FD '02

Courtesy NOAA

ENV 201

Environmental Science I & Environmental Science I Laboratory

Fall 2002

Dr. Gail Kaaialii

Syllabus

Human alteration of earth is substantial and growing. Between one-third and one-half of the land surface has been transformed by human action; the carbon dioxide concentration in the atmosphere has increased by nearly 30 percent since the beginning of the Industrial Revolution; more atmospheric nitrogen is fixed by humanity than by all natural terrestrial sources combined; more than half of all accessible surface fresh water is put to use by humanity; and about one-quarter of the bird species on Earth have been driven to extinction.

Peter M. Vitousek et al.
Science 1997

A worldview does not dissolve overnight. Rather, like one of Hutton's mountain ranges, it erodes through long centuries.

Lorien Eisley

Few will have the greatness to bend history itself; but each of us can work to change a small portion of events, and in the total of all those acts will be written the history of this generation.

Robert F. Kennedy

A thing s right if it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong if it tends to do otherwise.

Aldo Leopold

Change your thoughts and you change the world.

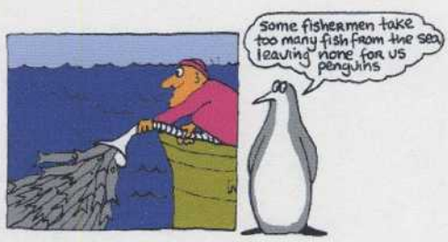
Norman Vincent Peale

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

John Buchan

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 anyone on almost any subject matter.

W. Quine and J. Ullian



Class Schedule

Part I
Knowledge, Ethics & the Environment

DATE	TOPIC	ACTIVITIES
8/27/02	Course introduction & outline; Who we are; Why enviro science? Connectedness with nature	Fill out course roster & survey
8/29	What's happening to our environment in general? What can we do about it in general?	**Read:** "Human domination of Earth's…" (copy provided)
8/30	**Lab: (A)** Safe laboratory practice/chemical hygiene **(B)** Survey of environmental issues that concern us **(C)** Introduction to land we manage in Honouliuli	**Bring in one example of an environmental issue (local or global)** Guest Speaker: Nat Pak
9/3	What is science? How is it done? Why do it?	**Read**: Chapter 1 in your textbook
9/5	Science and indigenous knowledge; Scientific belief and faith belief and the importance of both in environmental problem-solving	**Read**: "The Philosophy of Science"
9/6	**Lab: (A)** Indigenous knowledge	**Bring example of indigenous knowledge;** **(Video:** "Nomads of the Rainforest")
9/10	Introduction to worldviews, origin myths and ecological ethics	**Explain Hypoth Expt Written Project** **Read:** " Forests and Trees…"
9/12	The interplay between science and ecological ethics	**Read:** "Mind in the biosphere; Mind of the biosphere" (copy provided)
9/20	**Lab: (A)** Devise our management plan for Honouliuli – class project **(B)** Scientific systems of measure worksheet	**Indigenous knowledge write-up due!**

Part II
Pristine Nature: Ecology and History

DATE	TOPIC	ACTIVITIES
9/24	The history of life on earth; The needs and characteristics of life	**Read:** "The Creation of Ecosystems…"
9/26	Biodiversity, classification and the connectedness of all organisms	
9/27	**Lab: (A)** Mini value lab **(B)** Survey your own home and ethic **Issue 20:** Global fisheries	**Bring in something to assign "value" to** **St. Louis Hike** **Enviro Issue 20**
10/1	Our current and historical place in nature	
10/3	Pacific peoples and their island homes	**Read:** Chapter 2 in your textbook
10/4	**Lab: (A)** Classification and Diversity lab	
10/8	Principles of ecology: Structure of ecosystems	
10/10	Biotic interactions in ecosystems	
10/11	**Lab: (A)** Initiate pollution experiment	**Bring in a pollutant!** **Hypotheses due!**
10/15	Biotic interactions in ecosystems (continued)	
10/17	E X A M I	

10/18	**Lab: (A)** Observing biotic interactions in the "field"	**Fieldtrip to the Waikiki Aquarium** **Habitat Types Project Explained**
10/22	Abiotic interactions in ecosystems;	**Read:** "We're made out of sunlight"
10/24	Important cycles that renew resources;	**Revised Hypotheses due!**
10/25	**Lab: (A)** Water quality testing **(B)** Collect data from experiments	**Video:** "Clear Water, Cloudy Future"

Part III
Island Ecosystems and Challenges

DATE	TOPIC	ACTIVITIES
10/29	Habitats and Climate	**Read:** Chapter 3 in your textbook
10/31	Terrestrial ecosystems – soil as habitat	**Read:** Chapter 4 in your textbook
11/1	**(A)** Habitat project reports **Issue 15:** Global warming and thermal expansion of sea water	**Habitat Types Oral Presentations** **Do Enviro Issue 15**
11/5	Terrestrial ecosystems: uses and challenges	
11/7	Aquatic ecosystems; life in the water	**Read:** Chapter 5 in your textbook
11/8	**Lab: (A)** Soil analysis **(B)** Collect data from experiments **(C)** Writing up a scientific research paper	**Bring in soil samples to analyze**
(11/8	Last day to withdraw from classes)	
11/12	Aquatic ecosystems: uses and challenges	**Hand out graph worksheet**
11/14	Coral reef ecosystems	**Read:** Chapter 6 in your textbook
11/15	**Lab: (A)** Quantifying habitat variation in the field	**Fieldtrip to Makapu'u** **Hypothetical Experiments due!**
11/19	EXAM II	
11/21	Indigenous island communities; Population change	**Read:** Chapter 7 in your textbook
11/22	**Lab: (A)** Creating a data spreadsheet **(B)** Creating graphs, tables **(C)** Simple statistical analyses of your data **Issue 19:** Coral reef fishes and marine biodiversity	**"Fieldtrip" to the computer lab** **Graph worksheet due** **Do Enviro Issue 19**
11/26	Pest species and endangered species	**Read:** Chapters 8 in your textbook
11/28	THANKSGIVING BREAK	
11/29	THANKSGIVING BREAK	

Part IV
Living Sustainably on Island Earth

DATE	TOPIC	ACTIVITIES
12/3	What is sustainable living? Island resources, indigenous cultures and sustainability	**Read:** Chapter 9 in your textbook
12/5	Challenges posed by living sustainably on islands and elsewhere	**Read:** "Sustainable development: Ten…"
4/26	**Lab:** Sustainable/Non-sustainable living	**Video:** "It Needs Political Decisions" **Term paper due/Fomal Lab due**

The Final Exam for this class will be on Monday, December 9, 2002 from 8:00 – 10:00 in our classroom

Environmental Science I
Fall 2002
Course Introduction

Meeting time: lecture: TR 9:30 – 10:50; lab: F 2:00 – 4:50

Meeting Location: lecture: H 33; lab: H39

Instructor:
Dr. Gail Grabowsky Kaaialii ("Dr. Gail" is fine!)
Behavioral Sciences Bld, rm 107
Phone: 735-4834
E-mail address: gkaaiali@chaminade.edu

Office hours: MWF: 9:00 – 10:30; TR: 2:00-5:00, Or by appointment

Required Text:
Allen, John, H. 1997. Student Atlas of Environmental Issues
Loban, C. S. and M. Schefter. 1997. Tropical Pacific Island Environments. University of Guam Press, Mangilao, Guam.

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. 2000. Annual Editions: Environment 00/01. Dushkin/McGraw-Hill, Guilford, CT.
Brown, L. R. et al. Editors. 2000. Vital Signs: The Environmental Trends that are Shaping Our Future. W.W. Norton & Co, New York.
Carroll, J.E. 1997. The Greening of Faith: God, the Environment and the Good Life. University Press of New England, Hanover, NH.
Ehrlich, Anne, H. 1996. Betrayal of Science and Reason. Island Press, Washington, D.C.
Hartmann, T. 1998. The Last Hours of Ancient Sunlight. Mythical Books, Northfield, VT.
Heinberg, R. 1996. A New Covenant with Nature. The Theosophical Publishing House, Wheaton, IL.
McConnell, R. L. and D.C. Abel. 1999. Environmental Issues: Measuring, Analyzing, Evaluating. Prentice Hall, Upper Saddle River, NJ.
Miller, G.T. 2001. Environmental Science. (Eighth Edition). Brooks Cole Thompson Learning, Pacific Grove, CA.
Orr, D.W. 1994. On Education, Environment, and the Human Prospect
Quine, W.V. and J.S. Ullian. 1970. The Web of Belief. 2nd ed. Randon House, New York.
Soule, M.E and G. Lease. 1995. Reinventing Nature: Response to Postmodern Deconstruction. Island Press.
Underwood, L. 2001. Case Studies in Environmental Science. (Second edition). Harcourt College Publishers, New York.
Union of Concerned Scientists eds. 1993. World Scientists' Warning Briefing Book. Unuion of Concerned Scientists.
Wilson, E.O. editor. 1988. Biodiversity. National Academy Press, Washington, DC.
Wynn, Charles, M. and Arthur W. Wiggins. 1997. The Five Biggest Ideas in Science. John Wiley & Sons, New York.

Introduction:
Welcome to Environmental Science I. I *really* enjoy teaching/facilitating this class because it comes from the heart (and the mind) as I am a scientist and a citizen concerned for the environment. When I say that I am concerned for the environment, I mean I am concerned for the current and future welfare of all the other species we share the planet with as well as for the future welfare of the people alive today and those who will come after us. I feel this class is not simply a course you take in college, it changes the

lives of most who take it as it addresses real-world issues we confront every day (or every time we take a breath of air…). 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".

The formalized scientific method was invented by a particular culture but peoples all over the world have been doing, among other things, things that are similar to science in order to learn about their world. Thus there are other "ways of knowing" in addition to science. We will discuss these and see how they are useful as well in this course.

One thing I want all of us to realize through this course is that science is NOT a "sacred cow." It is a very useful tool, but it is not in itself infallible or a solution to our environmental challenges. Both of these points may take some time to understand and are some of the goals of this course (so don't panic if they don't make sense right now). 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 a human endeavor. Although scientists like to believe that science is completely objective and that the scientist is a completely detached observer, we know that in reality science is subject to the effects of culture, our own mind's ability to perceive/conceive reality, etc. Thus science can neither give us a perfect or complete understanding of reality. In addition, 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, desires, etc! The science we do only helps us gather information about a phenomenon or determine how to behave in order to change a situation for the better, it does not tell us what is better or worse, 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 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.

Required Extras:

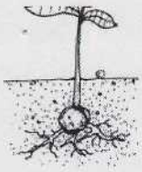
1. **Lab notebook:** This must be a separate notebook from whatever you use to keep your lecture material from this course in. You will be receiving lots of separate handouts and reading materials for the lab so the notebook should be one that you can easily add materials to. The purpose of the notebook is to provide a place for you to record data, make observations, keep lab protocols, file returned documents, etc. It is a precious record of your work. It will be collected periodically by Dr. Gail because I love to see these and I want to help you help yourself to be organized by giving you some incentive to be organized (i.e. a notebook check!).
2. **Outdoor "field" clothing:** You'll need to have something to cover your feet that can get wet and/or muddy. A bottle of mosquito repellant is a good idea too!
3. **Bottled water:** We can't have you getting dehydrated, so keep a bottle of water (*at least* a half liter) handy that you can bring to labs when we are going out "into the field." If you come on a service outing always bring *at least* a liter of water with you.

Course Objectives:

Lecture:

When a you complete this course you should:

- ☺ **Know what science is and how science is done**
- ☺ **Understand the role of science in enabling us to understand environmental phenomena**



- ☺ **Gain an understanding of some of the specific things peoples from other cultures know that allows(ed) them to live with nature**
- ☺ **Understand the role of ethics in allowing us to define environmental problems and solutions**
- ☺ **Know the major global and tropical Pacific island environmental problems**
- ☺ **Be familiar with a number of the potential solutions to global and tropical Pacific island environmental problems**
- ☺ **Know the basic structure and types of marine, fresh water and terrestrial ecosystems**
- ☺ **Understand the basic sorts of interactions between organisms and their environment in an ecosystem**
- ☺ **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**

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 determine species abundance and distributions**
- ☺ **Know some of the measures used to determine ecological stress**
- ☺ **Know how to interpret and create graphs, tables and 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**

Grading:

You will receive a letter grade for both the lecture and the lab portions of this course. Lecture exams will be as objective as possible although they will contain some essay/short answer questions which tend to be more subjective. For oral and written project assignments, laboratory worksheets and service learning you will be graded on your ***effort, correctness*** (when there is a correct response etc.) and your ***thoughtfulness***.

Effort in general manifests itself as neatness, completeness, thoroughness, calories expended per unit time(!), timeliness, correct spelling, any extra creative things you do above-and-beyond what is expected, etc. Correctness means do your statements jive with corresponding scientific knowledge, do your conclusions follow from the evidence before you, did you calculate an equation correctly, interpret a graph accurately, make a table that illustrates your data properly, etc. Thoughtfulness can show up in many ways, perhaps you really think things through, trying to consider all the variables or you worked hard to tie pieces of evidence together, maybe you consider something that may be important that everyone else ignores. By being "thoughtful" I don't mean that you look out for other people (i.e. are kind) I mean that you have done some thinking, really reflected upon a topic, have given it some time, have analyzed it, etc. thoroughly.

All major assignments are already in the syllabus with the exception of the service learning activities and dates which are presented to you in a separate *Service Calendar*.

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

Lecture Grade:

Exam I	20%
Exam II	20%

Final Exam	20%
Habitat Type Oral Project	10%
Service Learning/Term Paper	20%
Pop Quizzes on readings	10% (if given)

Lab Grade:

Lab worksheets, assignments & Issue homeworks	50%
Native Plant Expt/Tidepool Lab Write-Up	30%
Hypoth Expt Written Project	10%
Attendance	10%

Some Course Specifics:

Service Learning Option:

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, designing an environmental research project or helping out "in the field" (as we biologists – which you now are -- like to say) as we try to restore native ecosystems, document the state of particular ecosystems, etc. 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, and they are all educational in a way that pertains to the course. **If you do <u>five</u> service outings (25 hours) then you do not have to do the term paper and you receive an automatic A for that 20% of your lecture grade.**

Service learning activities occur in conjunction with one of a number of 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. Some of these groups are: The Nature Conservancy, The US Fish & Wildlife Service and Reef Check.

Term Paper Option:

The term paper is a 15 – 20 page paper about an issue in conservation biology/environmental science. The paper is due on May 3 (the last day of class). It must have five hardcopy references and three of these must be original scientific research from a peer-reviewed scientific journal. If you choose this option I will help you to find the scientific articles by teaching you how to do a search in the scientific literature.

Extra Credit Options:

Periodically throughout the course there will be talks you may attend that pertain to the course material. I will let you know when these opportunities arise. If you choose to attend you will earn +1.5 extra credit points towards a lecture exam. If you do not wish to partake of the service learning option you may attend service outings and receive extra credit (+3 points per outing). If you do this you'll have to do the course term paper. If you do more than the five required service trips then you'll receive extra credit for those outings you do after your fifth (+3 per trip). You may not do the term paper as extra credit, if you do a term paper it is for the grade (for that 20% of the course).

Attendance:

While I dearly hope that you can make every class…, since you are adults now, you are free to miss any *lecture* class you choose… but **<u>KNOW</u>** that there may be some consequences should you choose to exercise this option: your grade could (and most likely **<u>WILL</u>**) suffer. I believe that students who have missed a lot of classes ALWAYS would have done better if they had not missed classes. There simply is no substitute for being in class when it comes to understanding the material. I can give you a fishing pole, but I cannot make you fish. So do yourself a favor and give yourself the 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!

If you miss a lecture exam or lab your absence must be excused if it is not to *formally* effect your grade. Excused absences occur when you bring in a doctor's note, a funeral announcement for a family member, notice of participation in athletic events, etc. Unexcused absences occur when you were working, surfing, sleeping, cramming for an exam in another class, etc.

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 course schedule are living documents: they are free to change. I try to adhere as closely as possible to them 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! USE IT to keep you organized!!!

Mahalo

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?

_____

Would you like to be part of the new Environment Club at Chaminade? _____

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 . . .