



**Course** GEOG 4386: Global Changes and Its Challenges  
**Term** Spring 2017  
**Meetings** Tuesdays & Thursdays 10:00 – 11: 15 P.M., GR 3.402 B

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## GENERAL COURSE INFORMATION

### Description:

Change is a characteristic feature of the Earth. Change occurs across various time and spatial scales, is triggered by both natural and anthropogenic stimuli, and impacts the ability of the earth to support human and animal populations. While issues of environmental concerns have persisted for many years, arriving at ways of resolving these remain a challenge despite research, media attention, increased public awareness, campaigns by environmental groups, and international agreements. This introductory course brings some of the changes that occur across the globe into focus. We will pay attention to the physical processes and patterns of terrestrial, atmospheric, and climatic changes, as well as discuss the social causes and implications of such changes. The course's main objectives include developing an understanding of: i) basic earth system processes and the mechanisms that lead to environmental change ii) the human impact on earth systems, its effects on the global environment, and the ways in which these changes in turn affect humans, and iii) exploring data that will allow us to observe change.

We will look at the ways in which human activities affect the land, water and atmosphere, including topics such as land-use and land-cover changes (e.g., deforestation), land degradation (e.g., soil erosion), water pollution, acid rain, photochemical smog, stratospheric ozone, the greenhouse effect, and climate change. Through a series of laboratory exercises, students will explore change within a given locale, and more broadly investigate how scientist study the impacts of change on biodiversity.

### Learning outcomes:

At the end of the class students will be able to:

- Describe global environmental change and the various components of the earth system that drive change
- Observe, analyze, evaluate and synthesize data and facts related to change in various aspects of the Earth system
- Use numerical data to arrive at informed conclusions on change on the Earth surface and the drivers of such change
- Work with others to examine and articulate issues critical to our response to global-level change

### Topics to be covered:

1. Introduction to global environmental change
2. Biogeochemical cycles
3. World population, development, and resource consumption
4. The changing Earth surface: land and water

5. The changing atmosphere: acid deposition, photochemical smog, stratospheric ozone
6. The changing atmosphere: carbon cycle and global climate
7. Change detection
8. Species distribution modeling

### **Texts and Materials:**

The required text for this course is David Archer's "Global Warming: Understanding the Forecast" Blackwell Publishing 2011. The older edition of the textbook will also suffice. We will use this text extensively during the second part of the course. The text is available through Amazon.com and the UTD bookstore. For the first part of the course readings from a variety of sources will be assigned and you will be directed to these via eLearning or in class. Assigned readings correspond to the lectures and discussions and are listed on the course organizer on page 4. Please be sure to look for the readings for a specific date and download them ALL. Submitting questions on the readings for discussion is a course requirement and the method for question submission will be discussed in class.

## **COURSE POLICIES**

### **Requirements:**

The classroom environment for this class is a place for active discussion, participation and interactive learning. This class meets twice per week and you are required to attend lectures, complete assigned readings and get your own notes. Assigned readings and questions posed on these are aimed at helping students better understand the materials being covered in lectures. Students are required to complete the required readings and come to class prepared to share their analysis of the issues being covered. For each reading students are required to submit questions that will be used to guide class discussions. In addition to learning to critically think about and discuss content, an important aspect of the course will be developing skills and gaining practice in writing, literature review and analyzing evidence. Lecture slides will also be uploaded to eLearning after class so as to allow for lecture time to be interactive sessions. Exams and quizzes will be based on lectures, readings, discussions and daily report presentations. The dates for exams and quizzes are listed in the course organizer. While exams cover an extended period of the class, quizzes cover materials over specific periods and you are encouraged to consult the organizer to become familiar with these. There are two main assignments in addition to daily reports, five (5) in-class quizzes, two (2) exams and four (4) lab assignments. An overview of assignments is given below, with more details provided as the course develops and due dates approach.

**Daily report (s):** Each student will choose one date in the semester when they will bring a 5-7 minute report on an issue in the news or that has caught their attention through some other means that is relevant to GEC. Their report may include handouts, pictures, or a PowerPoint presentation. You have complete freedom to make it fun or dramatic, but reports are judged on quality of presentation and relevance to the class.

**Assignment 1:** Each student will identify an issue relevant to GEC, perhaps something that has been on their mind for a long time, will research this issue and prepare a 7-8 page paper and 5-7 minute PowerPoint presentation on their topic.

**Assignment 2:** This group project is worth 10% of the overall course grade. You will choose to be in a group that examines one of several problems that will be defined later based on students' interests. Group problem may include modeling the distribution of a species relative to changes in climatic conditions, reviewing the

work of the United Nations Climate Change Convention (UNFCCC) or reviewing the outlook for sea level rise and implications for coastal populations. Your group will present the findings of your work during a class session (see Organizer for date). More details on these options will be covered in class.

### **Grading:**

The final grade for this class will be determined from five main areas listed above - exams, quizzes, labs, and assignments and as described below:

- Attendance, participation and daily reports: 10%
- Five in-class quizzes: 10%
- Two exams: 40%
- Four labs: 20%
- Assignments: 20%

Letter grades will be determined as follows:

A+ > 95; A = 93-95; A- = 90-92; B+ = 87-89; B = 83-86; B- = 80-82; C+ = 77-79; C = 73-76; C- = 70-72; D+ = 67-69; D = 63-66; D- = 60-62; F = <59

**Attendance:** The attendance grade will be computed from 6 random days distributed throughout the semester. Each student is allowed one free miss on a random day, however, if you are absent on more than one random day, the proportion of the 5% (1% per day) of class participation grade will be deducted from your overall course grade.

**Make-up Exams:** The dates for exams and quizzes are listed on page 4. In fairness to other students, proof of absence (e.g. a doctor's letter) will be required if you are ill or have a personal emergency and will need to make up an exam or quiz.

**Late work:** Late submission of work will be penalized 10 % per day.

### **ACADEMIC HONESTY & CONDUCT**

Please refer to the Academic Integrity Policy for the University of Texas at Dallas:

<http://www.utdallas.edu/deanofstudents/dishonesty/>.

**Comet Creed:** This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: "As a Comet, I pledge honesty, integrity, and service in all that I do."

### **CLASSROOM CITIZENSHIP**

Show respect for others by arriving to class on time and staying the full length of the lecture or discussion. Allow others to speak, even when you may disagree with them. Please turn off your cellphones while in class. Food and beverages are not allowed in class.

### **DISABILITY**

Please contact the Office of Student Affairs (<http://www.utdallas.edu/studentaffairs/>) to complete the relevant paperwork to share with me.

**UT Dallas Syllabus Policies:** <http://coursebook.utdallas.edu/syllabus-policies/>

## ACADEMIC ORGANIZER

Week	Date	Topic	Reading (s)/Milestone
1	10-Jan	Introductions and Class overview	-
	12-Jan *	Introduction to Global Environmental Change I	Thomas et al.
2	17-Jan *	Introduction to Global Environmental Change II Lab 0: Introduction to ArcGIS	Mackenzie (Introduction), Harris (GEI)
	19-Jan	Lab 1: Data Acquisition – USGS and World Clim.	-
3	24-Jan *	Sustainability Science and Ecosystem Services Provision	Wu/ <b>Quiz 1</b>
	26-Jan *	Biogeochemical cycles and Human Well- being	Mackenzie Ch. 7/ Lab 1 due
4	31-Jan *	World Population, development, resource use I	IHDP Update
	2-Feb *	World Population, development, resource use II	Population dynamics
5	7-Feb *	Changing earth surface: land use/land cover change	Lambin et al.
	9-Feb	Lab 2: Land Cover Classification – An Amazonian example	Earthshots: Rondonia Brazil/ <b>Quiz 2</b>
6	14-Feb *	Changing earth surface: land use/land cover change/Lab 2 continued	State of the World's Forests 2011; 2014
	16-Feb	Paper 1 Presentations	The Economist
7	21-Feb *	Changing earth surface: forests	Lal et al./Paper 1 due
	23-Feb *	Changing earth surface: soils and land degradation	Mallin et al./Lab 2 due
8	28-Feb *	Changing earth surface: water	HBRF
	2-Mar	Lab 3: Change Detection	Lu et al./ <b>Quiz 3</b>
9	7-Mar *	Changing atmosphere: acid deposition /Exam Review	Beevers
	9-Mar	<b>Exam 1 (Everything from 10-Jan to 7-Mar)</b>	
10	<b>13-18 Mar</b>	<b>SPRING BREAK- NO CLASSES</b>	
11	21-Mar *	The Changing Atmosphere: tropospheric ozone /The Changing Atmosphere: stratospheric ozone	Weatherhead and Andersen/ Lab 3 due
	23-Mar	Lab 4: Species Distribution Modeling	Phillips et al./ <b>Quiz 4</b>
12	28-Mar *	The Changing Atmosphere: Climate- radiation balance and the greenhouse effect	Archer 1-4
	30-Mar *	Climate I – proxy records	Lab 4 due
13	4-Apr *	Greenhouse gases	Archer 1-4
	6-Apr *	Energy Options /Switch	AAG/Archer 8,9
14	11-Apr *	Factors influencing climate	Archer 5-8
	13-Apr *	Fossil fuels and energy	Archer 9 and 12 and Heat/ <b>Quiz 5</b>
15	18-Apr *	Carbon on Earth and Carbon Sequestration	Popkin; Archer 10
	20-Apr *	Climate change - the forecast	Archer 13
16	25-Apr	Final Project presentations/Review for Exam	Review of COP
	27-Apr	<b>Exam 2 (Everything from 21-Mar to 25-Apr)</b>	

\*denotes a day when a Daily Report can be presented.