

**EVS 4021 Fall 2020 – ONLINE**

Critical Thinking in Environmental Science, 3 credits

Prerequisites: NTR classification, senior standing.  
**Class Schedule: Tuesdays 8<sup>th</sup> periods**  
**Thursdays 8<sup>th</sup>-9<sup>th</sup> periods**

Instructor: Dr. Ignacio Porzecanski  
 Office Hours: Phelps Lab, Tuesdays and Thursdays 11am-3pm and also by appointment  
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*“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.” Marie Curie*

**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
- Epidemiology of disease and the environment
- Water Quality
- Pollution, contamination
- Climate change
- Resource depletion & patterns of consumption
- 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. Identify and define 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 habits of disciplined thinking applicable to topics in the natural and social sciences.

### Class activities and procedures:

**The class will meet synchronously during Periods assigned above via Zoom. For this reason the course will have different characteristics from the usual group assembled together in a classroom. The following description pertains to the latter case, and we shall endeavor to maintain similar activities and procedures, especially group discussions and assignments online.**

Each class meeting will consist of a presentation by one or more students, or a presentation by the instructor, followed by a discussion in which everyone is encouraged to participate. A reading list will be provided on a weekly basis, and can be mined for suitable material. However, students will be encouraged to select their own reading material, the source of which can be any serious and relevant piece of news, website, or scientific material.

Questions and Research: Students who are presenting should ask one or more questions 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.

**Course etiquette (for Zoom times):** students are required to attend classes from their own computer screens. Please be prepared to be present during the whole class period(s). Please let me know if you have difficulties establishing online links to the class.

### **Grading Determination and Criteria:**

Class Participation & attendance (online), 25%. This is a presentation / 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 and exchange of ideas and opinions. 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.

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

#### 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 %

The weekly thematic content of the course will generally adhere to the following Schedule. This can be slightly modified according to the way interactions with students during class discussions proceed:

#### Week 1

Introduction of themes, instructor, students.  
 On the nature of “evidence” and belief.

#### Week 2

Epidemiology and pollution –a historical perspective. Begin discussion of Conservation Biology issues.  
 Research Topic: IUCN categories of protected areas.

#### Week 3

Read and Discuss effects of air pollution in detail. Urban and rural environments in the developed and developing world.

#### Week 4

Research topic: the “odds ratio” and ideas of risk. Assignment: search and define Type I and Type II statistical errors. Other statistical tools –dose/response curve.

#### Week 5

Is there a role for Cost-Benefit Analysis in environmental, health, and safety regulation?

#### Week 6

Science, politics, and the struggle to save the Chesapeake Bay.

#### Week 7

Discussion of ecosystem management tools.

#### Week 8

Environmental management and economic growth, carrying capacity, sustainability.

#### Week 9

Exercise in EcoJobs -how to write a cover letter when applying for a job.

#### Week 10

Payments for ecosystem services.

#### Week 11

Fisheries

#### Week 12

Water issues, quantity and quality. Virtual water.

#### Week 13

Collaborative governance and adaptive management.

#### Week 14

Environmental policy and trust; social dilemmas and collective memories.

#### Week 15

Focus on Social Capital and the environment.

#### Final Class:

Research on the epistemologies of the natural and the social sciences.

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### Grades and Grade Points

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

Attendance and Make-Up Work Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

### Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals.

Guidance on how to give feedback in a professional and respectful manner is available at:

<https://gatorevals.aa.ufl.edu/students/>.

Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>.

Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

**Academic Honesty** As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, 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 assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code.

Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action.

For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.