ENV 216—Earth Systems Science

Winter quarter, 2009

Logistics

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Office hours: following class or by appointment

Textbook (required): *The Blue Planet*, 2ed, Skinner Porter & Botkin, ISBN 978-0-471-16114-1

Course overview

The official description: "This course uses a systems approach, to investigate the fundamental structure of functions, processes and changes within, and dynamic interactions (cycling) among Earth's living and non-living systems. This course is designed for students with fundamental grounding in biology, chemistry, ecology, and mathematics." This class will focus on three of the great spheres of the Earth (lithosphere, hydrosphere and atmosphere) and how they interact with each other and the fourth sphere, the biosphere. I will assume students have a basic understanding of how living organisms need air, sunlight and water to grow (e.g., photosynthesis & respiration). We will study how the physical earth works together with these organisms to create a stable environment for life. Also, we will consider how humans rely on the integrated earth system (e.g., clean air, water, mineral resources) and how our industrial activities modify important earth system cycles. The overall goal of the course is for students to understand how physical earth systems influence the serious environmental problems that face society.

Course philosophy

We will strive to have an interactive discussion on the topics addressed in this class. Science is difficult to learn passively—classroom participation promotes active learning. Also, earth system science is especially tricky since every topic requires two phases of understanding. First, the 'facts' of the phenomenon must be understood (for example, hot air rises). The second phase is learning how the phenomenon interacts with other Earth spheres (for example, rising air causes rain and drives the water cycle). In order to cover the vast amount of material that underpins earth system science, you will learn the facts (first phase) by reading the textbook and my lectures will emphasize the second phase—tying everything together. To facilitate this process, we use a weekly structure centered around chapters from the textbook that is outlined in the first three policies below.

Policies

Monday quizzes: On Monday, the class will start with a short quiz (approximately 5–7 questions/10 minutes) based on assigned reading (the chapter being covered that week). Completion of this quiz will also count as attendance for that class.

Wednesday figure presentation: Each Wednesday, three students selected on the preceding Monday will 'take over' for me. For each student, I will randomly select one figure from the chapter and project it. The student will lead a 4–5 minute discussion of the figure, answering questions from myself and the class.

Friday discussion: On Friday, students will bring in answers to the "Questions for Discussion" at the end of that week's chapter. Your answers must be printed out and not hand written. I will lead a 10–15 minute discussion, and students will be able to refer to their written answers during the discussion. At the end of the discussion, I will collect all the replies. Again, completion of this assignment will count as attendance for the class.

Local interaction paper: To apply some of the concepts learned during the quarter, you will study and describe an interaction between two or more Earth spheres that either occurs or is especially relevant to the Chicago region. Here are several examples: how glaciers affected the landscape, the history of waste water treatment, and how air pollution damages urban trees. You will present your investigation with a short (3–4 page, double-spaced) paper towards the end of the quarter (March 6). A short abstract (150 – 200 words) of your proposed topic is due Feb 20.

Exam: Because of the cumulative nature of earth system science, there will only be a final exam that stresses the interactions between the material learned in the individual chapters.

Class mid-quarter evaluation: As a new faculty member at DePaul, I am particularly interested in student feedback. In addition to the standard end of the quarter evaluation, I will conduct a mid-quarter evaluation to look for ways to improve both the content and delivery of this course.

Blackboard: All class materials and grades will be available on the Blackboard site. I will post all lectures on the Blackboard site within 24 hours after the class and all assignment grades one week after their due date.

Attendance: Attendance is required for all classes. Students will be allowed to miss two classes without penalty during the quarter. This should cover all 'routine' absences such as colds, doctor appointments, competitions, etc. Further excused absences will only be granted in exceptional circumstances with appropriate documentation. If you miss a Monday quiz, you must email me and I will give you an alternate assignment which is due the following Monday. If you miss a Friday discussion, you must turn in the discussion questions by the following Friday. Because the class structure relies on your participation for the Wednesday figure presentation, being absent when you are scheduled to present a figure cannot be excused. After the first two absences, 0.5 percentage points for each missed class will be taken off your final grade. Exams must be taken at the scheduled time. Any exceptions to this policy must be arranged in advance.

Late assignments: All assignments are due at the beginning of class. Any late assignment received before 5pm on the due date will have a 10% grade penalty. After that, late assignments will receive half credit if received within one week (except at the end of the semester—nothing will be accepted after the final class).

Academic Integrity: According to the DePaul University Student Handbook, "Violations of academic integrity include but are not limited to the following categories: cheating; plagiarism; fabrication; falsification or sabotage of research data; destruction or misuse of the university's academic resources, alteration or falsification of academic records; academic misconduct; and complicity." The Handbook also states that, "If an instructor finds that a student has violated the Academic Integrity Policy, the appropriate initial sanction is at the instructor's discretion." For more information, definitions, and examples, see DePaul University's Academic Integrity website at http://academicintegrity.depaul.edu.

Grading

Grades in this class will be determined on the following scale:

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

I may change these grade boundaries, but this will always be in favor of the students and will be applied uniformly to the entire class. Grades will be determined from the individual components of the course by the following allocation:

Attendance	Quizzes	Figure	Fri Questions	Paper	Final exam
15%	20%	5%	20%	20%	20%

Sources of help

If you think you may have special learning needs, please feel free to see me as soon as possible, and every effort will be made to reasonably accommodate your needs.

- **PLuS Program**: for students with learning disabilities and/or attention deficit disorders
- **Writing Center**: for students who need help with writing
- **OSD**: for students with physical disabilities
- **Dean of Students**: accommodations with health or family emergencies

Upon completion of this class, you will be able to:

- Explain what earth system science is.
- Using a systems approach:
    - Describe the four major Earth spheres.
    - Describe the interactions between these spheres.
- Describe the impacts of contemporary human activities on the Earth's physical processes.
- Be able to describe how the Earth's spheres and their interrelationships affect the major environmental issues facing society today.

Syllabus

Week—Dates	Topic	Reading (due Mon)	Notes
1—Jan 5–9	The Earth System	Chapter 1	Quiz on Wednesday
2—Jan 12–16	Plate Tectonics	Chapter 4	
3—Jan 19–23	Earth's Crust	Chapter 8	
4—Jan 26–30	Water on Land	Chapter 9	
5—Feb 2–6	World of Snow and Ice	Chapter 10	
6—Feb 9–13	World Ocean	Chapter 11	
7—Feb 16–20	Composition and Structure of the Atmosphere	Chapter 12	Paper abstract due on Friday (2/20)
8—Feb 23–27	Winds, the Weather, and Deserts	Chapter 13	
9—Mar 2–6	Earth's Changing Climate	Chapter 14	Paper due on Friday (3/6)
10—Mar 9–13	Geochemistry and Life	Chapter 16	

The above schedule is a framework, and changes will be communicated in class and via the Blackboard site.

Class times: Monday, Wednesday & Friday 9:40–10:40 am
Class location: McGowan South room 206
Final exam: Tuesday, Mar 17 8:45–11:00 am