GEOL 456: Global Climate Change, Fall 2017

University of Tennessee, Knoxville

COURSE SECTION: n/a
MEETING TIME AND PLACE: Strong Hall 105
COURSE CREDIT HOURS: 3.0

Faculty Contact Information

Instructor: Dr. Andrew D. Steen
Office Hours: Wednesdays 1:20 – 3:20 pm.
Office Location: 717 Strong Hall
Email Address: asteen1@utk.edu
Office Phone: (865) 974-8021, but really, email is a much better way to contact me.

Course Description/Information:

Examines natural and anthropogenic changes in global climate systems. Topics include biogeochemical cycles of greenhouse gases and the water cycle, including water resources and pollutants and changes in the biosphere as both cause and effects of physical global changes. Historical (baseline) dynamics are compared to current changes in order to predict human impacts and suggest technical and policy solutions.

No prerequisites are required. However, an introductory geology course is recommended. The course assumes familiarity with high-school level chemistry and physics.

This class is part of the Humans Living on a Dynamic Earth and Understanding Climate Change Connections packages.

Value Proposition:

Students will learn the fundamental mechanisms that drive the Earth's climate in contemporary times and throughout geological time, as well as how Earth's climate has changed in the past and how it is predicted to change in the future. Whether students pursue a career in geoscience or an unrelated field, the foundations they receive in this class will help them to make sound judgments as citizens about the most pressing environmental challenge of our time.

Student Learning Outcomes/Objectives:

Global Climate Change will serve the following learning outcomes & objectives:

- Demonstrate knowledge of climate change principles and processes
- Demonstrate critical thinking through synthesis of multidisciplinary sources
- Demonstrate communication skills through written and oral presentation

Programmatic Outcomes / Department Goals:

This course will contribute to an integrated understanding of the fields of geology and environmental studies by imparting understanding of the mechanisms of climate change.

Learning Environment:

Class will be primarily lecture-based, although frequent small-group discussion and in-class problem solving tasks will be assigned. The whiteboard will be used whenever possible instead of Powerpoint slides. Brief lecture outlines and/or slides will be posted after lectures. Homework assignments will

reinforce quantitative understanding. Occasional short (paragraph-to-page-length) writing assignments will reinforce critical thinking and communication skills.

Course Communications:

I will use Canvas for announcements and to distribute course documents and assignments. Outside of class hours, email is the best way to contact me. I will seek to respond to email within two working days.

How to Be Successful In This Course:

STUDENT RESPONSIBILITIES:

1. Go to class. I don't take attendance, but you are unlikely to get a good grade unless you're almost always present in class.
2. Arrive on time. If you will regularly struggle to get to class on time, let Dr. Steen know.
3. Read assigned texts before they are due.
4. Bring a pen or pencil and some paper to class.
5. Be respectful of students and the instructor.
6. Focus on class activities during class time.
7. Actively contribute to the classroom intellectual environment.
8. Abide by the UT Honor Code.

INSTRUCTOR RESPONSIBILITIES:

1. Prepare enlightening lectures and classroom activities.
2. Create assessments (homeworks, quizzes, exams and project assignments) to fairly assess students' understanding of assigned reading and in-class material.
3. Evaluate students promptly, fairly and equitably.
4. Respectfully challenge students to reach their potential.
5. Maintain a constructive classroom environment. This may include asking disruptive / non-contributing students to leave the classroom.
6. Behave according to University codes of conduct.

Texts/Resources/Materials:

REQUIRED TEXTBOOK: Archer, David (2012) Global Warming: Understanding the Forecast. 2nd Edition. Wiley: Hoboken.

Required Equipment:

None.

Course Resources:

The course Canvas site will be used extensively.

Course Requirements, Assessments, and Evaluations:

Classroom attendance is not required but it is ***strongly*** encouraged. There will be frequent in-class graded assignments, on which students who are absent without an excuse will earn a zero.

GRADES WILL BE WEIGHTED AS FOLLOWS:

- Weekly grades: 25%
- Exam 1: 20%
- Exam 2: 20%
- Final presentation: 10%
- Final Exam: 25%

Weekly grades will be a simple average of in-class assignments, scheduled and unscheduled quizzes, and homework. These will vary from week to week, but will be weighted equally by week. *Weekly grades may be qualitatively adjusted either direction due to poor or exemplary class participation.*

EXTRA CREDIT POLICY: Up to 3 percentage points of extra credit MAY be available, at the discretion of the instructor.

GRADES:

A	A-	B+	B	B-	C+	C	D	F
≥93	(93-90]	(90-86]	(86-83]	(83-80]	(80-76]	(76-70]	(70-60]	<60

The instructor reserves the right to curve grades upwards at his discretion. Grades on any assignment may be appealed to the instructor, who may choose to re-grade the entire assignment. Note that grades of C- will not be given.

Major Assignments and Exams (names and due dates)

- Exam 1: Tuesday, September 26
- Exam 2: Thursday, November 2
- Final exam (cumulative): December 6, 12:30-2:30 pm
- Final projects. These will involve creating activities for K-12 students designed to communicate ideas from this class.
- Components of the weekly grade
    - Approximately 10 homework assignments, including quantitative problem sets and short writing exercises.
    - Small in-class assignments, including surprise quizzes and in-class exercises.

Course Feedback:

Dr. Steen welcomes direct feedback from students at all time: in class or out of class; in person, via email, or anonymously by unsigned note left in my mailbox. I cannot see this course from a students' perspective, so I rely on your input to teach the best class possible. As with all University of Tennessee classes, students will be asked to provide feedback via SAIS forms. *Students will also have the opportunity to meaningfully influence the direction of the class, especially by determining the form of the final project.*

University Policies:

Dear Student,
The purpose of this Campus Syllabus is to provide you with important information that is common across courses at UT. Please observe the following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high quality learning experience.

I wish you the best for a successful and productive semester.
Interim Provost John Zomchick

Academic Integrity:

"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."
A NOTE ON PLAGIARISM: Plagiarism means presenting someone else's ideas as one's own. This includes copying text, copying the structure of an argument, and failing to appropriately cite others' ideas. Please talk with Dr. Steen if you have any questions about what constitutes plagiarism!

University Civility Statement:

Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: http://civility.utk.edu/.

Disability Services:

"Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 100 Dunford Hall to document their eligibility for services. ODS will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities."

Your Role in Improving Teaching and Learning Through Course Assessment:

At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester, you may be requested to assess aspects of this course either during class or at the completion of the class. You are encouraged to respond to these various forms of assessment as a means of continuing to improve the quality of the UT learning experience.

Key Campus Resources for Students:

- Undergraduate Catalog: (Listing of academic programs, courses, and policies)
- Graduate Catalog
- Hilltopics: (Campus and academic policies, procedures and standards of conduct)
- Course Timetable: (Schedule of classes)
- Academic Planning: (Advising resources, course requirements, and major guides)
- Student Success Center: (Academic support resources)

- Library: (Access to library resources, databases, course reserves, and services)
- Career Services: (Career counseling and resources; HIRE-A-VOL job search system)
- Student Health Center (visit the site for a list of services)
- OIT Help Desk: (865) 974-9900

Course Outline/Assignments/Units of Instruction/Clinic Schedule:

Unit	Date	Reading Due	In-Class topic
Physical basis of the greenhouse effect	8/23 (1)		Introduction
	8/29 (2)	Archer Ch 2	Dimensional Analysis
	8/31 (3)		Blackbody radiation
	9/5 (4)	Archer Ch 3	Simple Climate Models
	9/7 (5)	4.	
	9/12 (6)	5. Archer Ch 4	Greenhouse gasses
	9/14 (7)	6.	
	9/19 (8)	7. Archer Ch 5	Atmospheric structure
	9/21 (9)	8.	REVIEW SESSION
	9/26 (10)		EXAM 1
	9/28 (11)	9. Archer Ch 6	Weather and climate
	10/3 (12)	10.	
	10/5 (13)		FALL BREAK
	10/10 (14)	11. Archer Ch 7	Feedbacks
	10/12 (15)	12.	
The carbon cycle	10/17 (16)	13. Archer Ch 8	The carbon cycle
	10/19 (17)	14.	
	10/24 (18)	15. Archer Ch 9	Fossil fuels & energy
	10/26 (19)	16.	
	10/31 (20)	17.	REVIEW SESSION
	11/2 (21)		EXAM 2
	11/7 (22)	18. Archer Ch 10	The perturbed C cycle
	11/9 (23)	19.	
The forecast	11/14 (24)	20. Archer Ch 11	Contemporary temp. records
	11/16 (25)	21.	
	11/21 (26)	22. Archer Ch 12	Potential climate impacts
	11/23 (27)		THANKSGIVING
	11/28 (28)	23. Archer Ch 13	What to do?
	11/30 (29)	24.	
	12/5 (30)	25.	Review session
	12/12	10:15 – 12:15	FINAL EXAM Strong Hall 105

A NOTE ON SCHEDULE: this schedule will almost certainly drift, as some topics require more or less time than planned. Changes to the schedule will be announced in class and posted to Canvas.