

**Globalization and Sustainability
Technology and Social Change 220
Spring 2014**

**1140 Howe Hall
MWF 11:00–11:50**

Catalog Description

T SC 220. Globalization and Sustainability. (Cross-listed with ANTHR, ENV S, GLOBE, MAT E, M E, SOC) (3-0) Cr. 3. 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.

Graduation Messages: Cannot be used for technical elective credit in any engineering department.

Primary Learning Objective

Students will develop a model/framework to that enables them to understand, communicate, and apply sustainability concepts.

Instructional Team

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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 instructors 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.

1. 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.
2. 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.
3. Paradigms—A paradigm is a set of practices that define a discipline, practice, or community of thought 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.

A primary goal of the course is to enable the students to identify these limits/constraints and develop a narrative that can then be used to examine sustainability.

Overview of the Course

The class will be composed of a three-week introduction, followed by five two-week sections, each focused on a topic in global sustainability, and a final two-week section that will confront the students with the need to challenge the dominant paradigms that limit our progress towards a sustainable society.

1 Introduction

2 Personal Transportation

3 Energy

4 Water and land

5 Villages and communities

6 Stuff

7 Emergence

A more detailed course schedule is provided on Blackboard and will be updated on a regular basis. The schedule includes the general topics for each lecture and the timing of class presentations.

Course Format

The five main two-week sections of the course will each consist of six class periods, five which will be instructor lead discussions with the sixth consisting of student presentations. Examples of topics to be discussed in each two week section include the following.

1. **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.
2. **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?
3. **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.
4. **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?
5. **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.

Student Assessment

Students will be evaluated on four components.

1. Eight objective quizzes given via Blackboard. Each quiz will be worth 25 points for a total of 200 points on quizzes. The quizzes will be assigned at regular intervals during the semester. Students will normally have a 2–3 day window to complete the quiz from the time it is available.

Quiz Schedule

Quiz Number	Available Dates on Blackboard
1	Tuesday 21 January at 9:00 until Friday 23 January at 13:00.
2	Wednesday 29 January at 13:00 until Friday 31 January at 11:00.
3	Wednesday 12 February at 13:00 until Friday 14 February at 11:00.
4	Wednesday 26 February at 13:00 until Friday 28 February at 11:00.
5	Wednesday 12 March at 13:00 until Friday 14 March at 11:00.
6	Wednesday 2 April at 13:00 until Friday 4 April at 11:00.
7	Wednesday 16 April at 13:00 until Friday 18 April at 11:00.
8	Wednesday 30 April at 13:00 until Friday 2 May at 15:00.

2. Three one hour in-term tests given at the Testing Center. Each will be worth 100 points for a total of 300 points on tests. Students will typically have a 2–3 day window in which to take each test.

Test Schedule

Test Number	Available Dates at Testing Center
1	Monday 10 Feb at 8:00 until Thursday 13 February at 13:00.
2	Monday 10 Mar at 8:00 until Thursday 13 Mar at 13:00.
3	Monday 14 Apr at 8:00 until Thursday 17 April at 13:00.

3. A final examination given partly in class and partly at the Testing Center. This will be worth 200 points.

Final Examination Schedule

Test Number	Available Dates
Testing Center	Monday 5 May at 8:00 until Thursday 8 May at 13:00.
In-class	Tuesday 6 May from 9:45–11:45.

4. Group Presentations

Much of the learning in this course will come from group presentations and discussions. The class will be divided into groups of four individuals by the beginning of the second week of class. Each group will be responsible to prepare two class presentations, each of which will be worth 50 points. This gives 100 total points for class presentations. Assignments of topics to groups will take place by the beginning of the third week of class.

The group presentation will consist of three parts: i) a 250 word written summary, ii) eight presentation slides, and iii) a presentation to the class. The grade will be assigned based

on the first two items. Only a small number of randomly selected groups will make class presentations.

The grade will be based on how well the written summary and the eight slides satisfy the following rubric.

Grading Rubric for Presentations

Item	Criteria	Points
1	Identification of a specific important problem (something that needs to be solved or where the current solution needs to be improved) in sustainability related to the assigned topic. This includes the statement of an objective to be attained.	10 pts
2	Identification of the current paradigms for solving this problem. Identification of the resource, policy, technical, human, and economic constraints to solving the problem.	10 pts
3	An outline of one or possibly two solutions for the chosen problem.	10 pts
4	A careful analysis of how the preferred solution meets the objective taking into account the constraints in item 2.	10 pts
5	Overall professionalism of presentation (organization, clarity of text and graphics, visual impact, “money slide”, take home message)	10 pts
	Total	50 pts

Presentation Schedule

Topic	Presentation Date
Personal Transportation	Friday 14 February
Energy	Friday 28 February
Water and land	Friday 14 March
Villages and communities	Friday 4 April
Stuff	Friday 18 April

Overall Grading Summary

Criteria	Points
Quizzes	200 pts
Tests	300 pts
Final Exam	200 pts
Two class presentations	100 pts
Total	800 pts

Course Policies

1. Plagiarism is unacceptable. You will receive a zero score on any assignment in which plagiarism is detected. A second occurrence of plagiarism will result in a failing grade for the course.

2. Students are expected to take tests, examinations, and quizzes during the times and days on which they are scheduled.
3. Any student who feels s/he may need an accommodation based on the impact of a disability should contact one of us privately to discuss your specific needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from the Disability Resources (DR) office (phone 515-294-7220). DR is located on the main floor of the Student Services Building, Room 1076.
4. Iowa State University does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, gender identity, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Director of Equal Opportunity and Diversity, 3280 Beardshear Hall, (515) 294-7612.