

# BSC 4055/ZOO4926: Climate change and human systems

SPRING 2022

CLASS MEETING AND TIME:

**MWF Period 5 (11:45-12:35) Bartram 0211**

**Instructor:**

**Stephen Mulkey, PhD**

[smulkey@ufl.edu](mailto:smulkey@ufl.edu)

Phone: 208.596.3234 (personal cell phone – please do not distribute beyond this class)

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

**Office Hours:** Arranged as needed through Zoom

**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.

**Textbook:** The lectures and associated materials are your textbook. The books below should be regarded as references. Exams will not be drawn from these references.

**Optional References:**

*Climate Change and Population Health.* Sarfaty. 2020. ISBN: 1284170209

*Climate Change and Public Health.* Levy & Patz. 2015. ISBN: 9780190202453

*Global Climate Change and Human Health.* Luber & Lemery. 2015. 978111860358

**Additional Resources:** There is no required textbook for BSC 4930. Additional readings are included through the Canvas pages for each week through the [UF Library](#). I recommend that you use [UF VPN](#) and bypass the cumbersome UF Library proxy system. Using UF VPN makes UF your virtual domain and provides access to all UF subscriptions. If alternative accessible versions of these resources are needed for any reason, please contact me and I will provide accommodations.

**Course Description:** The course will use principles derived from basic medical science, ecology, and relevant social science to describe the major factors and their combined effects of climate change on human health and wellness. Natural sciences, social sciences, the humanities, and the [scientific method](#) will provide the basis for understanding [sustainability science](#) as a

framework for mitigation and adaptation of the disruption of the Earth System and impacts on living systems and human wellbeing.

**Prerequisite Knowledge and Skills:** BSC 2011 and BSC 2011L with minimum grades of C.

**Course Goals and/or Objectives:**

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

1. Apply knowledge of how climate change affects living organisms and human mortality and morbidity.
2. Describe direct impacts of climate change related to air quality, vector borne diseases, water and food borne diseases, and mental health and violence.
3. Describe compound impacts of climate change related to extreme temperatures, extreme weather events, nutrition and food security, and land use amplification of disease.
4. Use peer-reviewed literature as a foundation for communicating about climate change and human wellness.
5. Analyze the emergency nature of climate change, the utility of proposed mitigation techniques and implications for public health, and community management of public health.

**Instructional Methods:** During the pandemic this course is delivered synchronously online using instructor delivered lectures and videos, peer-reviewed literature, and additional resources from online sources. Students will be expected to review and synthesize these materials to participate fully in course assignments, quizzes, exams, and discussions. *Lectures will not be recorded and class attendance is essential.*

## Course Policies

**COURSE EXPECTATIONS:** Significant scholarship will be required of students to achieve the expected outcomes of this course. The course is designed to leverage learning through multiple low stakes graded activities and synthetic essay exams. Students are expected to manage time effectively and carefully review information communicated through the course syllabus, announcements, and e-learning website. 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 assessments. Not having read the information in this syllabus or noted instructor announcements will not constitute an excuse for missing an assignment, exam, or other assessment.

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

- 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 to me in an email through Canvas and I will answer it in the Announcement portion of the website.
- If it is a question specific to you (e.g., account or grade specific), e-mail me at [smulkey@ufl.edu](mailto:smulkey@ufl.edu). Barring unusual circumstances, expect a reply within 24 hours (Monday through Friday). E-mails are checked at least once per day, but sometimes not more than that.

Should you have any complaints with your experience in this course please visit <http://www.distance.ufl.edu/student-complaints> to submit a complaint.

**REQUIRED READINGS:** You are responsible for reading and interpreting of all assigned readings. Not all reading materials will be covered in the course lectures. Read carefully and critically. Most, but not all, of the required readings will be covered in lectures.

**POLICIES:** You are required to complete online assignments. If at any time you have questions about these assignments, please contact me. 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 Sundays or the date specified in Canvas. All assignments must be completed by the stated due date and time for full credit. Except under special circumstances, 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 although essay exams will be open book. 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](#).

**DUE DATES:** All assignments are due by 11:59 PM (ET) on the assigned date listed in the course schedule unless otherwise specified. Some assignments will have a grace period for late submission and no assignments will be accepted after the assignment closes. You should make back-up copies of all work and submit your work early to avoid technical problems.

**COURSE TECHNOLOGY:** This course is facilitated online through Canvas. You may access Canvas from UF's e-Learning webpage: <http://elearning.ufl.edu/>. For any questions related to UF's e-Learning platform, contact:

- <http://helpdesk.ufl.edu> (352) 392-HELP - select option 3 for Canvas Help

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.](#)

I will use Zoom for conferences by appointment and to facilitate discussion. All materials delivered by the instructor using zoom are grist for quizzes.

UNIVERSITY STATEMENT ABOUT CLASSES WITH RECORDED MATERIALS: Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

ONLINE 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>.

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. In most cases I will immediate grant permission for non-commercial use, but not that most slides will have proprietary information from the original source. You will be responsible for citing this source.

PowerPoint and pdf materials are to be used for note-taking purposes only by students enrolled in BSC 4930 at the University of Florida. I advise you to download the pdf of lectures and annotate as I deliver the materials online. Often, I will update lecture materials a couple of hours before class, so check to be sure you are using the most recent version.

A PROMISE TO YOU: If you keep up with the lectures, regularly attend lectures, turn in the assignments on time, and interact with me and your classmates, *you will succeed in this course. Participation with your group is critically important for your success.* The amount of material can be daunting. I will help you as you work your way through the modules. Please keep me informed of your individual progress and alert me if you need help.

# UF Policies

ATTENDANCE AND MAKE-UPS: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

If you are experiencing COVID-19 symptoms ([click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#). Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Refer to the above link for more information on the university's attendance policy.

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

ACADEMIC INTEGRITY: "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 (<http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/>) 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.

## RESOURCES AVAILABLE TO STUDENTS

### ***Health and Wellness***

- *U Matter, We Care*: [umatter@ufl.edu](mailto:umatter@ufl.edu); 392-1575
- *Counseling and Wellness Center*: <http://www.counseling.ufl.edu/cwc/Default.aspx>; 392-1575
- *Sexual Assault Recovery Services (SARS)*: Student Health Care Center; 392-1161
- *University Police Department*: <http://www.police.ufl.edu/>; 392-1111 (911 for emergencies)

### ***Academic Resources***

- *E-learning technical support*: [Learningsupport@ufl.edu](mailto:Learningsupport@ufl.edu); <https://lss.at.ufl.edu/help.shtml>; 352-392-4357 (opt. 2)
- *Career Resource Center*: Reitz Union; <http://www.crc.ufl.edu/>; 392-1601
- *Library Support*: <http://cms.uflib.ufl.edu/ask>
- *Teaching Center*: Broward Hall; 392-2010 or 392-6420
- *Writing Studio*: 302 Tigert Hall; <http://writing.ufl.edu/writing-studio/>; 846-1138

PROCEDURE FOR CONFLICT RESOLUTION: Any classroom issues, disagreements or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact the Undergraduate Coordinator or the Department Chair. Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the University Ombuds Office (<http://www.ombuds.ufl.edu>; 392-1308) or the Dean of Students Office (<http://www.dso.ufl.edu>; 392-1261). For further information refer to [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf) (for residential classes) or <http://www.distance.ufl.edu/student-complaintprocess> (for online classes).

COURSE EVALUATIONS: 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 [gatorevals.ua.ufl.edu/students/](http://gatorevals.ua.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 [ufl.bluera.com/ufl/](http://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.ua.ufl.edu/public-results/](http://gatorevals.ua.ufl.edu/public-results/).

CLASS NETIQUETTE: All members of the class are expected to follow rules of common courtesy in all face-to-face interactions, email messages, threaded discussions and chats. [See the UF Netiquette Guide](#).

Although the scientific consensus is essentially 100% on its basic features, climate change remains a politically charged topic. Regardless of politics or background, we will assiduously adhere to the most validated peer-reviewed science. Base your interactions on this science and the direct conclusions that are logically indicated by the science. The authorities that are entrusted to make these conclusions are the IPCC and other UN agencies, the USGCRP and its partner US agencies, and the major government-sponsored research groups throughout the developed world. Please avoid using the gray literature and reports in popular media except where it is defensibly based on validated peer reviewed science and recognized authority.

## Grading Policies

**EXAMS (20%)**: You will have two essay exams in this course, a First Midterm and Second Midterm Exam. The second exam will not be comprehensive, although it will draw on principles and materials developed throughout the course. There is no official final exam during the assigned final examination period provided by the Registrar. Both exams will be essay based,

wherein you will select from a list of topics and respond according to the prompts provided. You will be allowed 2 hours to answer the questions. A possible list of essay questions will be distributed one week in advance of the exam date. I expect you to develop full essay responses to all of these questions. The exam questions will be chosen from these questions. Preparation for the exams should be based on review of the possible questions and your responses to each. You may have access to your prepared answers and to the internet during the timed exam. Exams are open-book and the internet/provided course resources may be used to develop your answers. If you find that you are finished well before the time is up, you should consider that you may have not developed adequate essays for each of your answers.

Your answers must be in your own words and must reflect scholarship as well as comprehension and synthesis. When you can, cite a reference in the text of your answer, but complete citation is not necessary. You will not be assessed on use of language or grammar, but proper use of scientific terminology is important. The grading rubric is included in Canvas. *PLEASE be aware that answers to these questions must be fully developed with sufficient detail to demonstrate your understanding of literature and the lectures. Answers to the exam questions are **not brief essays** that you may have been asked to provide in other courses.*

**TERM PROJECT WITH GROUP (50% divided in the following parts):** Each group will be assigned to a theme for development within Canvas. Each member of the group will select an aspect 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 subtopic/theme for each group member. Submitted by one group member.
- 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: Group presentation developed by all group members delivered by 2 or 3 members.
- Part 5: Provide feedback to two peers based on criteria provided in Canvas.
- Part 6: 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 are posted separately for each aspect of the assignment. A more detailed review of these requirements has been posted to the course website.

**QUIZZES (20%):** Module quizzes will be given online and provide you with an opportunity to apply what you have learned in the module. You are encouraged to seek out correct answers from the module content and activities. The module quizzes should be used to gauge and assess your comprehension of course materials and concepts and prepare for your First and Second Midterm Examinations.



- Quizzes have 20 multiple choice questions and two short answer essay questions based on the literature.
- The time limit is 70 minutes, and you will have only one attempt for each quiz. You may use your notes.
- After you have submitted the quiz, your graded responses along with the correct answer will be available for the multiple-choice part of the quiz. The essay part of the quiz will be graded within a week of submission.

Please submit the quiz by the due date. Specific due dates are listed in Canvas, and all quizzes are due by **11:59 PM (ET) on Sundays or the specified due date**, usually but not always on Sunday.

Please allow five business days from the due date for quiz feedback on free-response questions. Instructor comments will appear on the right side. Contact me via the Canvas Mail Tool to clarify any questions or quiz responses.

**DISCUSSIONS (10%):** There are several modules having discussion forums. These are opportunities to extend what you have learned in the same module. Students are expected to adhere to professional etiquette/netiquette standards as outlined above (see UF Policies) in all posts and to engage in constructive dialogue.

You are expected to contribute your thoughts about one of the topics available in each module as indicated in the Assignments portion of Canvas. Each discussion is worth 10 points. *You will receive 6 points for your original and thoughtful contribution, and 4 points for responding to at least two of your peer's posts. Posts are expected to be thoughtful, detailed responses (i.e., "yes," "no," "good job," "I agree," or "I disagree" answer is not sufficient).*

See the rubric attached to each discussion for additional grading criteria.

In most cases, discussions require some research or reading before initial post. For discussion forum assignments, **timeliness is critical**, and due dates should be adhered to. Please check the course schedule for the specific due dates.

**OUTSIDE SPEAKER EVENTS (2%)** There will be many opportunities to virtually attend outside speaker events during this semester. Please attend at least two of these and follow the directions for submission of your review as an assignment. I will announce many of these as they become available, but you are welcome to propose your own. Note that these talks must be science based and delivered by a recognized expert. Many IFAS Extension talks are excellent, but some target a lay audience and contain only minimal science. Talks in Sustainability Studies should be critically evaluated before you submit them for a grade.

#### **COURSE GRADING:**

<b>Assessment</b>	<b>Points</b>	<b>%</b>
Exams (2@100 pts each)	200	20
Online quizzes (12@20 pts each)	240	20



Online discussions (12@10 pts each)	120	10
Outside speakers (2@10 pts each)	20	2
Description of subtopic	10	2
Draft of annotated bibliography	20	3
Final annotated bibliography	100	15
Presentation by group on term project	100	10
Peer review of presentations (2@25 pts each)	50	3
Final project report	100	15
Totals	990	100

Note that the current UF policy for assigning grade points is available at the following undergraduate catalog web page: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### Grading Scheme

A	100 %	to 94.0%
A-	< 94.0 %	to 90.0%
B+	< 90.0 %	to 87.0%
B	< 87.0 %	to 84.0%
B-	< 84.0 %	to 80.0%
C+	< 80.0 %	to 77.0%
C	< 77.0 %	to 74.0%
C-	< 74.0 %	to 70.0%
D+	< 70.0 %	to 67.0%
D	< 67.0 %	to 64.0%
D-	< 64.0 %	to 61.0%
E	< 61.0 %	to 0.0%

## Course Schedule - spring 2022

(Subject to changes prior to the first day of classes)

Module	Topic	Readings	Assignments
1	Anthropogenic climate change: Causes and process	Emissions summary from Nature 2019 How do we know?  The scientific consensus CMIPs Kate Marvel – How climate change works	Discussion 1 Quiz 1

2	Anthropogenic climate change: Impacts	Climate change is ubiquitous Imperative of stabilizing at 2°C Ecosystems Hal Wanless on SLR Hothouse Earth Tidal Flooding & SLR	Discussion 2 Quiz 2 Project part 1
3	Carbon cycle; Earth System models; Emissions	Peters et al. 2019 SOTCC Planting trees Videos – UK Hadley Center	Discussion 3 Quiz 3
4	Overview of climate change and public health	UGCRP 2016 Climate & Health Countdown 2020 Haines & Ebi 2019 CDC BRACE Patz TEDxOshkosh	Discussion 4 Quiz 4 Project part 2
5	Heat	Dahl et al. 2019 UCS killer heat Turning up the heat Devastating heat waves CIRSO – State of the Climate 2018	Discussion 5 Quiz 5
6	Air quality	Climate & Health Chapter 3 NASA China pollution & climate change UCS Air pollution	Discussion 6 Quiz 6 Midterm exam possible questions 18 February
7	Vector borne disease	Climate & Health Chapter 5 Morens et al. 2004 Franklinos et al. 2019 NCAR – Vector diseases	Discussion 7 Quiz 7 Project part 3 Midterm exam 1 due 26 February
8	Water and food borne disease	Climate & Health Chapters 6 and 7 European food safety	Discussion 8 Quiz 8

		Paralytic shellfish poison Food nutrition	
9	Risks and hazards	IPCC WG2 AR5 APA report Ballew et al. 2019 Global Commissions Adaptation 2019 Global Risks 2019 Kim et al. 2019 Thonicke et al. 2020	Discussion 9 Quiz 9 Project part 4
10	A primer on geoengineering	Renewables and DAC Ethics of removing CO <sub>2</sub> Carbon capture social and health costs Ten ways to use CO <sub>2</sub> Drawdown	Discussion 10 Quiz 10
11	Agriculture; food and water security; nutrition security	Food for thought Golden Rice EAT-Lancet NCA4 Chapter 3: Water WRI water security & conflict Industrial agriculture Ensuring food security	Discussion 11 Quiz 11
12	Energy systems and the social costs of carbon; Economics	Dave Roberts Social cost of carbon Rennert &Kingdon 2019 Mark Jacobson William Nordhaus	Discussion 12 Quiz 12
13	Reality of a climate emergency		Midterm exam possible questions available 8 April
14	Group Presentations		Midterm exam 2 due 16 April  Project part 5 Project part 6

Readings and supporting material will be provided online for each module. This syllabus represents my current plans and objectives as of 11 January 2020. As we progress through the semester, these plans may need to change to enhance the class learning opportunity or to accommodate scheduling issues. Such changes, communicated clearly, are not unusual and should be expected.

## Resources:

### Journals\*

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

[Nature](#)

[Nature Communications](#)

[Science Advances](#)

[Scientific Reports](#)

[Earth's Future](#)

[Nature Climate Change](#)

[Sustainability Science](#)

[Ecology and Society](#)

[Global Environmental Change](#)

[Climatic Change](#)

[Climate Risk Management](#)

\*All are freely available if accessed from UFL.EDU or through UF Library as proxy. I strongly recommend that you use [UF VPN](#) to access articles behind a paywall. This is much more direct than using the UF Library proxy.

### Sources of Literature Reviews and Assessments

US Climate Resilience Toolkit. <https://toolkit.climate.gov/tools>

US Global Change Research Program overview of resources <https://www.globalchange.gov/browse>

US Global Change Research Program report on human health <https://www.globalchange.gov/browse/reports/impacts-climate-change-human-health-united-states-scientific-assessment>

UN Intergovernmental Panel on Climate Change (IPCC) <https://www.ipcc.ch/> and specifically <https://www.ipcc.ch/working-group/wg2/>

UN Development Program for Climate Change Adaptation. <https://www.adaptation-undp.org/resources/featured>

**About Stephen Mulkey:** “Stephen Mulkey is an environmental scientist dedicated to developing undergraduate and graduate programming to build society’s capacity for environmental mitigation, adaptation, and resilience. Mulkey was the president of Unity

College in Unity, Maine from 2011 through 2015. His leadership and forward-looking vision resulted in Unity College being the first college in the U.S. to divest its endowment from the top 200 fossil fuel companies, and the first college in the U.S. to adopt sustainability science as the framework for all academic programming. Mulkey believes that higher education has an ethical duty to prepare generations of graduates for the extreme sustainability and climate change challenges of this century. During and after earning his PhD at the University of Pennsylvania, he spent over twenty years as a tropical forest ecologist affiliated with the Smithsonian. Mulkey has served as tenured faculty at three doctoral granting universities, as science advisor to the state of Florida, and as a program officer at the National Science Foundation.”

You can see more of my writings at [environmentalcentury.net](http://environmentalcentury.net)

**Letters of Recommendation:** Please do not request a letter of recommendation unless you have cultivated a professional relationship with me. Getting an A in my course is not sufficient. I need to know much more about your professional development before I can write a meaningful letter.