

PSCI 378 – Energy and the Environment

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 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, 3)

Prerequisites: This course makes use of some algebra and statistics to quantify 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: Available in the bookstore

- ❑ **Sustainable Energy – without the hot air**, David JC MacKay, UIT Cambridge Ltd (2009) ISBN 0954452933 – Downloadable as PDF from <http://www.withouthotair.com>.
- ❑ **Plan B 4.0: Mobilizing to Save Civilization**, Lester R. Brown, Earth Policy Institute (2010) ISBN 0393337197 – Downloadable as PDF from <http://www.earth-policy.org/books/pb4>
- ❑ **Coal: A Human History**, Barbara Freese, Perseus Publishing (2016) ISBN 0465057934
- ❑ Supplemental Material provided on-line

Evaluation: Each component of the course counts as follows –

Participation and Reading	Activities	Project Work	Project Papers	Project Presentations	Tests and Quizzes
20%	20%	20%	20%	10%	10%

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%

Class Schedule: MWF from 2:00 to 2:50 pm in Hagen Hall room 325

Online Course Tools: [D2L Brightspace](#) is used to distribute, collect and grade materials with group reading discussions managed using [Perusall](#) (access code **LINDAAS-A3M4M**). General information is available at <http://web.mnstate.edu/lindaas/>.

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.

- ❑ **Participation and Reading (Discussions):** This course makes use of class discussions and group projects and hence participation and attendance is expected. Please note that quality is more important than quantity of participation. To be an effective participant you need to complete background readings prior to scheduled class discussions. We will be using [Perusall](https://perusall.com) to facilitate online peer discussion (access code LINDAAS-A3M4M). <https://perusall.com>
- ❑ **Activities:** The hands-on activities are for you to explore, experiment and gain experience with course concepts. You will typically work in small groups on activities.
- ❑ **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.
 - **Work:** Assignments will be a mixture of problems – typically utilizing the texts. You are free (even encouraged) to collaborate; however, work turned in should be your own. All or a subset of the problems will be graded and completeness checked.
 - **Papers:** You will be assigned reflection papers in response to readings. You will also submit individual reflection and summaries of your project.
 - **Presentations:** Presentations are short summaries (10 minutes) that you and your team will create. You may choose to emphasize a subset of your entire project.
- ❑ **Quizzes and Tests:** Periodically throughout the semester quizzes and exams will be given. These assessments will focus on assignments, readings and class activities (including demos and discussions). Partial credit will be given, but only if what you have written is logical and well organized. Make up quizzes and exams will be given only in cases of documented emergencies.
- ❑ **Universal Excuse Form (UEF):** Late work is generally not accepted. However life happens – use this form to propose a solution – preferably prior to anticipated problems. The UEF initiates a discussion between you and the course instructor that will hopefully result in an acceptable plan.
- ❑ **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/sthandbook/> (under Student Policy Info).

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, Title IX Coordinator, petrsnly@mnstate.edu; 218-477-2967, or Ashley Atteberry, Director of Student Conduct & Resolution; ashley.atteberry@mnstate.edu, 218-477-2174; both located in Flora Frick 153. Additional information is available at: www.mnstate.edu/titleix