Instructor: Prof. L. Gregory Huey  
Ph: 404-894-5541, email: greg.huey@eas.gatech.edu

Lectures MWF 12:05-12:55, Clough Commons 152

Lecture TA: TBD

Office Hours MWF 3:15 to 5:00 PM or by appointment, ES&T Rm. 3130. I am also usually available after class.

Laboratory Multiple Sections, CULC Room 335

Themes for the Course: Environmental Science, the Earth System, and Climate

Text: There is no required text book. However, if you desire a reference on the subject matter you can purchase *The Earth System* by Kump, Kasting and Crane. (Editions 2 or 3 are best). This is the primary source for suggested reading.

Grades will be determined by a weighted average of your performance in the Lab, 4 in-class Exams, and the Final Exam. Note that you will be required to show your Buzzcard when you turn in an exam.

Laboratory Grade: 25%
Exams 1, 2, 3, & 4: 12.5% per exam
Final Exam: 25%

Grading Scale: >89% - A, 80-89% points - B, 70-79% - C, 60-69% - D, <60% - F
The scale will be adjusted for the A and B range but not for the C and D range. However, these ranges will only be adjusted down. The medians of the test grades are used as the dividing line between a B and a C and one standard deviation above the median is taken as the dividing line between an A and a B. For example, the median test score is often 70% with a standard deviation of 15%. In this case final averages of approximately 73% and 87% would be the minimum for a grade of B and A, respectively. This has typically been the case in previous years but may not apply to this semester. Also please remember that extra credit is not offered. A grade of zero on any exam will result in a course grade of F.

Excused Absences: You may be excused from tests or labs for valid reasons such as illness, job interviews, etc. However, you must obtain the appropriate approval. You must provide documentation for the reason. For example, if you have a job interview forward a copy of the invitation along with your request to be excused. In all cases the absence can only be excused within two weeks of its occurrence (i.e. don’t try to get excused from a lab you missed the 2nd week of class during finals). Please note that showing a travel letter from the athletic department to the instructor at the beginning of the semester is not
sufficient and the procedures below should be followed. Finally, it is always much easier to obtain approval for an absence in advance.

i) **Laboratories** must be made up the same week as the absence by attending another lab section (e.g. if you miss a Monday lab you could attend a Friday lab). You may attend another laboratory section that week if you have the approval of the TAs of both lab sections. Do not show up to a lab section without prior approval from the TA. You may be excused from attending a laboratory for some circumstances but you must email the instructor (greg.huey@eas.gatech.edu) and cc: your laboratory TA to obtain permission.

ii) **Exams** require the permission of the instructor to be missed and he must be contacted in all cases. Early exams due to conflicts are given routinely for valid reasons. However, make up exams will only be given for serious circumstances and will often be a different format than that give to the rest of the class.

Finally please remember that in all serious situations (death in the family, acute illness, etc.) you should go to the Dean of Students as they are there to help you in these situations.

**Honor Code** Students in this class are expected to abide by the Georgia Tech Honor Code and avoid any instances of academic misconduct. In particular, improperly obtaining written or oral information in the preparation of an exam is a violation of the honor code. You are not allowed to collaborate on exams with other students. **If you are caught cheating on an exam you will be turned in to the Dean of Students.** Use of any previous semester course materials is allowed for this course; however, I remind you that while they may serve as examples, they are not guidelines for any tests, quizzes, homework, projects, or any other coursework that may be assigned during the semester. Also please note that the instructor takes the Honor Code very seriously.

**Posted Material and Study Priorities**

A web page for the class will be maintained through the t-square.gatech.edu portal. Lecture notes, class information, pertinent web links, study problems, and old tests will be posted. I recommend that you make sure that you can do all of the posted study problems and the old tests. As a second priority read pertinent book chapters and review your notes. **However, the posted notes should not be considered complete. The posted notes are not a substitute for attending class. Note that all lecture material will not be posted.**
Important Dates

Test 1 – September 14 (Friday)
Test 2 – October 8 (Friday)
Test 3 – November 2 (Friday)
Test 4 – November 30 (Friday)

Final – December 14 (Friday), 11:30 – 2:20 pm

Note the last day to withdraw from classes is October 12

Holidays

September 3 – Labor Day
October 15-16 – Fall Break
November 22-23 – Thanksgiving Break
Course Topics

1. **Introduction - Earth as a Changing Planet**
   a. Land Use
   b. Population
   c. Environmental Change – Climate
   Suggested Reading – Global Change Chapter – The Earth System

2. **Earth as a System**
   a. Feedbacks – controls on environmental change
   b. Dynamic Equilibria
   c. Daisyworld
   Suggested Reading – Daisyworld Chapter – The Earth System

3. **Radiation and the Earth**
   a. Electromagnetic Radiation
   b. Radiation Fluxes
   c. Black Body Radiation (BBR)
   d. Earth Sun Relationships – Temperature change with latitude and season
   e. Energy Balance and Planetary Temperature
   f. Greenhouse Effect and Greenhouse Gases
   Suggested Reading – PhysicalGeography.net, Global Energy Balance – The Earth System
   Further Reading – Wikipedia or any basic physics presentation of BBR

4. **The Atmosphere**
   a. Composition, Structure – atmospheric pressure and temperature
   b. Vertical Circulation – Convection
   c. Horizontal Circulation – Winds, High and Low Pressure Systems
   d. Hydrologic Cycle – Clouds, Precipitation, Energy Transfer
   e. Aerosols – Pollution and impact on radiation and clouds
   Suggested Reading – Atmospheric Circulation – The Earth System,
   PhysicalGeography.net
   Online Resource - http://geography.uoregon.edu/envchange/clim_animations/
5. The Ocean
   a. Composition
   b. Structure – density, temperature, salinity
   c. Horizontal Circulation – Currents
   d. Vertical Circulation – Thermohaline Circulation (deep water formation)
   e. Biology – nutrients and productivity
   f. Biological Pump

   Suggested Reading – Ocean Circulation – The Earth System,
   PhysicalGeography.net

6. The Solid Earth
   a. Composition – Rocks and Minerals
   b. Structure – Seismology
   c. Continental Drift
   d. Horizontal and Vertical Motion – Plate Tectonics

   Suggested Reading – Plate Tectonics – The Earth System,
   PhysicalGeography.net

7. Environmental Chemistry
   a. Organic and Inorganic Carbon
   b. Oxidation, Reduction, and Energy
   c. Acids, Bases, and pH

   Suggested Reading – Chemistry Worksheet posted on TSquare

8. Carbon Cycle
   a. Carbon Reservoirs and Residence Times
   b. Short Term
   c. Long Term

   Suggested Reading – Recycling of Elements Chapter – The Earth System

9. Climate Change
   a. Natural
   b. Anthropogenic

   Suggested Reading – Posted Papers on TSquare