FD99

Dr. Gail Grabowsky Kaaialii
ENV 201L: Environmental Science I
Fall 1999

Environmental Science I
Syllabus

A chain is no stronger than its weakest link, and life is after all a chain.
William James

The nation that destroys its soil destroys itself.
Franklin D. Roosevelt

Civilization is a conspiracy . . . . Modern life is the silent compact of comfortable folk to keep up pretences.
John Buchan

After you have exhausted what there is in business, politics, conviviality, and so on – have found that none of these finally satisfy, or permanently wear – what remains? Nature remains.
Walt Whitman

The scientific community is no private club. In principle, and in its best and broadest sense of the words, scientific inquiry can be undertaken by by anyone on almost any subject matter.
W. Quine and J. Ullian
The Web of Belief

DATE	TOPIC	ACTIVITIES
	Part I: The Roles of Science and Culture in Environmental Issues	
8/30/99	What is Environmental Science? Course mechanics; Service learning options	Fill out questionnaires
9/1	Introduction to the major environmental issues; Your pre-existing notion of what constitutes an environmental issue	READ: M. Vitousek et al.: "Human Domination of Earth's Ecosystems": Notes, discussion, class brainstorm **Guest**: Nak Pak: The Nature Conservancy Hawaii
9/2	**LAB 1.1: What are the environmental problems in our own backyard? What aspect of each could we address through science?**	**Bring in information about an environmental issue that concerns you.** **Guest:** Mary Pickett: Waikiki Aquarium
9/3	Fall Convocation: NO 11:00 am classes today!	

9/6	Science and the environment: What role(s) does science play? Grappling with nature's complexity in a logical, systematic way	READ: L. Newton & C. Dillingham: "Toxin's Holloween: The Story of Love Canal": Notes & discussion
9/8	Ethics and emotion in environmental problem-solving: the role of pathos and ethos	READ: M. Soule: "Mind of the Biosphere; Mind in the Biosphere" Notes & discussion

9/9	**LAB 1.2: The role of our environmental ethic in determining what we ask scientifically about our world. Ethical dimensions of your environmental issue from LAB 1.1**	**LAB 1.1 write-up due** **READ: J. Callicott: "Far Western Environmental Ethics"**
9/10	Combining science and culture for the environment	**Guest**: Donna Kahakui: Kai Makana
---		
9/13	Introduction to Pacific island environments and Pacific peoples	READ: Chapter 1 Loban & Schefter
9/15	Ways of learning about our world: science, traditional knowledge and religion; Doing science	Chpt 1 (cont'd); Survey of our own traditional knowledge
9/16	**LAB 2: Traditional knowledge versus science as a way of knowing**	**LAB 1.2 write-up due**

Part II: Principles of Ecology and the Environment

9/17	The history of life and where we are now	READ: J. Moore's Introduction from: Science as a Way of Knowing; Handouts
---		
9/20	Principles of Ecology: Structure of ecosystems	READ: Chapter 2 Loban & Schefter
9/22	Biological classification and the historical relatedness of organisms	Chpt 2 (cont'd)
9/23	**LAB 3: Taxonomy and Phylogeny lab**	**LAB 2 paper due**
9/24	The interdependancy of life: Symbiosus and succession	Chpt 2 (cont'd)

9/27	Video: "Krakatau" (A documented example of ecological succession)	HWK: What is the difference between succession and habitat destruction?
9/29	Habitat Variation	READ: Chapter 3 Loban & Schefter
9/30	**LAB 4: Plankton trophic levels lab**	**LAB 3 worksheets due**
10/1	Climate	Chpt 3 (cont'd)

10/4	Habitat, Climate and Organisms	Chpt 3 (cont'd) HWK: Internet habitat diversity project
10/6	Habitat diversity reports	
10/7	**LAB 5: General survey of rocky intertidal plants and animals (Makapu'u)**	**LAB 4 data sheets due**
10/8	**E X A M I**	

10/11	**D I S C O V E R E R ' S D A Y no class**	

Part III: Island Ecosystems and the Challenges They Face

10/13	Terrestrial Pacific island ecosystems: Soil & Erosion	READ: Chapter 4 Loban & Schefter
10/14	**LAB 6: Soil lab**	**Bring in soil samples** **LAB 5 survey results due**
10/15	Grasslands & Forests	Chpt 4 (cont'd)

10/18	Forest ethnobotany and conservation	Chpt 4 (cont'd)
10/20	Aquatic Pacific island ecosystems: Life in the water and organismal design	READ: Chapter 5 Loban & Shefter
10/21	**LAB 7: Global grain production lab**	**LAB 6 results due**
10/22	Freshwater ecosystems; Mangrove ecosystems	Chpt 5 (cont'd)

10/25	Development and coastal wetlands; Video: "Danger at the Beach"	HWK: What kind of "development" is right?
10/27	Coral reef ecosystems	READ: Chapter 6 Loban & Schefter
10/28	**LAB 8: Properties of a healthy reef**	**LAB 7 problems due** **Field Trip: Waikiki Aquarium**
10/29	Ciguatera and red tides: Risks to the reef and those who depend on it	Chpt 6 (cont'd) **Guest**: John Schmerfeld
---		
11/1	Reef fisheries; Open ocean fisheries	Handouts from the Western Pacific Fisheries Management Council; Chpt 6 (cont'd)
11/3	*Acanthaster*: The crown-of-thorns vs. reefs	Chpt 6 (cont'd)
11/4	**LAB 9: Measuring water toxicity levels using yeast bioasays**	**LAB 8 due** **Bring in a toxin (I will give you some ideas for toxins that are relevant to the real world**

Part IV: Island Biodiversity: Indiginous versus Introduced Species

11/5	Getting to an Island: MacArthur and Wilsons' theory of island biogeography	READ: Chapter 7 Loban & Shefter; Handouts
---		
11/8	Surviving on an Island; Evolution of endemism	Chpt 7 (cont'd)
11/10	Introduced species	READ: Chapter 8 Loban & Shefter
11/11	**V E T E R A N ' S D A Y no class**	
11/12	Endangered species	Chpt 8 (cont'd) HWK: Endangered species information paper
---		
11/15	**E X A M I I**	
11/17	Extinction is the fate of all species; When is extinction okay? When is it not?	READ: D.M. Raup: "Dinosaurs and the Death of Species"; Discussion
11/18	**LAB 10: Dolphin safe tuna and the global fisheries lab**	**LAB 9 write-up due** **Guest Speaker: Karyn Herrmann**

Part V. Living Sustainably on Island Earth

11/19	Human resources: Positive things we bring to the effort to live sustainably: Knowledge, values economics	READ: Chapter 9 Loban & Shefter HWK: Sustainable vs non – sustainable development short research paper
---		
11/22	Resources: renewable vs non-renewable	Chpt 9 (cont'd)
11/23	Naturally occurring living resources; Agricultural resources	Chpt 9 (cont'd)
11/25	**T H A N K S G I V I N G B R E A K no class**	

11/26	**THANKSGIVING BREAK no class**	

11/27	Water resources; Ecotourism and sustainable development; Agenda 21 and examples of sustainable efforts	Chpt 9 (cont'd) **Guest**: Shaklee products representative
11/28	Dealing with waste: sewage	READ: Chapter 10 Loban & Shefter
11/29	**LAB 11: Sand Island Waste Treatment Plant's Water Quality Assessment Laboratory**	**LAB 10 worksheets due; Field trip**
11/30	Solid, hazardous and radioactive waste	Chpt 10 (cont'd)

12/6	Human population growth and solving environmental problems	READ: G. Miller's Chapter 9 in Environmental Science
12/8	Global challenges and their island repercussions	READ: Chapter 11 Loban & Shefter
12/9	**Reports on living sustainably vs living like there is no tomorrow**	**LAB 11 worksheet due** **Presentations! How to live and how not to live!**
12/10	Island solutions and island Earth solutions	READ: E. Wilson's: "The Environmental Ethic"; Discussion, brainstorming, synthesizing

The Final Exam for this class will be from 10:30 – 12:30 in HH202 on Wednesday 12/15.

Environmental Science I
Fall 1999
Course Introduction

Meeting time: lecture: MWF 11:00 – 11:50 am; lab: R 2:00 – 4:50

Instructor:
Dr. Gail Grabowsky Kaaialii ("Dr. Gail" is fine!)
Henry Hall Rm. 16
Phone: 735-4807
E-mail: gailgk@aloha.net

Office Hours:
MWF: 9:30 – 10:30 am
T: 2:00 – 4:00
R: 10:00 – 12:00
F: 1:00 – 4:00

Required Text:
Loban, C. S. and M. Schefter. 1997. Tropical Pacific Island Environments.

Other Readings and Exercises from: (These will be provided to you)
Allen, J.L. editor. 1997. Student Atlas of Environmental Issues. Dushkin/McGraw-Hill, Guilford, CT.
Allen, J.L. editor. 1999. Annual Editions: Environment 99/00. Dushkin/McGraw-Hill, Guilford, CT.
Brown, L. R. et al. Editors. 1998. Vital Signs: The Environmental Trends that are Shaping Our Future. W.W. Norton & Co, New York.
Callicott, J. B. Earth's Insights: A Survey of Ecological Ethics from the Mediterranean Basin to the Australian Outback. University of California Press, Berkeley, CA.
McConnell, R. L. and D.C. Abel. 1999. Environmental Issues: Measuring, Analyzing, Evaluating. Prentice hall, Upper saddle River, NJ.
Moore, J. A. 1993. Science as a Way of Knowing: The Foundations of Modern Biology. Harvard University Press, Cambridge, MA.
Newton, L H. and C.K. Dillingham. 1994. Watersheds: Classic Cases in Environmental Ethics. Wadsworth Publishing Co., Belmont, CA.
Raup, D. M. 1986. The Nemesis Affair: A Story of the Death of Dinosaurs and the Ways of Science. W.W. Norton & Co, New York.
Wilson, E.O. 1992. The Diversity of Life. W. W. Norton and Co., new York.
Wilson, E.O. editor. 1988. Biodiversity. National Academy Press, Washington, DC.

Required Extras:
1. **Lab notebook:** This must be a separate notebook from whatever you use to keep your lecture material from this course in. You will be receiving lots of separate handouts and reading materials for the lab so the notebook should be one that you can easily add materials to. The purpose of the notebook is to provide a place for you to record data, make observations, keep lab protocols, file returned documents, etc. Any scientific notebook should be a place you can return to years and years later and still make sense of! It is a precious record of your work and conclusions AND yours will be graded! The basis of the notebook grading will be explained in class. (Put that explanation somewhere in your notebook!)

2. **Folder for returned written homework:** This course contains a number of short written assignments aimed at getting us to think about and understand: the complexities of environmental issues, the role of culture in creating and solving environmental problems, the purpose and use of science in solving environmental problems and just what we should be striving for – what is the right thing to do when it comes to the environment. All of these, which are simply called "HWK" , for homework, in the syllabus, should be kept in a single place because I have designed the course so that they all go together.
3. **Outdoor "field" clothing:** You'll need to have something to cover your feet that can get wet for two of the labs. If you chose to do service learning with the Nature Conservancy or the research project with Kai Makana you will have to have appropriate shoes and attire: I will announce what these are when the time comes.

Introduction:

Welcome to Environmental Science I. This is the first semester that this particular course is being offered so you are part of a "historic" class of sorts. I really enjoy teaching a class the first time around because it is very exciting and I find that I remember everything that happens and each of you forever! The first time around a class is sort of a work-in-progress. The syllabus has been layed out, all is planned, yet all need not be adhered to. I inevitably plan too much so I will keep you informed of any changes as the course unfolds.

This course is one of two, the second course being (surprise) Environmental Science II. In this first course we will be examining the *biological* aspects of environmental issues. We will use science: its methods and results, to understand the biological aspects of environmental issues. Science however is not undertaken in a vacuum, it is only a tool, a systematic methodology, for determining what may very well be "reality". Formalized scientific method was invented by a particular culture (although peoples all over the world have been doing, among other things, things that are similar to science in order to learn about their world).

There are, in addition to science, other "ways of knowing. " We will discuss these and see how they are useful as well in this course. What I want all of us to realize through this course is that science is NOT a "sacred cow." It is a very very useful tool, but it is not in itself a solution to all our environmental challenges. Even though I am a scientist and thus I obviously very highly value what science can tell us about the world, I, and (most) other scientists fully realize that science is part of culture, that it is done by people and that it can't tell us everything. To solve or consider any environmental problem we need to consider the people involved, their values and beliefs, their economics, their politics, their history, their needs and desires, etc! The science we do only helps us gather information or determine how to behave in order to change a situation for the better, it does not tell us what is right or wrong, what we should or should not do.

Because of the complexity of environmental issues and the fact that science is only one of the players involved in learning about and solving environmental issues, we will have to (get to) touch on those other factors in this science course. I need to have you understand the context in which the science occurs and be sensitive to the importance of the ethics and values of any environmental issue. Thus this course is about the biological aspects of environmental issues and those important factors "external" to the doing an interpreting of environmental science that nevertheless play a crucial role in determining what science should be done and what should be done with the results of that science.

Course Objectives:

Lecture:

When a student completes this course they should:

- **Be aware of the major global and tropical Pacific island environmental challenges**
- **Understand the importance of science and ethics in contributing to environmental problem-solving**
- **Understand how science is done**

- **Understand the basic structure of ecosystems**
- **Understand the basic sorts of interactions between organisms in an ecosystem and the potential roles of those interactions in establishing the structure of the ecosystem**
- **Understand the abiotic factors that play important roles within ecosystems**
- **Be familiar with the basic types of marine, fresh water and terrestrial habitats and the major causes for the distributions of each**
- **Be familiar with tropical Pacific island habitat types**
- **Be familiar with the many potential causes for a species or biome's biogeographical range**
- **Understand what a sustainable ecosystem is and what sustainability means in general**
- **Understand why human population growth occurred and what its future implications are for ourselves and other species**
- **Be familiar with the environmental challenges posed by agriculture and mining: soil erosion, soil contamination, desertification and habitat loss.**
- **Be familiar with the environmental challenges posed by the overdrawing, rerouting, eutrophication and pollution of fresh water**
- **Understand the challenges posed by all sorts of waste disposal**
- **Be familiar with the general effects of hazardous chemicals, air pollution, water/soil loss and pollution on ecosystems**
- **Understand the detrimental effects of introduced species on pristine ecosystems**
- **Understand the general effects of pollutants on human societies and human health**
- **Understand the effects of ecosystem loss and degradation on human societies and human health**
- **Be aware of the various opinions regarding the future role of science and technology in ameliorating environmental degradation and enhancing the quality of human life**

Lab:

When a student completes this course they should:

- **Understand the scientific method and how to apply it to real environmental issues**
- **Understand what descriptive science is and how it is important in environmental biology**
- **Know the basic units used in making scientific measurements**
- **Know and understand the taxonomic hierarchy, systematic biology methodology and the species concept**
- **Know how to identify species and use a dichotomous key**
- **Know how to determine species abundances and distributions**
- **Know how to determine net primary productivity**
- **Know some of the measures used to determine ecological stress**
- **Know how to do toxicity testing**
- **Know how to read topographic and remote imaging maps**
- **Learn the importance of, and how to access and read, the primary scientific literature**
- **Know how to design a scientific experiment aimed at supporting or disproving a particular hypothesis**
- **Know how to prepare a formal laboratory write-up**

Course Competencies:

Once a student has completed this course they should be able to:

☺ Recognize that scientific inquiries into environmental issues are often initiated because of our particular values and that scientific results may, in turn, inform as to what sorts of behaviors are ethical.

- ☺ Clearly communicate the structure, interactions and workings of ecosystems in general.
- ☺ List the major threats to ecosystems in the tropical Pacific posed by man's activities.
- ☺ Explain how threats to ecosystems may effect the quality of human life.
- ☺ Give a scientific explanation for a belief that a particular activity or substance poses a threat to the health of ecosystems and/or ourselves.
- ☺ Explain what is being done or could be done in theory to decrease particular threats to ecosystems and improve human health and quality of life.
- ☺ Integrate their understanding of ecosystems, threats to ecosystems and humans, and potential science-based solutions to environmental challenges in such a way that they are prepared to understand and anticipate future challenges and devise potential solutions -- or avoidance measures -- for those challenges.

Grading:

You will receive a letter grade for both the lecture and the lab portions of this course (if you are enrolled in both). Exams will be as objective as possible although they will contain some essay/short answer questions which tend to be more subjective. For written homework assignments and service learning or service research you will be graded mainly on your *effort* and your *thoughtfulness*. I will explain to all of you how both effort and thoughtfulness should manifest themselves in your work, i.e. what effort looks like for a particular assignment and what thoughtfulness for assignment "x" is, etc. I will give you these explanations as to the specifics of the grading for each assignment when I describe the assignment to you. All assignments are already in the syllabus with the exception of the service learning and service research assignments. I will be explaining these to you in the first week of class and telling you how they can effect your grade.

Your grades in lecture and lab will be based on the following:

Lecture Grade:

Exam I	20%
Exam II	20%
Final Exam	20%
5 HWK Assignments	30%
Participation	10%

Lab Grade:

Lab write-ups, worksheets, problems, papers	80%
Attendance	20%

Some Course Specifics:

Service learning Options:

In this course you will have the opportunity to work in the community and/or in the field and do a variety of environmentally-related activities. These activities may involve teaching others about environmental issues, helping out at environmentally-related events, participating in an environmental research project or helping out "in the field" (as we biologists – which you now are -- like to say) as we try to directly help the environment by restoring native ecosystems. These activities are all "Service Learning" opportunities. They are all fun – experience has taught me this, my students always get a lot out of them. They are all educational in a way that pertains to the course. And they all get you out of doing some of the course homework or count as extra credit!

Service learning activities occur in conjunction with one of three environmental groups or "NGO's": non-governmental organizations. The groups I use for service learning have been carefully chosen by myself because (1) I believe they have a worthy and justifiable environmental mission, (2) they do things that provide opportunities for education for you and (3) they are easy to work with.

These groups are: Kai Makana, The Nature Conservancy of Hawaii, and The Waikiki Aquarium. You will be hearing from members of each of these organizations. I will explain to you the opportunities that each provides for us that you may want to participate in.

Attendance:

While you are expected to make every class, since you are adults now, you are free to miss any class you choose . . . with some consequences should you choose to exercise this option: your grade will suffer! Excused absences will not effect your grade. Excused absences occur when you bring in a doctor's note, a funeral announcement for a family member, etc. Excused absences can occur for: participation in athletic events, death in the family, illness, extreme personal stress, and on rare occasion, an emergency fill-in at your job ("but Dr. Gail they just couldn't find anyone else to do it!"). Unexcused absences occur when you were working, surfing, sleeping, cramming for an exam in another class (which means you need to pay good attention on the day that we discuss time management!), etc. If you are more than 5 minutes late for class you are marked absent.

Unexcused absences from lecture will not effect your grade directly, meaning you simply get marked absent. I have noticed over the years however that missing lecture definitely has an effect on your performance! So do yourself a favor and give yourself an opportunity to do the best you can do by coming to class! Paddling analogy pertaining to this: don't bail water into your boat – come to class!

Unexcused absences from lab have definite material repercussions – you get a zero in that lab! If you are going to have an excused absence remember to bring a note and it is a good idea to call me prior to class and let me know you'll be missing lab.

Classroom Atmosphere:

Guys, I value a very open, yet courteous class atmosphere. Express your ideas! Ask your questions! (The only dumb question is the one in which you ask yourself if you should ask your question!) Respect the thoughts and ideas and opinions of others – really think about what others say. Let them fully express their thoughts and ideas and then you do the same. **The thing I value most from my college days are all the wonderful, valuable, diverse ways of looking at and understanding the world that I was exposed to. Be an open vessel – take ideas in! You will learn as much from each other as you do from me.**

This syllabus and its introduction are living documents: they are free to change. I try to adhere as closely as possible to the syllabus for your convenience, but there will be times in which we will take longer on a particular topic or add or delete a topic to enhance the course. I like to be able to react to you as the course proceeds and go with the flow a bit in order to make the course experience sort of custom fit to you!

You are responsible for all of the information in this document: losing it or not reading it are not excuses for not knowing what's in it!

Environmental Science Questionnaire

This is a non-graded questionnaire which I give you so that I may assess where your interests are regarding the environment and your education at Chaminade, what you expect out of this course and a little bit about you and your background.

Name: _____

Where did you grow up? _____

Year at Chaminade: _____

When are you planning on graduating? _____

What is your major? (If you don't have one yet what are you thinking about majoring in?):

_____

Did you know that Chaminade has a new Environmental Studies Certificate Program? _____

Would you be interested in obtaining material about the Certificate Program? _____

Are you thinking about obtaining the Certificate in Environmental Studies along with your major?

_____

Why did you take this class?

Are you interested in environmental issues? _____
Why or why not?

On a scale of 1 to 10 (10 being of utmost importance) how important do you think the environmental issues facing us today are? _____

What kinds of things are AS important as environmental issues in your opinion?

What kinds of things are MORE important than environmental problems in your opinion?

Do you have any experience with environmental volunteer work, education, etc.

Are you interested in a career in the environment? _____
If yes what specifically? (If you have an idea.)

What one environmental issue do you feel is the most important one facing the planet?

What science classes have you had in college or high school:

What are you hoping this course will teach you?

What are you hoping we will get to do in this course?

Finish this sentence: Good teachers . . .

Finish this sentence: Poor teachers . . .

Any comments, thoughts, questions for me???

Thank you!!!