

## BSC3307C: CLIMATE CHANGE BIOLOGY

Course Number: BSC3307C

Credit Hours: 4

Semester: Fall 2019

Class meeting time and location: This course is facilitated 100% online

### **INSTRUCTOR:**

NAME: Stephen Mulkey, Ph.D.

Office Location: 621 Carr Hall

Email: Please use the Canvas Inbox Tool.

Phone: 352.294.6313

**OFFICE HOURS:** By appointment only. Please contact me to schedule an online Zoom Conference.

**COURSE WEBSITE:** <http://elearning.ufl.edu/>

**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:**

*Biodiversity and Climate Change*. Lovejoy and Hannah. 2019. Yale University Press. ISBN: 9780300206111

### **RECOMMENDED TEXTBOOKS:**

*Climate Change Biology*. Newman et al. 2011. Cabi International. ISBN: 978845936709  
(use for basic topic review of climate change biology if needed)

*Environment and You*. Christensen et al. 2018. Pearson. ISBN: 9780134646053 (use for review of ecology and environmental science if needed)

**ADDITIONAL RESOURCES:** Additional readings 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:** Climate change and its impacts on biological communities, feedbacks from the biosphere to the climate system and human impacts on the carbon cycle. Emphasis on the response of vegetation to climate change and rising atmospheric CO<sub>2</sub> concentrations and the role of terrestrial ecosystems in regulating climate via the carbon cycle.

**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 and living systems interact at the organismal, species, ecosystem, biome, and planetary levels of organization.
2. Describe markers of climate change related biogeochemical cycles, species survival, and shifting ecosystems.
3. Use peer-reviewed literature as a foundation for communicating about climate change and living systems.
4. Analyze the global nature of climate change and utility of proposed mitigation techniques.

**INSTRUCTIONAL METHODS:** This course is delivered in a fully online format, using instructor delivered lecture 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.

#### **COURSE POLICIES:**

**COURSE EXPECTATIONS:** Online learning requires students to manage time effectively and carefully review information communicated through the course syllabus, announcements, and e-learning website. You are expected to schedule worktimes for yourself, checking the course site at least 5-7 times per week. ***Not having read the***

***information in this syllabus or in instructor announcements will not constitute an excuse for missing an assignment, exam, or other assessment.***

If you have questions about assignments, policies, or any course content, it is imperative that you contact me in a timely manner for clarification. I understand that during this semester, you may experience challenging personal or professional situations, which may take your attention away from this course. It is important that if you are experiencing difficulty in the class to communicate with me as soon as a difficulty occurs.

**REQUIRED READINGS:** You are responsible for the interpretations of all assigned readings. Not all reading materials will be covered in the course lectures. Read carefully and critically.

**ASSIGNMENT/QUIZ/EXAM DATES/POLICIES:** As part of BSC3307C 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 the date specified in Canvas.** 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](#).

**DUE DATES:** All assignments are due by 11:59 PM (ET) on the assigned date listed in the course schedule. No assignments will be accepted after the due date. You are advised to make back-up copies of all work and submit your work early to avoid technical problems.

#### **COMMUNICATION AND QUESTIONS:**

When you have a question about the assignments, 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 I have to communicate with you in a timely manner)
- e-Learning General Posts
- General Course Questions

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 General Course Questions section in Module 0.

If it is a question specific to you (e.g. account or grade specific), contact me. Barring unusual circumstances, expect a reply with 24 hours (48 hours on weekends; do not expect an immediate response in the evenings). E-mails and eLearning Discussion posts are checked at least once per day, but sometimes not more than that.

**COURSE TECHNOLOGY:** This course is facilitated 100% 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 2

**PLAYPOSIT:** This course uses PlayPosit to provide interactions within the online lecture videos. When you select on a video thumbnail, the lecture video will open in a new tab for you to watch and complete the interactions (e.g., multiple choice questions, discussion forums, polling surveys, reflective pauses, etc.).

Why is this course using PlayPosit? There is [extensive research](#) to support the use of interactive videos in an online environment to enhance student engagement and retention. The interactions provide an opportunity for you to assess and apply your understanding of the concepts that are being discussed in the video.

For more information on PlayPosit, please review [The Student Experience](#). If you have any technical difficulties while using PlayPosit, please review [PlayPosit Troubleshooting](#) before contacting the UF Help Desk. Information relating to accommodations and privacy can be found at [PlayPosit Accessibility](#) and [PlayPosit Privacy Policy](#).

**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 to meet with you and discuss your plans for your group project and report. Further instructions will be provided in Canvas.

Peer presentations for your Group Projects will be recorded and shared using Zoom conferencing. For guidelines on using Zoom, please view the project assignment guidelines.

**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>. Evaluations are typically open during the last two or three weeks of the semesters, 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>.

**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.

PowerPoint materials are to be used for note-taking purposes only by students enrolled in BSC3307C at the University of Florida.

## UF POLICIES:

**UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES:** Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc](http://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.

**UNIVERSITY POLICY ON ACADEMIC CONDUCT:** 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 honesty 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-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.

**CLASS DEMEANOR OR NETIQUETTE:** All members of the class are expected to follow rules of common courtesy in all 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.

## GETTING HELP:

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

- <http://helpdesk.ufl.edu>
- (352) 392-HELP (4357)
- Walk-in: HUB 132

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from the Help Desk 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 within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at <http://www.distance.ufl.edu/getting-help> for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

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

## GRADING POLICIES:

### METHODS BY WHICH STUDENTS WILL BE EVALUATED AND THEIR GRADE DETERMINED:

**EXAMS (25%):** You will have two Exams in this course, one Midterm and one Final Exam. Both 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 at least one week in advance of the exam date. The exam questions will be chosen from these questions. Preparation for the exams should be based on review of the possible questions and an outline of your answer for each. You may have access to your outlines 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, I suggest that you 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. You should be aware that answers to these questions

should 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 (25%):** 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: Submit presentations (recorded via Zoom) given by each of you on your aspect of your group theme.
- 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 (25%):** Module Quizzes 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 Midterm and Final Examinations.

- Quizzes have 20 multiple choice questions and two short answer questions.
- The time limit is 60 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.

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 the specified due date.**

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 the instructor via the Canvas Inbox Tool to clarify any questions or quiz responses.

**DISCUSSIONS (20%):** 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. Posts are expected to be thoughtful, detailed responses (i.e., "yes," "no," "I agree," or "I disagree" answer is not sufficient).

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

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

**PARTICIPATION (5%):** Determined by PlayPosit Video Questions and overall engagement and professionalism within the course. You must complete each video assignment by viewing the entire presentation and answering all associated questions by the assigned due date.

## Course Grading

Item	Percentage Weight
Exams (Midterm and Final)	25
Term Project with Group	25
Module Quizzes	25
Discussions	20
Participation	5

### Point Range (%) Letter Grade

≥ 93.00	A	≥ 80.00	B–	≥ 67.00	D+
≥ 90.00	A–	≥ 77.00	C+	≥ 63.00	D
≥ 87.00	B+	≥ 73.00	C	≥ 60.00	D-
≥ 83.00	B	≥ 70.00	C–	<60.00	E

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>

### COURSE SCHEDULE:

Module	Date	Topic	Readings (Links provided in Canvas)	Assignment
Orientation	8/20– 8/26	Course Overview	Course Orientation and Syllabus	Syllabus Quiz <b>Due Sunday by 11:59 pm</b>  Introduce Yourself Discussion <b>Due Thursday by 11:59 pm</b>
1	8/20 –	Anthropogenic Climate Change	Chapter 1 - The Changing Biosphere	Module 1 Discussion

	8/25		<p><b>Chapter 2 - What is Climate Change?</b></p> <p>Smithsonian: What Is the Anthropocene &amp; Are We in It?</p> <p>NASA: Climate Change: How Do We Know?</p> <p>Bamber et al., 2019</p> <p>Burke et al., 2018</p> <p>Schuur et al., 2015</p> <p>Vogel et al., 2019</p>	<p><b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b></p> <p>Module 1 Quiz</p> <p><b>Due Sunday by 11:59 pm</b></p>
2	8/26 – 9/1	Earth Systems and Climatology	<p>Freund et al. 2019</p> <p>Knutti &amp; Hegerl 2008</p> <p>Runge et al. 2019</p> <p>CarbonBrief: The History of Climate Modeling</p>	<p>Module 2 Discussion</p> <p><b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b></p> <p>Module 2 Quiz</p> <p><b>Due Sunday by 11:59pm</b></p>
3	9/2 – 9/8	The Carbon Cycle: Greenhouse Gases and Global Emissions	<p>Bastin et al. 2019</p> <p>Ekblad &amp; Bastviken 2019</p> <p>Gruber et al. 2019</p> <p>Hicks Pries et al. 2017</p> <p>Plaza et al. 2019</p> <p>Tong et al. 2019</p> <p>USGCRP, 2018: <i>Second State of the Carbon Cycle Report (SOCCR2)</i></p>	<p>Module 3 Discussion</p> <p><b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b></p> <p>Module 3 Quiz</p> <p><b>Due Sunday by 11:59pm</b></p>
4	9/9 – 9/15	Impacts on Species Distribution and Abundance	<p>Chapt 3: Case Study 1</p> <p>Chapt 5</p> <p>Chapt 12</p> <p>Chapt 14</p> <p>Chapt 20</p> <p>National Academies of Sciences, Engineering, and Medicine 2019. A Research. Review of Interventions to Increase the Persistence and Resilience of Coral Reefs. Washington, DC: The National</p>	<p>Module 4 Discussion</p> <p><b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b></p> <p>Module 4 Quiz</p> <p><b>Due Sunday by 11:59pm</b></p>

			Academies Press. <b>(Summary Findings Section ONLY)</b> McDowell et al. 2015. Pecl et al. 2017	
5	9/16 – 9/22	Phenological Responses to Climate Change	Chapt 5 National Phenology Network Damien & Tougeron 2019 Miller-Rushing et al. 2019	Module 5 <i>Midterm exam questions distributed 16 September</i> Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 5 Quiz <b>Due Sunday by 11:59pm</b>
6	9/23 – 9/29	Shifting Ecosystems	Chapt 7 Chapt 10 Chapt 15: Case Study 6 Chapt 16 Chapt 17: Case Study 7 NCA3 Passarrondana et al. 2018 Prugh et al. 2018	Module 6 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 6 Quiz <b>Due Sunday by 11:59pm</b> MIDTERM EXAM <b>Due Sunday by 11:59pm</b>
7	9/30 – 10/6	Historical climate and Paleoclimate	Chapt 8 Chapt 12 Brönnimann et al. 2019 Galetti et al. 2018	Module 7 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 7 Quiz <b>Due Sunday by 11:59pm</b> Project Part 1: Topic

				Selection <b>Due Sunday by 11:59pm</b>
8	10/7 – 10/13	Agricultural Impacts, Mitigation, and Food Security	Food Security & Population Growth Sustainable Agriculture Water-Energy-Food Nexus Pellegrino et al. 2018 Sapkota et al. 2019	Module 8 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 8 Quiz <b>Due Sunday by 11:59pm</b> Project Part 2: Topic Description <b>Due Sunday by 11:59pm</b>
9	10/14 – 10/20	Land Use and Land Cover Changes	Soil Degradation and Climate Change IPCC UN Introduction to Land Use World Resources Institute review of IPCC Special Report Guo et al. 2018 Turner et al. 2018	Module 9 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 9 Quiz <b>Due Sunday by 11:59pm</b> Project Part 3: Annotated Bibliography <b>Due Sunday by 11:59pm</b>
10	10/21 – 10/27	Climate Change and Public Health	CDC videos on Public Health and Climate Change Climate Change and Asthma The World Bank on Climate Change and Health Matthews et al. 2019. Cohen 2019	Module 10 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 10 Quiz <b>Due Sunday by 11:59pm</b>
Project Work Week	10/28 – 11/3			Project Part 4: Presentation

				Recording <b>Due Sunday by 11:59pm</b>
11	11/4 – 11/10	Conservation Issues	Assisted Migration Debating Science Elizabeth Kolbert The Sixth Extinction Krosby et al 2018 Montwé et al. 2018	Module 11 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 11 Quiz <b>Due Sunday by 11:59pm</b> Project Part 5: Peer feedback <b>Due Sunday by 11:59pm</b>
12	11/12 – 11/17	Natural Climate Solutions	Direct Air Capture Afforestation Duan et al. 2019 Lenzi et al. 2018 Erb et al. 2018	Module 12 Module 12 Discussion <b>Initial post due Thursday by 11:59 pm, peer responses due Sunday by 11:59pm</b> Module 12 Quiz <b>Due Sunday by 11:59pm</b>
13	11/17 – 12/4	Conclusions, summary, and updates	Various recommended media – no required readings	<i>Final exam questions distributed 25 November</i> Project Part 6: Final Report Submission <b>Due Sunday 8 December by 11:59</b> FINAL EXAM <b>Sunday 1 December by 11:59</b>

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.