

# **EEB 409 – Current Topics in Climate Change Biology**

*Fall 2016; T TH 9:40-10:55, 608 Nielsen Physics Building*

## **Instructor: Dr. Heather Bird Jackson**

*Email:* hjacks15@utk.edu (use EEB 409 as the start of subject line)

*Office:* Offsite. *Office Hours:* By appointment.

## **Textbook**

We will not have a textbook for this course. Rather, journal articles and popular news articles will also be assigned and will be posted through Blackboard.

## **Learning Outcomes**

By the end of the course, if you engage fully with the taught material and opportunities for guided independent study, and you participate in class activities, then you will have gained at least the following:

1. Increased proficiency at reading, discussing, and critiquing scientific literature.
2. Enhanced ability to interpret, synthesize, and clearly communicate scientific research.
3. A greater capacity to evaluate claims about the impacts of climate change and climate change mitigation encountered in the media and to make more informed value judgments concerning policy proposals.
4. An understanding of important issues, concepts, and methodologies relevant to climate change biology, including:
  - a. The basic science of global climate change.
  - b. The historical, current, and projected impacts of global climate change on biodiversity.
  - c. The links among physical, chemical, and biological systems and how these relationships are altered by human activity.
  - d. The tools and methods biologists use to make predictions about global climate change and its impacts.
  - e. The implications of global climate change for policy and mitigation.

## **Teaching Methodology**

Content will be introduced and discussed in class. However, class activities are a small fraction of what we expect of students in a 400-level undergraduate class. To do well on course assessments, you will be expected also to read extensively outside class time, to contribute actively to discussions, and to engage with the assignments. Importantly, you will also be expected to reflect on the diversity of teaching activities to arrive at a synthetic interpretation of the material.

## **Assessment (700 points total)**

1. **Daily preparation and participation (200 points)**
  - a. Quizzes (100 points total, 5 points each)
  - b. Attendance and participation in discussion (100 points, 5 points each day)

2. **Project preparation and evaluation (100 points)**
  - a. Project idea (20 points)
  - b. Peer review of project idea (15 points)
  - c. Report first draft (50 points)
  - d. Peer review of report first draft (15 points)
3. **Final project (200 points)**
  - a. Final draft (100 points)
  - b. Oral report (100 points)
4. **Exams (200 points total, 100 each)**

## **Course Outline**

Here is the lecture and discussion schedule and due dates for major assessments. All written products (i.e. everything but the oral report) are to be done in Microsoft Word unless otherwise discussed with an instructor. Any changes to these dates will be announced in class and on Blackboard. *I reserve the right to exercise some flexibility in scheduling, usually in favor of giving more time to students.*

### **Class schedule (tentative)**

#### **Key**

Lectures listed in normal font

\*Assessments in brown

*Discussions italicized*

#### **Introduction**

August 23 – Introduction to Climate Change Biology

*August 25 – Discussion*

August 30 – Project idea workshop

\* Project idea due on Blackboard **before class**

\* Peer feedback on project ideas on Blackboard **by midnight**

*September 1 – UT closed – No discussion*

September 6 – Lecture 1 - The Science of Climate Change

*September 8 - Discussion*

#### **Lessons from History**

September 13 – Lecture 2 - Lessons from the Pleistocene

*September 15 - Discussion*

September 20 – Lecture 3 - Lessons from Deep History

*September 22 - Discussion*

September 27 – Report workshop

\* First draft report due on Blackboard **before class**

\* Peer feedback on two reports on Blackboard **by midnight**

#### **Effects of Climate Change on Individuals**

*September 29 - Discussion*

October 4 – Lecture 4 - Physiological Responses in Plants

*October 6 – UT closed – No discussion*

\*October 11 – First Exam

October 13 – Discussion

October 18 - Lecture 5 - Physiological Responses in the Oceans

October 20 - Discussion

### **How Populations Deal with Climate Change: Adapt, Move, or Die**

October 25 – Lecture 6 – Accommodation through Phenotypic Plasticity

\*October 25 – Final report due on Blackboard by midnight

\*October 25 – Final report self-assessment due on Blackboard by midnight

October 27 - Discussion

November 1 – Lecture 7 – Accommodation through Adaptive Evolution

November 3 - Discussion

November 8 – Lecture 8 – Range Shifts

November 10 – Discussion

### **Human Responses to Climate Change**

November 15 – Lecture 9 – Carbon Pricing

November 17 - Discussion

November 22 – Lecture 10 – Technological Solutions

\*November 29 - Second exam

December 1 - Discussion

\*Wednesday, December 14 (8:00-9:50am) – Oral reports during final exam period

**Late submissions of coursework will be penalized at 10% per business day** if there is no prior arrangement or proof of emergency. All written, submitted work should be word processed, spell-checked and presented clearly. Word limits will be specified and work that is overly long may be penalized.

## **Enrichment activities**

### **Interviews with Professionals**

I hope to engage a number of guest speakers to address the class (usually through Skype) in order to share their perspectives on how the science of Climate Change Biology is practiced.

### **Academic Integrity**

I expect students to commit to UT's Honor Statement and UT's policy for academic integrity. By enrolling in the course for credit, you agree that written work may be examined using plagiarism detection software at the discretion of the Instructor.

UT's Honor Statement:

*An essential feature of the University of Tennessee, Knoxville, is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.*

UT's Academic Policies and Procedures states:

Each student is responsible for his/her own personal integrity in academic life...

Students are also responsible for any acts of plagiarism. Plagiarism is using the intellectual property of someone else without giving proper credit. The undocumented use of someone else's words or ideas in any medium of communication (unless such information is recognized as common knowledge) is a serious offense, subject to disciplinary action that may include failure in a course and/or dismissal from the university.

Specific examples of plagiarism are

- Copying without proper documentation (quotation marks and a citation) written or spoken words, phrases, or sentences from any source.
- Summarizing without proper documentation (usually a citation) ideas from another source (unless such information is recognized as common knowledge).
- Borrowing facts, statistics, graphs, pictorial representations, or phrases without acknowledging the source (unless such information is recognized as common knowledge).
- Collaborating on a graded assignment without instructor's approval.
- Submitting work, either in whole or part, created by a professional service and used without attribution (e.g., paper, speech, bibliography, or photograph).

### **Classroom Participation**

As a discussion course, your thoughtful participation in classroom activities is essential. Our class is a shared learning environment and you will be asked to adhere to some "ground rules" in class to respect other students' learning and to enable me to use particular teaching methods. These include but are not limited to...

- Arriving promptly to class
- Being engaged in discussion (i.e refraining from texting, social media, and internet use)
- Not posting materials provided to you in this class on other websites

### **Disability Accommodations**

Any student who feels s/he may need an accommodation based on the impact of a disability should contact one of us privately to discuss your specific needs **as soon as possible**. Please contact the Office of Disability Services at 865-974-6087 in 2227 Dunford Hall to coordinate reasonable accommodations for students with documented disabilities. *A common accommodation is to provide more time for exams. We are happy to provide more time. Please see one of us as soon as possible to make arrangements.*

### **Mental Health and Stress Management**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Tennessee services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Health website: [http://studenthealth.utk.edu/clinics\\_mental.php](http://studenthealth.utk.edu/clinics_mental.php).

## **Sexual Harassment**

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program.

## **Diversity**

I strongly support UT's statement that "...the university welcomes and honors people of all races, creeds, cultures, and sexual orientations, and values intellectual curiosity, pursuit of knowledge, and academic freedom and integrity."

## **General Learning Outcomes for Biological Sciences**

I encourage you to keep in mind the larger goals for students in biological sciences which are outlined in this statement from the Biology Division at UT:

Students seeking a degree in Biological Sciences (whether the concentration is in Biochemistry, Cellular, and Molecular Biology, Ecology and Evolutionary Biology, or Microbiology) are expected to be able to do the following by the time they graduate:

Explain and provide examples of each the five big ideas in Biology, using their knowledge of biological concepts gained from their course of study:

- **Evolution:** Populations of organisms and their cellular components have changed over time through both selective and non-selective evolutionary processes.
- **Structure and Function:** All living systems (organisms, ecosystems, etc.) are made of structural components whose arrangement determines the function of the systems.
- **Information Flow and Storage:** Information (DNA, for example) and signals are used and exchanged within and among organisms to direct their functioning.
- **Transformations of Energy and Matter:** All living things acquire, use, and release and cycle matter and energy for cellular / organismal functioning.
- **Systems:** Living systems are interconnected, and they interact and influence each other on multiple levels.

*These biological concepts are more fully explained in the AAAS / NSF report "Vision and Change in Undergraduate Biology Education" ([visionandchange.org](http://visionandchange.org))*

Demonstrate the ability to perform the following scientific practices:

- Formulate empirically-testable hypotheses
- Interpret visual representations (figures and diagrams)
- Evaluate data and come to a conclusion (with evidence) (formulate an argument)

**Student ability to achieve these learning objectives will be tested periodically as part of their departmental requirements.**