

**GEOG 494B: Global Environmental Change  
Spring 2004**

**Instructor:** Dr. Barbara Annie Gibson (Dr. Becky Ostertag will be guest lecturing from time to time)

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**Textbooks:**

A readings packet will be available for purchase at Office Max. It is REQUIRED for this course. The IPCC report will also be required reading, and will be provided to you as a PDF file on CD.

**Course Description:**

This course will discuss the interactions between the hydrosphere, atmosphere, biosphere, cryosphere and lithosphere that together make up the Earth System. This new interdisciplinary view of our planet highlights the manner in which all systems of the earth control or influence each other on time-scales from days to billions of years. It is now clear that the state of the Earth has dramatically and abruptly changed many times in the past with tremendous environmental repercussions - Why did this happen? As we humans transform the globe in many ways, we need to understand:

How do the Earth's physical, chemical and biological systems interact? What were the causes and effects of past climatic changes and what can we learn from them about the future? What issues of climatic change confront us as we enter the 21st century? How do we predict the effects of our actions on the world ecosystem? This class will explore past, present, and future climatic change, what is clearly known and what is speculated, and how we can attempt to accurately predict our future.

**Grading:**

There will be no curve in this course. Each student's grades will be determined from the following:

|                        |     | <u>Grading Scale</u> |
|------------------------|-----|----------------------|
| Midterm                | 20% | A 88-100%            |
| Final                  | 20% | B 78-87%             |
| Final Proposal         | 30% | C 68-77%             |
| Annotated Bibliography | 20% | D 60-67%             |
| Class presentation/HW  | 10% |                      |

Total                      100 %

**Exams:**

The midterm and final exam will test/reaffirm your knowledge of the integrated systems approach to examining the forcing, system response and impacts of environmental change. They will focus on the key scientific areas of climate variability, sensitivity and prediction, environmental chemistry, ecosystem and anthropogenic responses. Each exam will be closed book and notes. **MIDTERM: March 15<sup>th</sup>; FINAL EXAM: May 10<sup>th</sup> @ 9:40 am**

Make-up exams will only be given in cases of emergency (i.e. w/ a doctor's excuse). NO EXCEPTIONS!!!

### **Homework:**

This class will emphasize learning by promoting class discussions of topics introduced related to global environmental change and earth system science. These discussions will often be facilitated by the class reading various journal, newspaper, magazine articles and then talking over what they thought of the content of the article related to their views and understanding of the topic. As these homeworks rely on class attendance and participation, a sign in sheet will be passed around in class and the instructor will note individuals who participate in discussions. Please don't be shy! For example, NCAR, the National Center for Atmospheric Research in Colorado announced that 1998 was the warmest year on record, and the 1990s the warmest decade. Thus, global climate change is becoming a hot topic and affects all individuals, especially those who live in the Pacific.

***Other homework includes:*** each student will chose a country to give a presentation in class on how global change is impacting that particular country. Student is to prepare a handout (factsheet) related to their presentation to give to fellow students the day of their presentation. Also, there will be class-related field trips and your participation in them is highly encouraged.

### **Annotated Bibliography:**

In order to fully introduce you to the various aspects of global environmental change, you are to submit annotated bibliographies of 5 refereed journals articles. These bibliographies are to be turned in no later than March 17th. An example annotated showing proper format will be handed out later in the semester.

### **Research Proposal:**

Students will be assigned into groups which will design a research proposal of their choice - with the hope they will use what they learn in class as the spring board for design of their proposal. The research proposal should address global change issues (especially as how they relate to the Pacific Basin), and we will encourage the inclusion and analysis of long-term global data sets. For example, potential topics might include: predicting El Niño events from NOAA ocean temperature data; estimating future CO<sub>2</sub> levels based using Mauna Loa Observatory data; or monitoring invasive species spread through the use of GIS. The proposal must be written in a style suitable to submit to NSF (see NSF proposal guidelines at [www.nsf.gov](http://www.nsf.gov)), and students in the class will serve as panelists in the review process. In order to avoid possible duplication of a research project, each group must get instructor approval before starting their paper/project. Groups are to submit a 2 page research pre-proposal (including tentative list of references: see below) to me no later than February 27th - remember, you must have my approval of your project before you begin.

Final project reports (DUE April 21<sup>st</sup>) are to be typed, single spaced, using 12 point font with 1 inch margins all around, and length should not exceed 15 pages (which does not include the title page, table of contents, and references). The paper will discuss each phase of the proposed research, including maps and other graphics to support the proposal. A minimum of 10 references need to be used, with at least 5 being from refereed journals. Please use CBE citation format (see my web page for details). No late proposals will be accepted!

### **Other Info:**

The contents of this syllabus are subject to change in the event of extenuating circumstances and at the discretion of the instructor.

Out of respect for your fellow classmates (and me!), cell phones, pagers, etc. need to be turned off while in class. If it is an emergency and you are expecting a phone call, please set it to vibrate and take the call outside of the classroom.

Any student with a documented disability who would like to request accommodations should contact the University Disability Services Office at 933-0816 (V), 933-3334 (TTY), campus Center

Room 311, as early in the semester as possible.

**Course Topics:**

- **Week 1:** Environmental Change from a Paleological Perspective
- **Week 3:** Human Population Growth: the interactions of humans with the environment before and after the Industrial Revolution
- **Week 5:** Atmospheric Chemistry: warming of climate, greenhouse gases, ozone depletion
- **Week 7:** Land Degradation and Land Use: land conversion issues, especially as related to Hawai'i (forestry, agriculture, ranching, fisheries and aquaculture), effects of land conversion activities (soil erosion, biomass burning, use of pesticides), carbon sequestration
- **Week 10:** Biodiversity: ecosystem function and biodiversity, invasive species, endangered species and habitats, restoration, ecosystem management, genetic diversity and genetically modified foods
- **Week 13:** Hydrologic Cycle: marine pollution, terrestrial/marine linkages, El Niño Southern Oscillation, sea level rise, freshwater eutrophication, desalinization
- **Week 14:** Economics and Policies of Global Change: evaluating ecosystem services, world trade, CITES, Kyoto Protocol, and global economies, costs of invasive species and environmental cleanups, alternative energy sources