1-2015

NRGY 101.01: Introduction to Sustainable Energy

Bradley E. Layton
University of Montana - Missoula, bradley.layton@umontana.edu

Marc D. Olson
University of Montana - Missoula

Missoula College
THE UNIVERSITY OF MONTANA
Marc Olson marc.olson@umontana.edu

Introduction to Energy Systems I

Course Number:	NRGY 101
Credits:	3
Meeting times:	Monday and Wednesdays, 2:00-3:30/pm
Instructor:	Marc Olson marc.olson@umontana.edu
Office Hours:	Tue and Thu 2:30-4/p, Griz House 8 (Available at other times, email to schedule)
Pre-/Co-requisites:	M090 or equivalent
Final Exam:	TBD finals week (F2F by request)

Course Description

NRGY 101 Introduction to Energy Systems I is a survey of traditional energy systems and technologies. The course introduces conventional primary energy sources—coal, oil, gas, nuclear—and examines the technologies used to capture, convert, distribute, store, and utilize these energy sources. Consideration is given to the physical and engineering aspects, as well as economic, social, environmental, and political factors that affect the sustainability of these sources.

Course Overview

Introduction to Energy Systems I is the first of a two-part course. It provides students with a comprehensive look at the history and nature of energy production and consumption. Consideration is given to the primary sources of the earth's energy supplies and their ability to sustain the increasing rate of consumption with current and emergent technologies. The various forms of conventional energy sources and the services derived from their use are discussed in considerable detail.

This course also addresses the invention and improvement of devices and machines that convert free energy into heat, light, and motive power. Of special interest are the inventions that enable the generation, distribution, and use of electricity. Costs, benefits, and sustainability of each type of conventional primary energy source and its associated technologies are evaluated.

Introduction to Energy Systems I provides students with a working quantitative mathematical knowledge of fundamental energy laws and principles and their associated technologies. It prepares students for the study of inexhaustible energy systems such as those that harvest solar, wind, geothermal, microhydro, tidal and wave power. Students also examine systems that rely on renewable energy sources such as biofuels and related technologies which are examined in more depth in Introduction to Energy Systems II. Both courses address physical and technical aspects as well as issues of sustainability, environment, economics (including feasibility studies) and society.

Marc Olson marc.olson@umontana.edu

Course Objectives

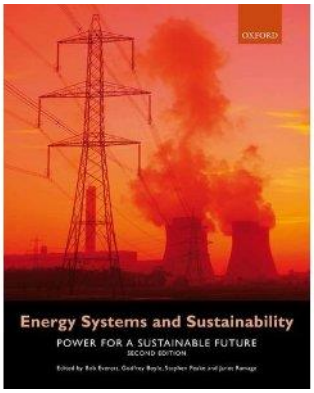
Upon completion of this course, the student will be able to:

- Understand the importance of energy in our current technological society;
- Understand the physical and technical aspects of energy and energy supply/demand systems;
- Identify the technologies, their key elements and basic principles, that we use to capture, convert, store, and distribute energy;
- Identify factors that contribute to the economic viability of energy generation, and evaluate the efficacy of conservation and efficiency measures;
- Discuss the problem of sustainability in the context of energy and identify technical and social barriers and solutions to energy use;
- Assess the costs and benefits associated with different energy sources and technologies;
- Perform basic energy-related calculations;
- Undertake first-order economic analyses of an energy project, taking into account the effect of such factors as discount rates and project lifetimes;
- Develop a strong practical and theoretical knowledge of the full suite of conventional energy systems and apply that knowledge to real world situations;
- Possess improved written communication and problem-solving skills.

Required Texts

Boyle, Godfrey, B. Everett, and J. Ramage, eds. *Energy Systems and Sustainability: Power for a Sustainable Future 2nd Ed*. Oxford University Press in association with The Open University, 2012. ISBN: **978-0199593743**

Note: The textbook comes bundled with Boyle, Godfrey, ed. *Renewable Energy: Power for a Sustainable Future*. Oxford University Press in association with The Open University, 2004. ISBN: 0199261784. This book will be used in Introduction to Energy Systems II. The "bundled" set can be purchased for a substantial discount; ISBN: 9780195370744.



Marc Olson marc.olson@umontana.edu

Assessment/Grading Policies

Grades are based upon successful completion of the following:

Exams (7)	35%
Assignments (5)	30%
Summaries (5)	25%
Participation/Attendance/Summary responses	10%

Grade scale

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

Homework/Exams/Summaries/Participation

Homework consists of summaries and assignments. It is the **student's responsibility** to check for schedule updates at least semi-weekly. Reading of the text is not regularly assigned but expected prior to the associated lecture. Lecture topics are announced in advance.

Exams consist of seven unit/chapter exams. Please consult the Exam Folder in the Course Information module for detailed information on taking exams. Exams typically open after the Wednesday class of the associated week and close before the next Monday class. There are no make-up exams without prior approval. If you foresee missing an exam because of a scheduling conflict or due to illness, **you must notify** the instructor in advance to seek permission to arrange for an alternative time to take the exam. Students must complete exams independently practicing academic honesty. The final exam is optional and is cumulative and replaces the previous lowest exam grade.

Summaries require your written analysis of an assigned topic. Including data and/or facts will strengthen your summary. Instructions are explained in the Guidelines and Expectations for NRGY 101 Summaries shown in the introductory portion of Moodle. Submit a preliminary draft of your summary to the Forum link for discussion and respond to at least two of your classmates' summaries for class participation credit. Submit your final summary to the Summary Submit link for grading.

Assignments (Problem Sets) involve step-wise problem solving. Consult the Guidelines and Expectations for Problem Sets given in the introductory portion of Moodle. *Show your work and include all units or dimensions, calculations, and conversions for full credit.* Examples are provided. Again you may submit a draft and comment via the Forum to receive participation credit

Participation and Attendance Traditional 3-credit courses meet for 3 hours per week. For every in-class hour, the student is expected to spend 3-4 hours outside of class reading, preparing, and doing homework. Thus, the student ideally spends 12-15 hours per week on this course, depending upon time management and study skills. The time commitment is the same for an online course.

Participation is based upon timely completion of assignments, exams and discussion board submissions. The bulk of this portion of the grade is determined by the quality of your Discussion Board participation (responses to classmates' summaries). Subject related and professionally termed responses are expected.

Deadlines for the submission of work are communicated when posted. Late work will normally result in grade reduction. It is understood that unusual circumstances can develop; it is the **student's responsibility** to notify the instructor ahead of time for permission to extend a deadline.

Marc Olson marc.olson@umontana.edu

Lectures

Lectures are recorded twice per week on Mondays and Wednesdays in Missoula. Lecture topics are announced, the student will enhance learning and participation greatly by reading the material prior to lecture. Students living in town are encouraged to attend. For out-of-town students, and students with commuting challenges, the lectures are also available for viewing via iTunesU. A link to iTunesU is available under OneStop. Instructions for logging into iTunesU are given in the introductory portion of Moodle. If you would like to log in during lecture, you may do so using the "Link for Live Lecture webstreaming" located.

Drop/Add Policy

The Drop/Add Policy may be found at the in the Provost's website**.**

Academic Honesty Policy

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.
All students must be familiar with the Student Conduct Code.

Accommodations

To request an accommodation, please contact the Course Instructor. For more information, visit accommodation website or call 406.243.2243 (Voice/Text).

Communication

Communication is vital to your success in this course. Contact information is provided in this Syllabus. As the Course Instructor, I try to answer all calls and e-mails promptly (typically 2-8/p weekdays and periodically weekends, will always get back to you). Communicating with the Course Instructor is the Student's responsibility especially with regard to meeting deadlines. Late assignments and exams are strongly discouraged. If an unforeseen event happens, please contact the Course Instructor immediately, and PRIOR to a deadline, to make alternative arrangements for meeting your class responsibilities.

Online support

Very effective help may be obtained via courseware-support@umontana.edu or 243-4999.I

Email policy at UM

According to University email policy, an "employee must use *only* UM assigned student email accounts for all email exchanges with students, since such communication typically involves private student information." For more information on setting up and using your GrizMail account, visit the UMontana Information Technology Website.

Schedule

(Firm due dates communicated when unit presented)

Marc Olson marc.olson@umontana.edu

Week 1 Intro, LU1 Chapters 1 & 2
Example Assign. (Problem Set)
Week 2 Chapters 1 & 2 Exam I
Assignment 1
Week 3 LU2 Chapters 3 & 4
Summary I
Week 4 Chapters 3 & 4 Exam II
Assignment 2
Week 5 LU3 Chapters 5 & 6
Summary 2
Week 6 Chapters 5 & 6 Exam III
Summary 3
Week 7 LU 4 Chapters 7 & 8
Assignment 3
Week 8 Chapters 7 & 8 Exam IV
Week 9 LU5 Chapter 9 Exam V
Summary 4
Week 10 LU6 Chapters 10 & 11
Assignment 4
Week 11 Chapters 10 & 11 Exam VI
Week 12 LU7 Chapters 12, 13, 14
Summary 5
Week 13 Chapters 12, 13, 14
Assignment 5
Week 14 Chapters 12, 13, 14 Exam VII
Week 15 Optional Assignment
Week 16 Optional Final