

PSCI 378 – Energy and the Environment

Instructor: Dr. Steve Lindaas lindaas@mnstate.edu
 Office: 307 G Hagen (218) 477-4268
 Office Hours: See information on-line at <http://www.mnstate.edu/lindaas>

Official Course Description: This course will examine the relationships between civilization, society and energy use. This will be accomplished by examining current and possible future energy sources as developed through the sciences of physics and chemistry and their applied technologies. It will then examine the applications of current sources and their affects by and on society and world ecosystems. Finally the course will examine how societies change and adapt, and look at possible steps to a sustainable energy and environmental future. (MNTC Goal 10, LASC 10, 3)

Prerequisites:

This course makes use of some algebra and statistics to quantify physics concepts. You will be fine if you have completed your LASC 4 mathematics requirement. If you have questions about the mathematical rigor expected this semester, please see the instructor.

Required Texts:

- ❑ **Sustainable Energy – Without the Hot Air**, David JC MacKay, UIT Cambridge Ltd.(2009)
 Available in the bookstore and downloadable as PDF from <http://www.withouthotair.com>.
- ❑ **Plan B 4.0: Mobilizing to Save Civilization**, Lester R. Brown, Earth Policy Institute.
 Available in the bookstore and downloadable as PDF from <http://www.earth-policy.org/books/pb4>
- ❑ Supplemental Material provided on-line

Evaluation: Each component of the course counts as follows –

Homework/Papers	Participation	Tests / Quizzes	Course Projects
30%	10%	30%	30%

Grades will be assigned on the absolute scale (right); plusses and minuses will be used for the top and bottom quarter of each bracket.

A	B	C	D	F
100-90%	89-80%	79-70%	69-60%	< 60%

Course Web Site: [D2L Brightspace](http://web.mnstate.edu/lindaas/) with general information at <http://web.mnstate.edu/lindaas/>
 This course makes use of the internet to distribute course materials (homework, solutions, etc.). If you anticipate having difficulty accessing the internet, please see instructor

Special Accommodations: Minnesota State University Moorhead is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you have, or think you may have, a disability (e.g. mental health, attentional, learning, chronic health, sensory or physical) please contact the DRC at (218) 477-4318 (V) or (800)627.3529 or 711 (MRS/TTY) to schedule an appointment for an intake.
- Additional information is available on the DRC website: <http://www.mnstate.edu/disability/>
- If you are registered with the DRC and have a current Accommodation Letter, please schedule an appointment to visit with me, during my office hours, to discuss implementation of your accommodations.

OUTLINE OF MAJOR CONTENT AREAS

- Energy Conservation: Energy may be transformed but it is always conserved. Typically energy is transformed into less useful forms. How do you create, store and use energy?
- Three Laws of Thermodynamics: The laws of thermodynamics determine fundamental processes limiting the efficiencies of engines. How do heat engines and steam engines work? What is maximum efficiency of an engine?
- Environmental Justice: What are the benefits and consequences of various energy sources? Is there a way to supply the energy required for our culture sustainably? How do different energy sources affect ecosystems?
- Historical Context: How have past cultures failed or survived based on their energy use and environmental stewardship? How have cultures changed and adapted to new paradigms?

LEARNING OUTCOMES (General)

- Understand science as a human endeavor, the nature of scientific knowledge, and the historical perspective of scientific argument.
- Know and apply the understandings and abilities of scientific inquiry to identify questions and concepts that can be explored. Evaluate scientific investigations; compare the use of multiple types of inquiry for answering questions; evaluate alternative explanations and models based on evidence, current scientific understanding, and logic; and communicate and defend a scientific argument.
- Use scientific understandings and abilities when making decisions about personal and societal issues.
- Know and apply the fundamental concepts and principles of physics concerning energy conservation and thermodynamics and be able to apply these concepts to address issues of human sustainability.

Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 10 – People and the Environment

- Explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems.
- Discern patterns and interrelationships of bio-physical and socio-cultural systems.
- Describe the basic institutional arrangements (social, legal, political, economic, religious) that are evolving to deal with environmental and natural resource challenges.
- Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.
- Propose and assess alternative solutions to environmental problems.
- Articulate and defend the actions they would take on various environmental issues.

Goal 03 - Natural Science

- Demonstrate understanding of scientific theories.
- Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
- Communicate their experimental findings, analyses, and interpretations both orally and in writing.
- Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

- ❑ **Homework and Papers:** Homework will be a mixture of problems and reflection papers in response to readings. You are free (even encouraged) to collaborate; however, work turned in should be your own. All the problems may be graded or a subset will be graded and completeness checked. You will also be assigned topics to write a reflection or defend a position. More details will be given for each assignment. Homework that is turned in on time will be graded promptly.
- ❑ **Participation (Discussions):** This course makes use of class discussions and group projects and hence participation/attendance is expected. Please note that quality is more important than quantity of participation. Background reading is expected prior to participating in discussions.
- ❑ **Quizzes:** Periodically throughout the semester quizzes will be given. These quizzes will focus on homework, readings and class activities (including demos and discussions). Late quizzes are not generally given.
- ❑ **Tests:** Exams will consist of several questions similar to homework problems as well as questions based on class discussions. Partial credit will be given, but only if what you have written is logical and well organized. Make up exams will be given only in cases of documented emergencies.
- ❑ **Projects:** You will be working in small teams on integrated course projects. The completed project will be shared with your peers and possibly the wider community.
- ❑ **Presentations:** You will share with the class your project results. Presentations are short summaries (10 minutes) that you and your team will create. You may choose to emphasize a particular area.
- ❑ **Academic Honesty:** Your education is only as good as your integrity. If you have any questions as to what is acceptable behavior see the instructor or review the MSUM Student Academic Policy in the Student Handbook: <http://www.mnstate.edu/s handbook/> (under Student Policy Info).
- ❑ **Universal Excuse Form (UEF):** Life happens – use this form to propose a solution – preferably prior to anticipated problems.

Class Schedule:

Monday, Wednesday and Friday	2:00 to 2:50 pm	Hagen 325
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Sexual Violence: Acts of sexual violence are intolerable. MSUM expects all members of the campus community to act in a manner that does not infringe on the rights of others. We are committed to eliminating all acts of sexual violence.

MSUM faculty and staff are concerned about the well-being and development of our students. We are obligated to share information with the MSUM Title IX Coordinator in certain situations to help ensure that the students' safety and welfare is being addressed, consistent with the requirements of the law. These disclosures include but are not limited to reports of sexual assault, relationship violence, and stalking.

If you have experienced or know someone who has experienced sexual violence, services and resources are available. You may also choose to file a report. For further information, contact Lynn Peterson, Coordinator of Sexual Assault Services at Hendrix Clinic and Counseling Center, 218-477-2211, or Ashley Atteberry, Title IX Coordinator in Owens Hall 208 (218-477-2174; ashley.atteberry@mnstate.edu). Additional information is available at: www.mnstate.edu/titleix