course will use ecological principles and processes to describe the major anthropogenic changes that are occurring globally. Fundamental concepts include changes in land use, alterations in the major elemental cycles (water, nitrogen, phosphorus, and carbon), climate change, redistribution of species, ecosystem disruption, loss of biodiversity and extinctions, and the threat of climate and biosphere disruptions to human civilization. We will consider best management practices, technologies, policies, and human behavior that can mitigate negative human impacts on the climate and biosphere and promote sustainability. Natural science and the [scientific method](#) will provide the basis for understanding [sustainability science](#) as a framework for mitigation and adaptation. The humanities and social sciences will contribute to our understanding of how we engage with the biosphere.

Objectives of the course will be achieved if, by its conclusion, students can:

- identify the major factors that influence land use change, alteration in water, nutrient, and carbon cycles, climate change, redistribution of species, and extinctions on a global scale.
- compare and contrast different practices, technologies, policies, and human behavior that can promote sustainability.
- have sufficient ecological literacy to apply basic concepts of ecology to understand human impact on global systems.
- be able to explain why climate change is a threat to civilization.
- identify the major carbon processes driving climate change and be able to explain why the living biosphere and the climate system are interdependent and must be managed as an integrated Earth System.

### **Expectations**

This course has high standards for student creativity and scholarship. Each student is solely responsible for reading and following the instructions, guidelines and schedules in this syllabus, on the course webpage, or announced in class. Independent research by students will be significant portion of assessment. Not having read or followed the instructions will not constitute an excuse for missing an assignment, exam, or other assessment. Please set your preferences in Canvas so that you receive

timely notifications of course announcements and other information. Check Announcements in Canvas regularly as e-mail notifications from Canvas do not always go through.

When you have a question, check the following sources first to see if it is already answered, before e-mailing your instructors:

- Course Syllabus
- e-Learning announcements (this is the primary means that your Instructor has to communicate with you in a timely manner)
- e-Learning Discussion General Posts

If you still cannot find the answer to your questions:

- If it is a question that others might find useful to know the answer to as well, post it in the e-Learning Discussion section.
- If it is a question specific to you (e.g., account or grade specific), e-mail Stephen. Barring unusual circumstances, expect a reply within 24 hours (Monday through Friday). E-mails and e-Learning Discussion posts are checked at least once per day, but sometimes not more than that.

### ***Required Readings & Media***

You are responsible for understanding all assigned readings and media. Not all reading and media materials will be covered in the course lectures.

### ***Assignments/Quizzes/Exams***

As part of BSC2862 you are required to complete online quizzes and assignments. Please contact me if at any time you have questions about these assignments. A schedule will be posted on e-Learning with the due dates for each assignment. Most assignments are due by 11:59 P.M. (ET) on the date specified in the course schedule; usually a Sunday night, but not always. All assignments must be completed by the stated due date and time for credit. Extensions will NOT be given because of technical or personal issues that occur within 24 hours of the assignment deadline. Many assignments will also have a set time limit, so make sure you have time to devote to that assignment before you begin. You are expected to work by yourself on the assignments and cheating will not be tolerated. Note that all due dates for assignments are clearly posted on course website and reflect the most up-to-date information.

### ***Make-up Policy***

Requirements for class attendance, make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the [Undergraduate Catalog's Academic Regulations](#).

### ***Zoom Conferencing***

Zoom is a video conferencing tool that allows for screen sharing and real-time communication at a distance. It also allows for synchronous communication to be recorded for viewing at a later time. View

the [Zoom Privacy Policy here](#). We may occasionally use Zoom to deliver material outside of the regular lecture and discussion periods. Instructions for use will be posted to Canvas.

### **Course Schedule spring 2020**

The lecture schedule will change periodically due to unfolding logistics as the course proceeds. Please check this syllabus on a regular basis.

Module	Day	Date	Topic/Activity	Readings & Media	Exam / Assignment
Module 1	T	07.01	Introductory lecture: Reality and Responsibility in the Anthropocene: An overview of the issues	-Generation Anthropocene -Climate Adam: Hopes for our climate future -How to (seriously) read a scientific paper	Required: Fill out your student profile and introduce yourself to the class on the Discussion board. Take the orientation quiz.
Module 2	Th	09.01	Intro continued; Biomes and biogeography	Chapter 7 -Terrestrial biomes -Atmospheric circulation -Life in Biosphere 2	
	T	14.01	Lecture continued; group projects		
Module 3	Th	16.01	Evolution, ecology, and demography	Chapter 4,5 -Survivorship -Human population growth -Mechanisms of evolution -Population ecology	Quiz 1 posted due 11:59 19.01
Module 4	T	21.01	Biodiversity & extinction	Chapter 8 -Madagascar -Value of nature -Biodiversity review	
	Th	23.01	Lecture continued; group projects		Group project subtopics due 11:59
Module 5	T	28.01	Communities & ecosystems	Chapter 6 -Competitive exclusion -Predation -Symbiosis	
	Th	30.01	Lecture and discussion; group projects		Quiz 2 posted due 11:59 3.02
	T	04.02	Catch up and review; group projects		Review for exam 1 (6-7 pm Bartram 211)
	Th	06.02	Exam 1		Exam 1

Module 6	T	11.02	Climate change 1: Causes and processes	Chapter 9 -GHG emissions summary -How do we know? -The scientific consensus	
	Th	13.02	Climate change 1 continued		Quiz 3 posted due 11:59 16.02
Module 7	T	18.02	Climate change 2: Impacts	-Imperative to stabilize climate -Climate change and ecosystems -Hothouse Earth -Tidal flooding & SLR	
	Th	20.02	Climate change 2 continued		
Module 8	T	25.02	C, N, and water cycles  Group projects.	Chapter 3; part 3.5 -Water management Gainesville -The nitrogen crisis -How we wrecked the ocean	
	Th	27.02	C, N, and water cycles continued	Chapter 11	Quiz 4 posted due 11:59 08.03
Spring Break					
Module 9	T	10.03	Land use: Agriculture and forestry	-Sustainable agriculture -Potential for global food crisis -Prescribed fire -Saving the rainforests -Ecology from the air	Review for exam 2 (6-7 pm Bartram 211)
	Th	12.03	Exam 2		Draft of annotated bibliography due 22.03 11:59
Module 10	T	17.03	Environmental change and human health	Chapter 10 -Climate change and health ( <i>The Lancet</i> ) -Air pollution -Mosquito-borne disease -Malaria -Mental health	
	Th	19.03	Discussion, group projects		
Module 11	T	24.03	Energy systems	Chapter 14, 15 -Reinventing fire -Grid energy storage -Wind energy -Distributed solar PV	Select dates for group presentation
	Th	26.03	Urban systems & waste	Chapter 16,17	Quiz 5 posted due 11:59 29.03

Module 12	T	31.03	Natural climate solutions & geoengineering	-Combining renewables with DAC -The ethics of removing CO <sub>2</sub> -Social and health cost of carbon capture -100 solutions -Empowering women	
Module 13	Th	02.04	Economics & ethics	No required readings or materials; See links in module for resources	Final annotated bibliography due 05.04 11:59
	T	07.04	Group presentations		Review for Exam 3 (6-7 pm Bartram 211)
	Th	09.04	Exam 3		Quiz 6 posted due 11:59 12.04
	T	14.04	Group presentations		
	Th	16.04	Group presentations		
Conclusions	T	21.04	Group presentations		
			Final project reports due <b>27 April 11:59</b>		

### ***Attendance***

Attendance is expected. If you are absent from class when an exam or other activity requiring your participation occurs, you will receive a zero grade for the activity unless the absence is *excused*. An absence is considered *excused* if there is an *acceptable reason* according to UF policy (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>). Examples of acceptable reasons are medical illness, religious holidays, military obligation, and the twelve-day rule. For religious holidays, students are required to notify the instructor prior to the absence, but documentation of the religious holiday is not required. In all other cases, the following policies apply: It is your responsibility to notify the instructor of an excused absence and to provide documentation of an acceptable reason. Otherwise, the absence will be considered *unexcused*. Whenever possible, notify the instructor by email prior to the absence. When this is not possible (e.g., due to unexpected emergency or illness), the instructor should be notified as soon as possible. You are strongly encouraged to read the assigned chapters before coming to class as this will make it easier to comprehend the lecture material. If you miss class, visit the e-Learning site for any lecture notes and course announcements.

### ***Exams***

There will be three 50-minute exams during the semester. There is no final exam. Exams will be administered during the normal semester and during normal class meeting times. Exams will be

objective and emphasize lecture materials and assigned readings and media. **Exams will be given via Canvas while you are in the classroom and will be proctored and timed. You must access the exam from your personal laptop (mac or pc) and you are required to be in the classroom for the exam. You will be using the LockDown Browser program during the exam. iPads are compatible with LockDown Browser, but Chromebooks are not.** You should arrange to borrow a compatible laptop if you do not have one. If you are using a laptop that is not your normal mode of accessing Canvas, you should familiarize yourself with UF login procedures on that laptop prior to the exam. You should take the practice test that will be provided (it will not be graded for credit) and verify that LockDown Browser works for you.

Each student must bring her/his Gator ID to class on exam days. No student will be allowed to start an exam after the first student to complete an exam leaves the classroom. No additional time will be given to complete an exam if you arrive late. Exams will be curved and normalized to a scale of 0 to 100 after the distribution of scores has been assembled. Review of your performance on an exam will be available by appointment one week after the date of the exam. Exams will not be available for review after the semester has ended.

No make-up exams will be given without prior permission or documentation of illness. Students that will be missing an exam due to a prearranged university-approved excused absence (sports, etc.) should let the instructor know a minimum of two weeks in advance. These students may be required to take the makeup exam before the scheduled in-class exam.

In case of illness on exam day, a letter from the student's primary care provider is required. This letter must state that the student was unable to complete the exam on the scheduled date (i.e., a letter stating only that the student was seen in a clinic is not sufficient). A personal matter requires a note from the Dean of Students (P202 Peabody Hall). These notes must be received within five business days after the exam. Make up exams may be short-answer or essay format.

### ***Comprehension Quizzes***

There will be 6 online quizzes to assess comprehension during the course of the semester. You will be allowed two attempts for each question and the highest score received will be recorded for that quiz. All quizzes must be completed by the stated date and time. Extensions will not be given because of technical or personal issues that occur within 24 hours of date of the quiz. Quizzes will have a set time limit. Students are expected to work independently on the quizzes and to not use notes.

### ***Term Group Project***

Each of you will be assigned a group by Canvas. Each group will pick from a limited number of themes for development as a research project. Each member of the group will select an aspect or topic that is part of the theme for construction of an annotated bibliography and peer-reviewed presentation. Each of you will write a final report with citations on the entire group project summarizing the primary results in your own words.

- Part 1: Submission of group selection of theme for group to be submitted by each group member with Part 2.

- Part 2: Submission of individual topic description (1-2 paragraphs) of each topic chosen by group members. Submitted by each group member.
- Part 3: An annotated bibliography written by each individual on one of the assigned individual topics within a theme. Submitted by each group member.
- Part 4: Review with Caitlin or Stephen your plans for presentation by your group.
- Part 5: Peer presentation given by your group.
- Part 6: Provide feedback to two presentations based on criteria provided in the instructions.
- Part 7: Submit final project report written by each individual in their own words drawing on the collective literature reviewed by the group. Submitted by each group member.

More detailed instructions and deadlines are posted separately for each aspect of the assignment.

### ***Online Discussions***

Periodically your TA or instructor will pose questions derived from the readings and lectures. Your online participation in these will be noted and recorded as part of your grade as indicated in the grading scale.

### ***Grades***

<b>Assessment</b>	<b>Points</b>	<b>Percentage weight of Final Grade</b>
In-class Exams (3 @ 60 pts each)	180	20
Online quizzes (6 @ 20 pts each; drop lowest)	100	20
Field trips & speaker events (4 at 10 pts each)	40	2
Online Discussions (up to 20 pts @ 2 pts each)	20	2
Presentation on Term Project	100	16
Annotated Bibliography on Term Project	100	18
Project Report Peer Review (2 @ 10 pts each)	20	2
Final Project Report	100	20
<b>Total</b>	<b>660</b>	<b>100</b>

### ***Grading Policy***

Percent	Grade	Grade Points	Percent	Grade	Grade Points
94.0 - 100.0	A	4.00	73.0 – 75.9	C	2.00
90.0 – 93.9	A-	3.67	70.0 - 72.9	C-	1.67



86.0 - 89.9	B+	3.33	67.0 - 69.9	D+	1.33
82.0 - 85.9	B	3.00	63.0 - 66.9	D	1.00
79.0 - 81.9	B-	2.67	60.0 - 63.9	D-	0.67
76.0 - 78.9	C+	2.33	0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>  
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***Students Requiring Accommodations***

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class. This course will use Turnitin to identify plagiarizing.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***Getting Help***

For technical issues related to Canvas, please contact the UF Help Desk at <http://helpdesk.ufl.edu>, 352.392.HELP (4357), or walk-in at HUB 132.

### ***Commercial Sale of Course Lectures***

The content presented in the class is the property of UF and may not be duplicated in any format without permission from UF and may not be used for any commercial purposes. Students violating this policy may be subject to disciplinary action under the UF Conduct Code.

### ***Use of Course Imagery and Multimedia***

No part of the PowerPoints or other instructional content posted on Canvas may be reproduced, shared, or posted in any form outside of the class without permission in writing from Stephen Mulkey

### ***Materials for Projects and Discussion***

#### ***Books and Essays***

*The Sixth Extinction: An Unnatural History*

Elizabeth Kolbert

Holt and Company 2014

ISBN-13: 978-1250062185

*Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming*

Paul Hawken

Penguin Books 2017

ISBN-13: 978-0143130444

*Merchants of Doubt*

Naomi Oreskes and Erik M. Conway

Bloomsbury Press 2011

ISBN-13: 978-1596916104

*21 Lessons for The 21<sup>st</sup> Century*

Yuval Noah Harari

Spiegel & Grau 2018

ASIN: B079WM7KLS

*Sustainability Science*

Ariane König and Jerome Ravetz (eds.)

Routledge 2017  
ISBN-13: 978-1138659285

*Thinking in Systems: A Primer*  
Donella H. Meadows (author) and Diana Wright (editor)  
Chelsea Green Publishing 2008  
ISBN-13: 978-1603580557

*Silent Spring*  
Rachel L. Carson  
Houghton Mifflin Harcourt 2002 (Anniversary Edition)  
ISBN-13: 978-0618253050

*The Unsettling of America: Culture and Agriculture*  
Wendell Berry  
Counterpoint 2015  
ISBN-13: 978-1619025998

*Half-Earth: Our Planet's Fight For Life*  
E. O. Wilson  
Liveright 2017  
ISBN-13: 978-1631492525

*Transitioning Toward Sustainability: Advancing the Scientific Foundation*  
Brose, D. et al.  
National Academies Press  
ISBN 978-0-309-44375-3

*Sustainability Key Concepts 2nd Edition*  
Leslie Paul Thiele  
Polity Press  
ISBN-13:978-1-5095-1106-8

### ***Journals\****

[Proceedings of the National Academy of Sciences US](#)

[Nature](#)

[Nature Communications](#)

[Science Advances](#)

[Scientific Reports](#)

[Earth's Future](#)

[Nature Climate Change](#)

[PLOS One](#)

[Global Change Biology](#)

[Ecology Letters](#)

[Environmental Research Letters](#)

[Trends in Ecology and Evolution](#)

[Sustainability Science](#)

[Biological Conservation](#)

\*All are freely available if accessed from UFL.EDU

***Sources of Literature Reviews and Assessment***

[US Global Change Research Program](#)

[Intergovernmental Panel on Climate Change](#)

[Skeptical Science](#)

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