GEOL 1070 - 785  GLOBAL CHANGE 2  Spring semester 2001

Class:  MWF 10:00-10:50 am, Baker Hall
Instructor:  Dr. David J. Lubinski, INSTAAR, RL-1 East Campus, 735-6619
Office Hours:  Baker 201 MW 11-11:45 pm (will be at 492-3428 during office hours), or by appointment, 735-6619, david.lubinski@colorado.edu

Texts:  •  Environmental Science: Earth as a Living Planet, 3rd ed. Botkin & Keller
        •  The Blue Planet, an Introduction to Earth System Science, 2nd ed., Skinner & Porter
        •  Readings on Reserve: Environmental Chemistry, second edition, O’Neill

Synopsis:  In the second semester of Global Change, we explore topics which have a more regional (versus global) impact, yet are pervasive around the world. We take the first five weeks of the semester to explore the topic of fresh water; fluvial geomorphology, surface and groundwater flow, flooding, dams, water use, water pollution and remediation. During this part of the course, you will be able to apply your knowledge to your own hometown drinking water resource. In the next six weeks, we will explore biogeochemical cycles of four of the elements essential for life: sulfur, phosphorus, nitrogen, and carbon. After studying the natural state of these elements in the Earth System, we will learn about some impacts of their manipulation (i.e. pollution) and methods of remediation. We will then explore how environmental threats to human health are assessed through toxicology/ and risk assessment, and then address soils and human impact on soils. We will finish the semester with your presentations on “what’s working” toward a sustainable future (see separate sheet).

Objectives and Expectations:  The course objective is to enhance your ability to think critically about change in our Earth System and to use what you learn in this course as a foundation for understanding present and future changes in the Earth System. Hopefully, this foundation will be added to and referred to for decisions you make through your life about your impact on the Earth System, and the impact of the Earth System on you. I expect that you will come to class prepared to participate, do the assigned reading, keep up with the class, and contribute to a classroom environment which is respectful of all people and conducive to learning. If you are having difficulty with material presented in this course, I also expect that you will take the initiative to come see me before you are tested on that material.

Grading:  Grading is based on a combination of exams, quizzes, projects, and class participation, as follows:

- 70% - 2 exams during semester, 25% each, final exam is 20%,
- 5% - better of two quiz grades; the lower will be dropped
- 10% - “what’s working” presentation (see separate sheet)
- 7% - hometown water report (see separate sheet)
- 3% - other small group reports and homeworks as follows: nitrogen (1.5%), 15 points for excellent presentation and discussion, 10 for mediocre presentation and discussion, 5 for below average presentation and discussion; hometown air (0.5%). 5 points for excellent report and discussion, 3 points for mediocre effort, 1 point for poor effort.

Unexcused absence on a report day will result in loss of all points for that assignment. There will be a few homework assignments TBA, depending on student understanding of the material (1%)

- 3% - attendance. (3%: < 3 classes missed. 2%: 3-6 classes missed. 1% 7-10 classes missed. 0 > 10 classes missed.)

- 2% - constructive contribution to class i.e. contributing to a learning environment by participating in discussions, asking questions (2%: frequent constructive contribution to class. 1.5%: moderate contribution to class. 1%: barely speaks, but knows material 0.5% little contribution to class. 0: never contributes, not prepared

Exams, Quizzes and report dates are listed on the syllabus. If you are unable to attend a quiz or discussion, you must contact the instructor a week before the date (less time granted for illness).
Only one make-up quiz per student is allowed. **You are responsible for any announcements made at the beginning of class.**

**Learning styles:** Different people have different learning styles, and the demands of college often require study habits to be more efficient than you have been used to. If you are finding that your study strategies are not providing the results you want in this course, come talk with me.

**Course Outline** (subject to change depending on time contraints…):

Unit I  Biogeochemical cycling - overview Jan. 17-19.
Concepts in biogeochemical cycling: reservoirs, residence times, fluxes, steady state, growing and depleting reservoirs, space and time constituents.

Unit II  Fresh water - Jan. 22 -Feb. 16
Review of hydrologic cycle, fluvial geomorphology, surface hydrology, ‘93 Mississippi flood, fluvial remediation, dams, Colorado River case study, groundwater hydrology, Ogallala Aquifer and Long Island case studies; water pollution, remediation.

**Quiz 1 Feb. 5**

**Hometown water reports start Feb. 12**

**Exam 1 Feb. 19**

Unit III Sulfur -Feb. 21- March 5
Species, chemical processes; reservoir sizes, residence times, humans and the sulfur cycle: uses, sulfur dioxide emissions, acid rain, acid mine drainage; impacts of acid deposition.

Unit IV Nitrogen - March 7-9
Species, chemical processes; reservoir sizes, residence times; humans and the nitrogen cycle: uses, eutrophication of lakes, effects in atmosphere, nitrification case studies.

Unit V Phosphorous -March 12
Species, residence times, reservoir sizes, fluxes; phosphorous in life processes; humans and the phosphorous cycle: uses, runoff from fertilizers, detergents, effects on aquatic life

Unit VI Carbon - about March 14-21
Chemical processes, reservoir sizes, residence times, focus on fossil fuels: origins, exploration, refining, combustion. petroleum products: benefits and pollution problems

**Exam 2 either March 21 or 23 (will announce later)**

**SPRING BREAK**

Unit VII  Air Pollution - April 2-4
Chemical pollutants, photochemical smog

Unit VIII  Waste Management - April 6-9
Past and modern waste management, recycling processes, the recycling industry, precycling

Unit IX  Environmental Health and Toxicology - April 11-13
risk assessment, Fluoride case study

**Quiz 2 April 16**

Unit X  Soils - April 18-25
weathering, soil components, major soil types, erosion, agriculture and soil erosion, remediation and retention

Unit XI "What’s working" April 27-May 4  **Reports in class April 30 and May 2**

**FINAL EXAM:**  Mon. May 7, 1:30-4 pm