SPRING 2012 EVS 4021
Critical Thinking in Environmental Science, 3 credits

Prerequisites: NE classification, senior standing.
Class Schedule: Tuesdays periods 8 & 9; Thursdays period 8
Black Hall 415
Instructor: Dr. Ignacio Porzecanski
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Science is the great antidote to the poison of enthusiasm and superstition.
Adam Smith, The Wealth of Nations, 1776.

Course Description: Develop critical thinking and communication skills in the practicing environmental scientist; analyze the strengths and limitations of arguments regarding environmental science, policy and management, and practice crafting arguments consistent with the scientific method.

Framing: This is the required capstone course for the major in Environmental Science. The course is about the scholarship of integration. By the senior year, Environmental Science majors have acquired comprehensive knowledge in the science and policy tracks and are ready to explore implications of what has been learned, confront conflicts in classical paradigms, and apply knowledge and skills to real-world and emerging problems. Students adopting this mode of thought will be equipped to deal with a high level of complexity and to continue learning and adapting as they gain experience during further academic study and their work lives.

The course uses well-written books, scientific articles, and non-science sources to examine what we know and how we think about environmental science.

- In science, how can we determine if what we think we know is actually true, and how can we modify our understanding in an orderly way?
- How do scientists develop reliable knowledge?
- Does the reliability of knowledge produced by biophysical science differ from that of social science?
- How can the course of environmental policy be enhanced by social processes that identify facts perceived to be true or outcomes desired by the affected community?
- How do beliefs, personal frames of reference, and theoretical paradigms shape, promote, and inhibit our thinking about environmental issues?
- To what extent do acquired worldviews and systems of belief embody seldom-examined assumptions or lead to preordained conclusions while precluding others?
- How does one ascertain whether proposed policy and technology innovations are based on faulty assumptions from weak (or ignored) science and engineering?
- How does one advance from knowledge to judgment to wisdom?

Specific attention will be given to the contradictions taught in ecology and economics, the differing nature of evidence and claims in biophysical vs. social sciences, major gaps in principles of natural resource management, how insufficient knowledge affects natural resource use, and the quest for sustainability. We’ll not be deterred by dilemmas and will seek promising avenues for resolution.

The substance of the course covers several topics in environmental science:

- The Role of a Scientist
- Water Quality
- Air Quality
Toxicity to Humans
Resource depletion
Social aspects of environmental problems
Environmental policy

Your work with these topics is intellectual fitness training through dialogue: integrating new information, forming or revising conceptual generalizations, facing ideas that challenge prevailing worldviews, applying the scientific method to contemporary problems, distinguishing reliable knowledge from plausible assertions, dealing with uncertainty, fairly assessing the claims and arguments encountered, and developing logical and intellectually responsible arguments within the framework of science.

Course objectives

At the end of this course students will be able to:

1. Understand and discipline your thinking in scientific matters: being better able to clearly formulate questions, evaluate evidence, detect assumptions and gaps in data, notice when evidence is ignored, recognize appropriate support from or excessive reliance on conceptual generalizations (theory), ascertain and acknowledge biases driven by beliefs, worldviews, or preferences, weigh the validity of conclusions based on the strength or weakness of evidence, be more willing to discard positions for which there is little or contrary evidence, assign degrees of likelihood to conclusions you are willing to accept and advocate, and prepared to challenge and refute problematic arguments.
2. Be explicitly aware of the scientific process and how you invoke it in your real-time thinking.
3. Formulate and present strong, logical, science-based arguments and evaluate and discuss arguments made by others.
4. Integrate prior knowledge of how biophysical systems work so as to better understand the constraints and opportunities for natural-resource and environmental management.
5. Better understand the crucial role of social processes, communities, and institutions in effective natural-resource and environmental management.
6. Develop a sense of judgment in the specific science topics covered in the course and, more generally, develop habits of disciplined thinking applicable to other scientific topics.

Procedure and Your Role

Every class meeting: All students will read Required Readings and Supplemental Readings (or Research Assignments) in preparation for class. We will use the Required Readings as text for discussion in class.

Questions and Research: In some instances, students who are presenting may want to ask a question about their reading material to the class. This can happen in advance or after the presentation. In other instances, some students may be asked to research a topic and present about it during the following class.

Grading Determination and Criteria:

Class Participation. 25%. This is a Socratic-method, discussion-based course. Your gain of critical thinking skills will depend on leadership by the day’s presenters who start the discussion and your own engagement
in the dialogue. Attendance and informed discussion are essential; you should do very well if you attend, come prepared, present effectively, and participate positively in class discussion.

Presentations, 25%: Your presentations should probe or extend the subject, or it should reveal some emerging problem or issue that was not obvious earlier. Your presentation will be successful if you address most of these questions:

- What is the nature (structure, context, significance) of the emerging issue you’re presenting?
- What are your key findings and conclusions?
- How do these compare with what’s in the Required Reading—what’s new or surprising to you?
- What is the nature and relative strength of the evidence?
- Do the arguments reference or appear to rely on a well-known body of theory, concept, or idea?
- Do the arguments appear to depend on assumptions, stated or unstated?
- Are the arguments influenced by belief, political philosophy, worldview, or desired outcome?
- What is the nature of key uncertainties?
- What alternative conclusions, controversies, and questions are raised, and what is their basis?

Midterm and Final Essays (50%, 25% each): You will write at least two essays during the semester (in some cases an additional essay may be warranted or convenient). Your assignment is to analyze material presented in the course and search the library and other data sources for a more complete and up-to-date understanding of the subject, the current issues it presents to society, and proposed solutions and their prospects. Each Essay consists of two or three question subjects, and there is usually a degree of choice (selecting 2 of 3 questions posed, for instance). Essays will be computer-screened to check for plagiarism. Criteria for grading papers will be: thesis clearly stated, essay structure clear and easy to follow, well formatted and edited, word usage and grammar correct, written in an engaging and compelling style, concepts presented in your own words, argument factually correct and complete, peer-reviewed articles and other references cited appropriately, essay contains original conclusions, conclusion backed by substantial evidence, and substance of the specific argument. A paper not handed in will receive zero credit; this means that you cannot receive a grade higher than C if you do not complete the paper.

Grading Scale
A 93.4-100 %
A- 90-93.3 %
B+ 86.7-89.9 %
B 83.4-86.6 %
B- 80-83.3 %
C+ 76.7-79.9 %
C 73.4-76.6 %
C- 70-73.3 %
D+ 66.7-69.9 %
D 63.4-66.6 %
D- 60-63.3 %
E <60.0 %

Topic Outline: A class by class schedule is attached separately and a CD with all reading material is provided.

Week 1
Introduction of themes, instructor, students.
On the nature of “evidence”.

Week 2

Week 3
Epidemiology of environmental contaminants
Read and Discuss:

Week 4
Continued from Week 3, read and discuss:

Week 5

Week 6

Week 7
Week 8

Week 9

Week 10

Week 11

Week 12

Week 13

Week 14

Week 15

Final Class:

Academic Honesty, Software Use, Services for Students with Disabilities, UF Counseling Services

The University of Florida requires all members of its community to be honest in all endeavors. Cheating, plagiarism, and other acts diminish the process of learning. When students enroll at UF they commit themselves to honesty and integrity. Your instructor fully expects you to adhere to the academic honesty guidelines you signed when you were admitted to UF.

As a result of completing the registration form at the University of Florida, every student has signed the following statement:
“I understand the University of Florida expects it students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

Furthermore, on work submitted for credit by UF students, the following pledge is either required or implied:
“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”

It is to be assumed all work will be completed independently unless the assignment is defined as group project, in writing by the professor. This policy will be vigorously upheld at all times in this course.

Software Use:
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources
Students experiencing crisis or personal problems that interfere with their general wellbeing are encouraged to utilize the university’s counseling resources. Both the Counseling Center and Student Mental Health provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal or lacking clear career and academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health is located on the second floor of the Student Health Services in the Infirmary.
1. University Counseling Center, 301 Peabody Hall, 392-1575; personal and career counseling: www.counsel.ufl.edu
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling: www.hsc.ufl.edu/shcc/smhs.htm
3. Sexual Assault Recovery Services (SARS), Student Health Care Center,
392-1161, sexual assault counseling; and
4. Career Resource Center, Reitz Union, 392-1601, career development
   Assistance and counseling.

Students with Disabilities Act
   The Dean of Students Office coordinates the needed accommodations of students with disabilities. This includes the registration of disabilities, academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faulty-student disability related issues.