

Globalization and Sustainability

Technology and Social Change 220

Spring 2015

1140 Howe Hall

MWF 11:00-11:50

Primary Learning Outcomes

Upon the completion of this course, students will be able to do the following.

- Develop a model/framework to that enables them to understand, communicate, and apply sustainability concepts.
- Articulate objectives for human flourishing into order to develop metrics for measuring the outcomes of alternative sustainability policies.
- Identify the primary constraints for sustainable human flourishing and use them along with various objectives to create a narrative for analyzing sustainability issues.

Required Texts



Mitchell, W. J. , Chris E Borroni-Bird, and Lawrence D Burns (2010). *Reinventing the automobile: Personal urban mobility for the 21st century*. MIT Press.

Instructional Team

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Course (Catalog) Description

An introduction to understanding the key global issues in sustainability. Focuses on interconnected roles of energy, materials, human resources, economics, and technology in building and maintaining sustainable systems. Applications discussed will include challenges in both the developed and developing world and will examine the role of technology in a resource constrained world. Cannot be used for technical elective credit in any engineering department.

Approach to Sustainability

The course is designed to help students develop a model/framework that will enable them to understand, communicate, and apply sustainability concepts. The instructor will introduce and utilize a systems based approach to sustainability and focus on the question “where do you draw the box.” That is, what are the constraints that limit the ability of a system to more or less reproduce or maintain itself over time without significant external injections of resources?

While sustainability refers to the ability of a system to maintain itself over time, we say that a system is resilient if its functionality is maintained when it is perturbed, or the elements needed to renew or reorganize it can be maintained if a large perturbation radically alters its structure and function.

The course will focus on the sustainability of complex systems involving social, economic, and environmental subsystems. The primary constraints on the system can be divided into three broad categories: technology, economics, and existing paradigms.

- **Technology**—Technology describes the processes that allow the conversion of inputs or resources (things we use) into outputs (things we want). Embedded in technologies are design attributes, physical laws and limits, costs, depreciation, and the extent of lock-in. Here lock-in is defined as the inability of a producer, a consumer or society to move from one solution/state to another without extremely large transition costs.
- **Economics**—Economics describes how individuals and societies choose to employ scarce resources that could have alternative uses to produce goods and services, and distribute them among various individuals and groups in society in such a way that the society maintains itself over time. Economic sustainability refers to the ability of an economic system to produce a constant or increasing standard of living over time.
- **Paradigms**— A paradigm is a set of practices that define a discipline, community of thought, or approach to problem solving at

any particular period of time. In a scientific community, paradigms “are the source of the methods, problem-field, and standards of solution accepted by any mature scientific community at any given time.” Paradigms are heavily influenced by attitudes and past practices. In many cases, received paradigms limit our ability to envision or design alternatives to current systems.

Course Structure

This course will be a 15-week class, composed of three primary sections each containing three to six learning modules. The first section comprises an introduction, material on economics and resources, justice, and a framework for sustainability. The second section considers energy and transportation, two the sectors most frequently discussed in terms of sustainability. The third section analyses industrial society, materials, climate change, and communities.

Modules will typically consist of two to five lectures. Each module will focus on a topic related to global sustainability. These topics include among others: introduction to sustainability; technology, systems, and constraints; economic concepts for sustainability including public goods, externalities, and discounting; natural and common pool resources; justice, equity, and future generations; paradigms, transformative change, and a decision framework; renewable natural resources such as water and land; energy, personal transportation, sustainability in an industrial economy; the materials cycle, climate change, the third industrial revolution, and villages and communities.

Each of the three main sections include the following.

- **Introduction**—An introduction to and an overview of the section along with a discussion of why it matters in relation to global sustainability. This may involve a specific case study, or a series of “items from the news” or something else.
- **Paradigms**—What are the needs/wants of consumers/producers/society in relation to this topic area? What are the current paradigms in this area? For example, what are the current paradigms for meeting the

transportation needs of individuals? How well are our needs being met within the current paradigm?

- **Constraints**—What are the constraints that must be considered in meeting our needs/wants? What are the natural and human resources available to these needs/wants? Are these resources renewable or non-renewable? What technologies are used today to meet these needs? What alternative technologies are available? What are the economic, social and institutional structures that constrain the solutions? Can these structures be modified to alter the constraints?
- **Theory**—What are the underlying scientific principles what can be used to understand, model, and address these issues? What are the key concepts that must be understood in order to propose alternative paradigms that make environmental, economic and social sense? What are common pitfalls in addressing these issues?
- **Transformative change**—Although small changes can have a positive effect on sustainability, the magnitude of the challenges before us requires transformative change. Transformative change is distinguished by radical breakthroughs in paradigms, beliefs and behavior. For example, a product that reduced our household energy by a factor of ten would fundamentally transform the way we use and think of energy; that is, we would have a new “DNA” for household energy.

Course Procedures

This course will be delivered face to face in 1140 Howe Hall. Lecture notes, readings and other materials will be provided through Blackboard Learn. Students will use their ISU Net-id to log in to the course page, where weekly required readings, videos, and other materials will be posted.

Course Expectations

1. **Exams:** There will be **three exams**, one after each of the three main sections. There will be no overall comprehensive final examination. The examination over the third section will

be given during finals week. The exams will consist of multiple-choice questions, matching and fill-in-the-blank questions, and will pertain to material from the textbook, lectures, lecture notes, lecture videos, and readings. Each examination will be worth 100 points. Tests will be given at an ISU Testing Center and will be closed book and closed note.

2. **Homework:** There will be 12 homework assignments. Scores on the best ten of them will count. Each assignment will be worth 20 points for a possible total of 200 points. The format of the homework assignments will differ depending on the material covered in a given week. Some questions will test comprehension of concepts covered in the lectures or readings, others the ability to formulate and solve numerical problems, some the ability to design optimal policies and so on.
3. Homework assignments will be administered and graded through Blackboard Learn. **Deadlines & Make-Up Assignments:** Deadlines are firm and will **NOT** be extended unless there are extenuating circumstances.

Grade Distribution

Exams	3 x 100	= 300
Homework	10 x 20	= 200
Total Points Possible		= 500

Grading Scale

92-100	A
88-91.99	A-
86-87.99	B+
82-85.99	B
78-81.99	B-
76-77.99	C+
72-75.99	C
68-71.99	C-
66-67.99	D+
62-65.99	D
58-61.99	D-
Below 58	F

If you want to calculate your approximate grade, divide earned points by total possible points

and multiply by 100. Look at the grading scale above to convert your percentage to a letter grade.

Academic Misconduct

All acts of dishonesty in any work constitute academic misconduct. The Student Disciplinary Regulations (<http://policy.iastate.edu/policy/SDR>) will be followed in the event of academic misconduct. Depending on the act, a student could receive an F grade on the test/assignment, F grade for the course, and could be suspended or expelled from the University. Academic misconduct includes all acts of dishonesty in any academically related matter and any knowing attempt to help another student commit an act of academic dishonesty. Academic dishonesty includes, but is not limited to each of the following acts when performed in any type of academic or academically related matter, exercise, or activity:

Plagiarism: Plagiarism is the act of representing directly or indirectly another person's work as your own. It can involve presenting someone's speech, wholly or partially, as your; quoting without acknowledging the true source of the quoted material; copying and handing in another person's work with your name on it; and similar infractions. Even indirect quotations, paraphrasing, etc., can be considered plagiarism unless sources are properly cited. Plagiarism will not be tolerated, and students could receive an F grade on the test/assignment or an F grade for the course. The Iowa State University policy for academic misconduct can be found in the Student Disciplinary Regulations.

Obtaining Unauthorized Information: Information is obtained dishonestly, for example, by copying graded homework assignments from another student, by working with another student on a take-home test or homework when not specifically permitted to do so by the instructor, or by looking at your notes or other written work during an examination when not specifically permitted to do so.

Tendering of Information: Students may not give or sell their work to another person who plans to submit it as his or her own work. This includes giving their work to another student to be copied, giving someone answers to exam question during the exam, taking an exam and discussing its contents with students who will be taking the same exam, or giving or selling a term paper to another student.

Misrepresentation: Students misrepresent their work by handing in the work of someone else. The following are examples: purchasing a paper from a term paper service; reproducing another person's paper (even with modifications) and submitting it as their own; having another student do their computer program or having someone else take their exam.

Bribery: Offering money or any item or service to a faculty member or any other person to gain academic advantage for yourself or someone else constitutes dishonesty.

Special Accommodations

Please address any special needs or special accommodations with your instructor the first day of class or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) from the Disability Resources Office.

Student Disability Resources

1076 Student Services Building

Ames, IA 50011-2222

Phone: 515 294-7220

Fax: 515 294-2397

TTY: 515 294-6635

E-mail: disabilityresources@iastate.edu

Website: <http://www.dso.iastate.edu/dr/>