

Environmental Sustainability
Professor Mick Womersley

Can global civilization become ecologically sustainable?

You must have heard about climate change? About the “energy crisis?” Have you heard about the “food crisis?” About hunger and poverty in developing nations? About population increase, which will lead to a planet of 9-10 billion humans by 2050? About the supposed relative decline of America as a manufacturing power, and the vast increase in manufacturing in other countries, particularly China, which is leading to a concurrent increase in food and consumer good consumption in that country? About terrorism? The difficult current economy?

How do all these things fit together and work together?

Everything *human* seems to be growing, but we only have one planet to live on. How, given the current strain on the planet’s resources, can we continue to provide clean water for, feed, clothe, and house nearly 10 billion people? Including you and any children you may have one day? And their children?

In other words, how can human systems become *sustainable*? And how can we ensure a sustainable global society enjoys the religious, social, political, and economic freedoms found in western countries today?

Isn’t this a big problem? The sort of problem most educated people will have to wrestle with in their time, as matters get worse, or possibly better? How are you going to be involved? Actively, trying to make things better as you go, or by default as events you might prefer to ignore catch up with you?

Previous generations can attest to the fact that the world’s events do affect individuals, whether the individuals concerned like it or not. The instructor and the college both believe that educated people have a duty to participate in such events and to help plan and build for the future.

This introductory course is designed to give you the basic science and social science information you need to become a literate and active participant in the events of your time. It does this primarily by helping you, and giving you practice, to think critically about humans, human problems and human systems. In particular, we expect that you learn to think critically and quantitatively about complex and interactive systems, like the human sociopolitical system, the agro-ecological system, or the climate system. This is really a class in applied ecology, and “systems thinking” is the basis of ecological science.

Outcomes of the Course:

These are the college-wide liberal learning outcomes that are assigned by the faculty of Unity College to this course. It is expected that graduates of any Unity College degree program will have met these outcomes.

Students that successfully complete IC 3013 Environmental Sustainability will have demonstrated...

1. Broad *understanding* of science by applying key scientific concepts, methods, and dispositions.
2. Broad *understanding* of social science by applying key social scientific concepts, methods, and dispositions.
3. Applied *understanding* of the interconnectedness of human and ecological systems by demonstrating understanding of social and ecological dynamics and applications; and of spatial and temporal scale; and by applying *skills* and information from one discipline to another.
4. A *disposition* to embrace difference through compassion, inclusiveness, openness, and respect for others as necessary within a pluralistic society.
5. The *ability* to reason clearly through thinking originally, reflectively, mathematically, critically, analytically, synthetically, and ethically; and by demonstrating the ability to plan, strategize, and solve problems.
6. A *disposition* to adopt a meaningful life path by demonstrating an inclination to acquire useful life skills and to personal, social and environmental sustainability.

Demonstration that you have met these outcomes will be by examination and by assignment. In particular, the final homework in quantitative modeling and the essay question on the final exam are designed for outcomes assessment.

Course Outline

Following an introduction based on the [Socratic](#) questions in the first section of this syllabus and an explanation of the outcomes above, the course is divided into four modules.

- The first module examines the question: **What are humans anyway?** There's not much point learning about human ecological systems if you don't have at least a working ecological definition of a human. To find out how humans fit into life on earth, we will investigate where they came from, what they are, biologically speaking, what they do ecologically as animals and organisms, and how they developed, and sustain, complex societies.
- The second module examines more closely the question: **What is ecology?** In addition to reviewing the basic concepts, theories and laws of the science of

ecology, particularly its physical basis, we will relate them to questions of human ecological adaptation. Contrary to popular opinion, ecology is a “**hard**” science, a **mathematical** one, and based as much in **chemistry** and **physics** as it is in **biology**. Together, we will begin to explore the nature of ecology, and the significance of unintended consequences resulting from human adaptations to changing ecological conditions.

- The third module provides opportunities to use the intellectual tools you learned in the first parts of the course to examine two of the most important and current human ecological case studies: the scarcity and efficiency of **fossil fuel energy** and its **alternatives**, and related global anthropogenic **climate change**. Together, these problems are creating a third, a global **food crisis**, which we will also examine.
- The final weeks, and assignments, of the class focus on synthesis. One synthetic technique is computer assisted **quantitative ecological modeling**. Using the case studies of the previous modules, I will have amply demonstrated this technique in class. You will demonstrate your learning by applying the technique to a case study of your own. Finally, you will address yourselves personally to the final exam essay question, which appears at the head of this document. Students who can effectively use the intellectual tools learned in this course will be able to provide the more credible, persuasive, and useful answers.

Books and other resources

These are the written and other materials that all students *must* read for this course, and on which the tests are partly based:

- 1) Gerald G. Martin: *Human Ecology: Basic Concepts for Sustainable Development*. Available in the bookstore.
- 2) The course documents available on the Internet at this site: <http://www.unity.edu/facultypages/womersley>, various library reserve materials announced from time to time, as well as handouts and photocopied materials passed out by the instructor each week (save all these for pretest review). I do not use the CAMs system for course reserve. Specific required readings include the report titled “[Maine’s Climate Future](#),” and the scientific paper by Judith Lean and David Rind titled “[How will Earth's surface temperature change in future decades?](#)”, but there may be others depending on where our conversation takes us. In addition, I read the science and economic news broadly and post links to interesting articles, videos and ideas on my blog at <http://www.uc sustainability.blogspot.com>
- 3) A serious international newspaper, radio news broadcast, or a TV news program. (There are many choices. You could choose any, it doesn’t matter, as long as regional and international environmental news are objectively covered on a daily basis). The Quimby Library has a good selection of newspapers. The New York Times is available on the Internet, and recommended. I also recommend the

[BBC](#), available on the short wave, the Internet, or at 5am and 3pm each day on [Maine Public Radio](#) 90.9 FM. If something big happens in the world to do with sustainability, and we talk about it in class, it is “fair game” for examinations, whether you were attending class that day or not.

Procedures and Grading

Consultation with Instructor: My office is easily located on the second floor of Activities, in the small corridor to the left of the main one. My email address is easy to remember (mwomersley@unity.edu). I am very easy to find just before or after class in the classroom. I growl occasionally, but do not bite. If you are worried about anything at all, please come see me. One-on-one office consultations in particular can be an important part of your academic life. To avoid them is to miss out on part of the service you are paying for at Unity College.

Attendance and Participation: As an active learning class, your regular attendance is expected. A portion of your final grade will be based on the regularity and quality of your participation in class activities, as well as for other special efforts in aid of collaborative learning.

Academic Dishonesty: includes plagiarism, cheating, and other actions in violation of the Unity College Honor Code (see Student Handbook for details). Students found to be intentionally engaging in academic dishonesty in this course will receive an “F” (no credit) for the particular assignment, and no higher than a “D” for the course grade, assuming the first attempt to cheat is the last. There will be no second attempts. These consequences will only be entered permanently in your grade record after you have an opportunity to consult with me about the specific dishonest act.

Final Grading: A final course grade of “A” requires 90+ points; “B” requires 80+ points; “C” requires 70+ points; and “D” requires 60+ points. Points will be accumulated as follows:

3 Exams (2 exams plus final):	80 Points
Ecological modeling problem:	10 points
Participation/collaboration:	10 points
Total	100 points