

**EGEN 530/EMAT 530**  
**ENERGY ISSUES AND ANALYSIS**  
**SYLLABUS**

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**INSTRUCTORS**

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**COURSE DESCRIPTION**

When presented with a proposed solution to a problem, an engineer or scientist must assess the technical and economic viability of the solution, identify the strengths and weaknesses, develop and evaluate alternative solutions, and ultimately recommend a defensible course of action. The instructors and invited guest lecturers will present current information on a range of topics that relate to energy supply and demand. Students will be challenged to draw on their science and engineering education to objectively and critically analyze various energy and power problems. Independent research into contemporary issues is emphasized.

**CREDITS AND CLASS MEETINGS**

3 lecture credit hours; times, days, and room number will be announced.

**DESIGNATION**

EGEN 530/EMAT 530 is a graduate-level course that could serve as a technical elective for undergraduate students who meet the prerequisite requirements.

**PREREQUISITES**

Senior or graduate standing in an engineering or science major; juniors who have completed a sufficient number of upper division courses may be admitted by obtaining Instructors' consent.

**TEXTBOOK AND REFERENCES**

No required textbook. Selected reading from supplemental literature may be assigned. In order to successfully complete the assignments, students are expected to consult engineering and science textbooks, the library, and other resources.

**TOPICS**

A different topic is featured each week. Guest speakers include representatives from various industries as well as Montana Tech faculty who are experienced with confronting and addressing energy issues. Planned topics (based on last year's course and, therefore, subject to modification):

1. Overview of USA and world-wide energy supply and demand
2. Chemical energy sources and energy balance calculations
3. Coal-fired power plants
4. Carbon capture and storage
5. Solar power
6. Nuclear power and nuclear fuel recycling
7. Energy storage and fuel cells
8. Energy consumption in primary and secondary metal production
9. Energy resources (coal and uranium mining, beneficiation, and processing)
10. Home insulation and heat transfer/loss vs. cost and payback
11. Hydroelectric power

12. Wind power
13. Biomass combustion
14. Biofuel processing vs. petroleum
15. Overview of electrical power transmission and use
16. Issues and solutions with gas, diesel, battery powered, and hybrid automobiles

## **OBJECTIVES AND OUTCOME**

The course is designed as a “capping course” that enables students to apply their education to real life energy problems. Students are challenged to analyze the scientific, engineering, and economic aspects of the energy issues associated with each course topic. Course graduates will have demonstrated their proficiency in:

1. Critical analysis of current energy issues
2. Application of scientific and engineering principles to solve energy-related problems

The objectives and outcome are responsive to the following (ABET a-k Criteria) skills, knowledge, and behaviors:

Criteria h and k are emphasized in this course.

## **EVALUATION AND GRADING CRITERIA**

Homework assignments will accompany most of the lecture topics. The nature of the assignments may be qualitative and/or quantitative depending on the specific subject matter and may require independent library research on the part of the student. There will be approximately one quiz per week throughout the semester. Subject matter covered during the previous week’s lectures and any associated reading assignments are considered fair game for each quiz. Each homework assignment and quiz will be graded on a 100% scale; the combined homework and quiz average will account for 80% of the student’s final grade.

In lieu of a comprehensive final examination, students must prepare a formal presentation on a specific an energy-related topic of their choice (topics are subject to instructor approval). Students are expected to analyze the issues and prepare formal 20-minute presentations on energy-related topics of their choice (topics are subject to instructor approval). The presentations will be scheduled for the final week of classes and the time designated by the registrar for the final exam. The presentations must not replicate subject matter delivered by the instructors or guest lecturers although it is permissible to expand on facets of previously covered topics. The expectation for this assignment is that the students will thoroughly investigate the topic by accessing a variety of sources and then summarize their observations and findings in an original work. In other words, the assignment is not a cut-and-paste exercise and properly cited literature references are mandatory. To be eligible for full credit (20% of the final grade), students must deliver the presentation according to schedule and provide the instructors with their PowerPoint slides or a written report.

The course grades will be based 80% on the combined homework and quiz average weekly topic assignments and 20% on the final presentation. Class attendance will be recorded but will not be a factor in the assessment and grading criteria except in instances of excessive absenteeism (i.e. greater than 20% of classes missed throughout the course of the semester). Students are responsible for all material discussed in class, whether or not they choose to attend. Late homework is not accepted and make-up quizzes are not given for unexcused absences. Exceptions may be granted at the instructors’ discretion.

Final grades are determined according to the following formula:

Homework & Quizzes	80% or 0.80 x (homework + quiz) average
Presentation (Final)	20% or 0.20 x presentation score

where

A = 90 to 100
B = 80 to <90
C = 70 to <80
D = 60 to <70
F = <60

Plus and minus grades may be assigned at the discretion of the instructors.

**Academic Honesty:** Students are expected to comply with the published Montana Technological University student conduct standards. Acts of academic dishonesty, which include but are not necessarily limited to plagiarism, replicating all or a portion of another student's examination, using unapproved aids or assistance to pass an exam, or assisting another student in an act of academic dishonesty, will be reported to the graduate dean or other responsible party at the student's home university. See Addendum 1, the Montana Tech Academic Honesty Policy.

Recording lectures or portions of lectures is forbidden without express written permission from the instructor.

If it is determined that a student has deliberately cheated on an assignment or examination, the student will be dropped from the course with an "F" grade. In compliance with Montana Tech policy, cases of academic dishonesty will be reported to the Office of the Vice Chancellor for Academic Affairs.

**Disability Accommodations:** Students that need academic accommodation because of disabilities must:

1. Register with and provide documentation to the Student Disability Coordinator (Joyce O'Neill, Engineering Hall Room 104; 406-496-4429; joneill@mtech.edu)
2. Provide the instructor with a letter that states the need and type of accommodation. This should be done during the first week of class.

In case that a student believes that he/she needs to record or tape classroom activities due to disability, the student must request an appropriate accommodation. In the event that such an accommodation has been arranged, the material may not be further copied, distributed, published, or otherwise used for any other purpose without the express written consent of the instructor.

### **PROFESSIONAL COMPONENT**

Engineering Topics:	100%
Design Component:	Yes (Mass & energy balances; equipment selection and sizing)
Computer Usage:	Yes (Excel spreadsheets; thermodynamic process models)
Ethics:	Yes (Sustainability; personal & professional ethics stressed)
Statistics:	No
Safety:	Yes (Relevant safety aspects discussed in selected lectures)

### **PREPARED BY**

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## **ADDENDUM 1: Montana Tech Academic Honesty Policy**

Montana Tech believes that academic honesty and integrity are fundamental to higher education. Montana Tech has a responsibility to promote academic honesty, integrity, and the highest ethical and professional standards and behavior in and out of the classroom. Accordingly, policies and procedures have been developed to address instances of academic dishonesty. Students who violate these standards commit academic misconduct and will be subject to academic and/or disciplinary sanctions.

### **Academic Dishonesty**

Academic dishonesty includes cheating; plagiarism; forgery; falsification; facilitation or aiding academic dishonesty; multiple submission; theft of instructional materials or tests; access to, manipulation of, or tampering with laboratory equipment, experiments, or computer programs without proper authorization; alteration of grades or files; misuse of research data in reporting results; use of personal relationships to gain grades or favors; and any actions intended to gain academic advantage by fraudulent and/or deceptive means.

### **Student Responsibility**

The student has full responsibility for the content and integrity of all academic work submitted. Ignorance of a rule does not constitute a basis for waiving the rule or the consequences of that rule. Students unclear about a specific situation should ask their instructors or academic staff, who will explain what is and is not acceptable in their classes or on campus.

### **Faculty, Staff, and Administrator Responsibility**

It is the shared responsibility of faculty, staff, and administrators to take reasonable precautions to prevent and discourage academic dishonesty. Additionally, it is a duty of faculty, staff, and administrators to report instances and charges of academic dishonesty to the Office of the Vice Chancellor for Academic Affairs through the Academic Dishonesty Violation online referral form.

### **Cheating**

Cheating is defined as obtaining or attempting to obtain, or aiding another in obtaining or attempting to obtain credit for work or any improvement in evaluation of performance by any dishonest or deceptive means. Cheating includes, but is not limited to, the following.

#### **Taking information:**

1. Copying graded homework assignments from another student.
2. Working with others on a take-home test or homework (unless specifically accepted by the instructor).
3. Looking at another student's paper or screen during an examination.
4. Looking at text, notes, or electronic devices (e.g., cell phones, tablets, smart pens, unauthorized calculators, etc.) during an examination (unless specifically accepted by the instructor).
5. Accessing another student's electronic device (e.g., cell phone, tablet, laptop, desktop, etc.) and taking information from the device without consent.
6. Allowing another person to complete assignments or an on-line course.

#### **Providing information:**

1. Giving one's work to another to be copied or used in an oral presentation.
2. Giving answers to another student during an examination or for a take-home test.
3. Informing a person in a later section about questions appearing on an exam after taking that exam.
4. Providing a term paper to another student

5. Taking an exam, writing a paper, or creating a computer program for another student.

### **Plagiarism**

Plagiarism is defined as submitting a term paper, essay, speech, laboratory report, or other assignment in which all or part of the words, ideas, or visuals are copied from the published or unpublished work of another individual without giving the original author proper credit for the words, ideas, or visuals. Such actions include, but are not limited to, the following.

1. Copying homework answers from a text to hand in for a grade.
2. Failing to give credit for ideas, statements, data, or conclusions derived by another author.
3. Failing to adequately summarize or paraphrase another's work.
4. Failing to use quotation marks when quoting directly from another, whether it be a paragraph, a sentence, or a part thereof.
5. Submitting a paper purchased from a research or term paper service or downloaded from the internet.
6. Copying another student's or a former student's paper and handing it in as one's own.
7. Giving a speech or oral presentation written by another and claiming it as one's own work.
8. Presenting another's computer program as one's own.
9. Failing to acknowledge the source of copied or adapted visuals.

### **Other Forms of Academic Dishonesty**

Other forms of academic dishonesty include any actions intended to gain academic advantage by fraudulent and/or deceptive means not addressed specifically in the definition of cheating and/or plagiarism. These actions may include, but are not limited to, the following.

1. Planning with one or more fellow students to commit any form of academic dishonesty together.
2. Giving a term paper, speech, or project to another student when one knows or reasonably suspects that student will plagiarize it.
3. Having another student take one's exam, or complete one's computer program or lab experiment.
4. Lying to an instructor to increase a grade or gain additional time to complete an assignment or exam.
5. Submitting substantially the same paper or speech for credit in two different courses without prior approval of the instructors involved.
6. Altering a graded work after it has been returned, then submitting the work for regrading, without the instructor's prior approval.
7. Removing tests from a classroom without the approval of the instructor, or stealing tests.
8. Using a person's signature without permission.
9. Offering, giving, receiving, or soliciting a bribe of money, materials, goods, services, or anything of value for the purpose of procuring or providing an academic advantage.
10. Forging documents or other data, or omitting facts which are material to the purpose for which the information is submitted to the University, potential employers, or community members.
11. Possession of unauthorized equipment or materials during a test, quiz, or similar, whether found accessing or not.

### **Policy on Cheating, Plagiarism, and Other Forms of Academic Dishonesty**

At faculty discretion, cheating may result in an F grade on the assignment or examination, or in the course. If a student does not accept the charge of cheating, s/he may bring the case to the Academic Standards Committee for review. Plagiarism may be considered a form of cheating and is, therefore, subject to the same consequences as cheating. However, as there may be plagiarism as a result of poor learning or inattention to format, and there may be no intent to deceive, some instructor discretion is appropriate. Under such circumstances, the instructor may elect to work with the student to correct the

problem at an informal level. In any case that a penalty is applied, the student must be informed of the event being penalized and of the penalty.

The instructor shall contact the student with evidence of the academic dishonesty incident in writing within 10 business days of discovery of the event. The Academic Dishonesty Violation Referral form will also be submitted electronically to the Office of the Vice Chancellor for Academic Affairs. The instructor will show the student all evidence being considered and allow the student to fully respond. The instructor will notify the Vice Chancellor for Academic Affairs of the intended disciplinary action.

The Office of the Vice Chancellor for Academic Affairs shall determine if any further disciplinary action is required. In reported cases of repeated academic dishonesty, the Academic Standards Committee may be alerted and may apply additional penalties beyond those imposed by the individual instructors.

Disciplinary actions might include, but are not limited to, reprimand; educational sanctions (completion of a report, paper, project, or workshop); loss of membership in organizations; or disciplinary probation, suspension, or expulsion from the University. If the Office of the Vice Chancellor for Academic Affairs and/or the Academic Standards Committee determines that no violation has occurred, the instructor will comply with the decision, and refrain from issuing penalties, or remove those already on the student's record.