

**BIOL 115 ENVIRONMENTAL SCIENCE
FALL QUARTER 2007**

SYLLABUS

COURSE GOALS

- Build a basic understanding of the physical and natural systems that make up the biosphere on Earth—land, water, atmosphere, and life—stressing the dynamics of these interconnected systems.
- Develop a scientific understanding of the causes and consequences of several of the major environmental problems facing today's society: human population growth, loss of biodiversity, chemical contamination, energy production, and the changing global atmosphere.
- Acquire the tools to enable you to think critically about other current and future environmental challenges you will face as a member of contemporary society.

CLASS MEETINGS

Times: MWF 2:40-3:55

Place: Dow Science Center 226

OVERVIEW

Science is not just facts and figures, but a way of getting credible answers to questions. Value judgments are inescapable in crafting solutions to environmental problems, but such values per se cannot be taught in a classroom. The knowledge on which each person bases his or her judgment can, however, be good or bad. The framework that science uses enables one to gain the best possible knowledge about a subject, and this includes recognizing the limitations of and uncertainties associated with, that knowledge. In this course, you will come to understand and be able to utilize this framework in order to apply it during a lifetime of thinking, learning, and making decisions about your environment, whether it be your neighborhood natural area, your national forests, or the global market in pollution permits.

This course will be divided into two parts. During the first three weeks we will set the stage and meet the players, learning about the earth's systems and our role as the most influential species on the planet. During the latter part of the quarter, we will investigate in some depth several environmental issues that will illustrate some of the complexities of the problems facing our society today. We will study the environment around us at a variety of scales, from the problem of suburban sprawl in Kalamazoo County to the changing global atmosphere. We will be working in both large and small groups as well as individually throughout the quarter, and students will draw upon and further develop their skills in quantitative reasoning, and both written and oral expression.

This course is **not**: (1) A primer in what to think and say about controversial environmental issues. (2) A course in how to be an environmental activist. (3) A course in public policy, ethics, sociology or economics. While we will incorporate elements of each of these disciplines as we examine environmental issues, the focus of this course will be on the science.

Required readings: journal and magazine articles and book chapters will be available as a course pack for your convenience. Additional material will be handed out in class or available electronically.

Useful things to know about the instructor:

Name: Dr. E. Binney Girdler

E-mail: girdler@kzoo.edu

Office: Dow Hall, Room 307

Phone: 269.337.5977

Office hours: Tuesdays & Wednesdays 9:00 - 11:00 am; by appointment

CASE STUDIES AND TEAM LEARNING

Case Studies: Unlike many science courses, this one will not have a traditional laboratory section in which experiments are set up in advance and there is a preset outcome upon which you are graded. In fact, you may have noticed (and indeed, may have chosen the course on this basis) that there are no formal laboratory sections associated with BIOL 115. In the interest of full disclosure, you should know that we *will* be doing science. Instead of meeting in a laboratory to conduct experiments, you will work in teams in a series of case studies in which we gather data from various sources (field- or Web-based) in order to answer questions about environmental problems. We will also break up into these teams for various other activities during the lecture periods. Please remember the Team Number to which you were assigned during the first week:

I am in team # _____.

Independent Projects: You will be breaking up into smaller project groups of three to independently investigate a problem in some other area of environmental science. Your group will choose a topic by the end of the 3rd week of the quarter, and will be responsible for an installment of your progress during the 6th week. We will periodically utilize time during the lecture period to allow for group work on these independent projects, and the projects will culminate in a poster session during 9th week.

I have to join with two other people and decide on a topic by _____.
(date)

Current Events: One of the goals for this course is to become astute consumers of science in the media. This means that you need practice tasting, chewing, and judging examples of media portrayal of scientific issues. So keep your eyes and ears open to news and views focusing on environmental issues at local, regional, national and international levels, and having to do with each of the four 'spheres that we will study in class. Each student will be required to present a "current event" during the quarter. You will receive a separate hand-out with details.

My team is responsible for Current Event Briefings starting _____.
(date)

OTHER IMPORTANT INFORMATION

All work completed during this course must be carried out in a manner consistent with the Kalamazoo College Honor System.

Much of the work we will be doing in this course will be collaborative, and as such, sharing of ideas and jointly preparing presentations and papers is essential and expected. Each student will be expected to contribute his or her share to group work; expect nothing less from your peers. I only need one copy of team work that is to be turned in, and all members names should be clearly indicated. Students will work individually on quizzes (excluding practice quizzes) and examinations. Unauthorized collaboration and receiving help from others outside the bounds permitted by the instructor are violations of the Honor Code. Please see the policy on academic honesty at <http://www.kzoo.edu/studev/acadPol/index.html>.

Disabilities: If you have a diagnosed (and documented) learning disability, please see me *as soon as possible* so that we can discuss how best to help you succeed in this course. Don't assume that my receipt of your paperwork will suffice; I need the paperwork *and* a personal meeting with you to discuss your needs.

COURSE ASSESSMENT

General Policies:

Attendance: Much of your learning in this course will be in cooperative teams. While I will not call roll at the start of lecture, your absence will be noticed if your team is short-handed. Unexcused absences will factor into the Participation portion of your grade.

Deadlines: Discussion questions for each reading and reaction papers are germane to the particular lecture period in which those readings will be discussed, therefore they must be turned in on time or you will not benefit from the discussion. I will also be strict about deadlines for collaborative work, because other students' learning is dependent upon your work. Otherwise, I am an understanding and usually flexible person, within limits: I hereby grant you three grace days for the quarter, to be used at your discretion (one at a time, all at once); after that, you begin to lose points.

Missed work/Absences: Please inform me ahead of time if you will miss a graded assignment (exam, class presentation). This includes athletes! Please allow a week's advance notice. With the exception of a documented illness, notification after the fact is not acceptable.

ACTIVITY	WEIGHT
Examinations: Exam I: Friday, 19 Oct (4 th week) Exam II: Friday, 9 Nov (7 th week) Exam III: Monday, 3 Dec (Exam week)	10 % 20 % 25 %
Reaction Paper: An essay of approximately 1000 words written in response to one of our required readings.	5 %
Case Study Team Assignments: Average of three team grades. We will be examining in detail several current environmental issues. Teams will be responsible for collecting, analyzing and interpreting data and presenting their findings to the class.	15 %
Current Events Briefing: Once per student	5 %
Participation: You will have a variety of opportunities to participate in class activities, including: in class/team discussions, team presentations, electronic discussions, and in-class exercises. To receive full participation credit, you need to be an active participant in one of these formats during the course, in addition to day-to-day engagement in class activities (<i>i.e.</i> , attending class; being a responsive, active listener). <i>One weekend field trip is also required.</i> Please see me if you are unsure whether you are on track toward fulfilling this requirement.	5 %
Independent Project/Poster: One grade for each small group, with a component for individual participation. There will be two required (and graded) "installments" on this project to help you make progress throughout the quarter. Final projects will be presented during 10 th week. The final grade will represent a composite of installment and final product evaluations, including a peer assessment.	15 %
Grading: Everyone will be graded on a straight percentage basis: 90-100% is an A, 80-89% is a B, 70-79% is a C, 60-69% is a D, and < 60% is an F. Plus and minus grades will be given within these ranges.	= 100 %

TENTATIVE WEEKLY TOPIC SCHEDULE—Major Assignments and dates in **bold**

Week	Topics	Readings & Assignments
1	Prologue <i>Human Population</i> Why do we have environmental problems?	Owen (2005) Vitousek et al. (1997)
2	<i>Society and the environment</i> Tragedy of the commons The nature of scientific uncertainty	Team 1 Current Events Hardin (1968) Michaels & Monforton (2005)
3	<i>How the world works, Part I</i> System dynamics Positive & negative feedback, time delays 1 st and 2 nd Laws of Thermodynamics Energy The four 'spheres	Team 2 Current Events Mon 8 Oct : Present Case Study #1 : Human populations Fri 12 Oct : Ind. Project Proposals Due
4	<i>How the world works, Part II</i> From atoms to the atmosphere Water and major nutrient cycles Ecosystems, soils, climate	Galloway <i>et al.</i> (2003) Zimmer (1995) Fri 19 Oct : EXAM I
FIELD TRIP Sunday, 21 October 9 am – 2 pm		
5	<i>Biodepletion</i> What is biodiversity? Genes, species, ecosystems We should we care? Direct & indirect benefits	Team 3 Current Events Wilson (1992) Constanza <i>et al.</i> (1997)
6	<i>Biodepletion (continued)</i> What is causing biodepletion? Video: “Cane Toads: An Unnatural History” What can we do about biodepletion?	Team 4 Current Events Mon 23 Oct : Present Case Study #2 : Bog Fri 27 Oct : Ind. Project Installment Due
7	<i>Energy Production/ Use</i> History of energy consumption Fossil fuels, peak oil	Campbell & Laherrère (1998) Fri 9 Nov : EXAM II
8	<i>Global Climate Change</i> Natural and anthropogenic climate forcings	Team 5 Current Events Kolbert (2005), Part I & II Fri 16 Nov : Present Case Study #3 : Energy
9	<i>Global Climate Change (continued)</i> Feedbacks Climate modeling **No class 21 November**	Team 6 Current Events Kolbert (2005), Part III
10	Epilogue Back to society: solutions Final project presentations	Team 7 Current Events Rosales (2005) Wed 28 Nov : Independent Project Symposium
Exam	Final Exam Mon 3 Dec 1 – 4 pm	