Instructor:  John Jechura
Class Hours:  M W 6:00 – 7:15 pm (AH 330)
Office Hours:  M W 5:00 – 6:00 pm & by appointment (AH 261)
Web Site:  http://inside.mines.edu/~jjechura/EnergyTech/
Phone:  303-843-2097 (URS an AECOM company)
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Course Description from Bulletin
In this course the student will gain an understanding about energy technologies including how they work, how they are quantitatively evaluated, what they cost, and what is their benefit or impact on the natural environment. There will be discussions about proposed energy systems and how they might become a part of the existing infrastructure. However, to truly understand the impact of proposed energy systems, the student must also have a grasp on the infrastructure of existing energy systems. Prerequisites: CBEN357 Chemical Engineering Thermodynamics (or equivalent). 3 lecture hours, 3 credit hours.

No Required Text Book

Supplemental Text & Materials
Francis M. Vanek & Louis D. Albright  Boyle, Everett, & Ramage

Sustainable Energy, Choosing Among Options
Tester, Drake, Driscoll, Golay, & Peters
MIT Press, 2005

Course Objective
The objective of this course is to provide to the student information about energy transformation technologies. We will discuss technologies that are commonly employed and then discuss how new technologies will compliment or replace the existing ones. Consideration will be given to how the technologies work, how they are quantitatively evaluated, what are the associated costs, & what is their impact on the natural environment. Specific topics will include:

- Tools to understand & evaluate energy systems, including a systems approach to energy and economic tools to evaluate energy systems as investments.
- A discussion of the infrastructure of existing energy systems.
- A discussion of how we define the efficiency of an energy conversion technology.
- A discussion of thermodynamic limits to conversion efficiency.
The discussions will include sources for energy, systems to transform the form of the energy sources, & methods for use of the energy sources.

A textbook will not be required for the course. However, the student will be required to do reading of materials handed out by the instructor and materials published on the Internet.

**Topics**

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<thead>
<tr>
<th>Energy sources</th>
<th>Transformation of energy sources</th>
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<tbody>
<tr>
<td>- Fossil fuels: coal, natural gas, petroleum</td>
<td>- Electricity production &amp; distribution</td>
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<td>- Solar</td>
<td>- Petroleum refineries</td>
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<td>- Wind</td>
<td>Usage of energy</td>
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<td>- Geothermal</td>
<td>- Fuel cell technology</td>
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<td>- Nuclear</td>
<td>Carbon capture &amp; sequestration</td>
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<td>- Biomass</td>
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**Grading Policies**

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<tbody>
<tr>
<td>Safety Topic</td>
<td>10%</td>
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<tr>
<td>Homework</td>
<td>35%</td>
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<tr>
<td>Short Quizzes</td>
<td>35%</td>
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<tr>
<td>Individual Presentation &amp; Written Report</td>
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There will be no formal full-period exams for this class. Instead there will be 6 to 10 short quizzes given throughout the semester. The quizzes will be 10 minutes in length and given at the very beginning of the class. Quizzes will be unannounced. There will be no make-up quizzes. It will be up to the discretion of the instructor to excuse an absent student from a particular quiz. To be eligible for an excused absence the student must notify the instructor of the absence via email before the class period.

There will be about 6 to 10 homework assignments. Homework will be announced at least one week before it is due. Homework will be due by 8:00 pm on the due date and is to be emailed to the instructor. Late homework will not be accepted. Homework is still expected on the due date even if the student is absent. The homework may require the use of Aspen Plus or HYSYS.

There will be one special project.

- Each student will be responsible for researching a topic related to energy or energy-transformation systems. The student will be responsible for preparing a written report on the topic as well as give an oral presentation to the class. The oral presentations will be scheduled for the end of the semester.

Class will begin with a short safety topic. Each student will be responsible to provide one topic during the semester. Doing so will provide the credit toward this grade.

**Policy on academic integrity/misconduct**

The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student’s academic achievements, and giving credence to the university’s educational mission, its scholarly objectives and the substance of the degrees it awards. The protection
of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

The complete policy is online.