

ETES 5060/7060: Energy Systems

The University of Georgia
Workforce Education
Spring 2008 Jan7. – May 6.
Class Meeting: Tues. 4:30 PM-7:15 PM
Room: 156 River's Crossing

Course Number: ETES 5060
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Office Hrs: By Appointment

Course Syllabus

- I. **Course Purpose:** To explore fundamentals of energy systems and sustainability.

- II. **Catalog Description:** *ETES 5060/7060 Energy Systems 3 hours.*
This course introduces concepts and applications of energy systems, including their present and future applications, as well as advantages and disadvantages of the technical, economic, and environmental aspects of each system. Alternative energy systems will be addressed: wind, water, solar, photovoltaic, energy conservation and bio-fuels will be the primary focus. Special attention will be given to appropriate technology and sustainability in power production.

- III. **Prerequisites:** Permission of department.

IV. General Course Objectives

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

- a. Identify the various energy sources that provide useful power
- b. Differentiate between various methods of controlling energy
- c. Compare and contrast energy sources based on the four major classifications of energy
- d. Research and develop a paper on the effects and/or sources of energy in our society
- e. Compare methods of measuring energy and power
- f. Identify and experiment with control devices involved in the transmission of power
- g. Develop and construct a terminal project used for teaching energy and power systems using student developed materials
- h. Define terminology associated with power and energy systems
- i. Identify the device parts that make up the various power systems that are addressed in the course
- j. Have knowledge of and apply safety precautions as they relate to the various power systems that are addressed in the course
- k. Compare thermodynamic energy cycles with mechanical energy cycles

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V. Course Content

Course Outline

Session	Date	Topic/Activity	Reading	Pages
1	Jan 8	Introductions/ Issue syllabus/Overview of courses	Chp. 1	1-56
2	Jan15	Primary Energy	Chp. 2 Personal Energy Audit	57-92
3	Jan 22	Energy Applications <i>Personal Energy Audit</i>	Chp. 3 Metric 500 R & D Activity	93-130
4	Jan 29	Forms of Energy Metric 500 R&D Activity	Chp 4 Power from air motors experi	131-156
5	Feb 5	Coal Resources Power from air motors experiment	Chp. 5	157-186
6	Feb 12	Heat to Motive Power Review for midterm	Chp. 6 Efficiency from motors and gen	187-226
7	Feb 19	Midterm		
8	Feb 26	Oil and Gas Internal Combustion Activity	Chp. 7	227 – 294
9	Mar. 4	Oil and Gas Engines Internal Combustion Activity	Chp. 8	295-332
9	Mar 11	Electricity	Chp. 9	333-394
10	Mar 18	Nuclear Power	Chp. 10	395-436
11	Mar 25	Future of Nuclear Power	Chp. 11	437-476
12	Apr. 1	Costing Energy	Chp. 12	477-518
13	Apr. 8	Penalties: Assessing the environmental and health	Chp. 13	519-572
14	Apr 15	Remedies: Making Fossil Fuel Use More Sustainable	Chp. 14	573-600
15	Apr 22	E-portfolio and Final Exam Review		
16	Apr 29	Final Exam		

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VI. Course Details

Please See course outline and Laboratory Manual plus:

Laboratory Activities

Laboratory exercises will be assigned on the various topics covered throughout the course. These exercises will usually be based on engineering basics.

Portfolio

Each student will present their completed problems and laboratory assignments at the end of the term in an electronic portfolio. The portfolio should contain a summary of each chapter that we cover during the course as well as the various laboratory assignments that coincide with the chapter. The portfolio will be evaluated on how well it represented material covered, organization, documentation, and attractively layout.

Examinations

There will be two (2) examinations during the term, a Mid-Term (covering material from the first class meeting to the date of the exam) and a Final (a comprehensive exam related to any/all material covered during the term).

Class Participation

Punctuality and attendance are important to successful completion of requirements for this course. For that reason, attendance will be taken at each class meeting. The class participation portion of the course evaluation will be based on punctual attendance to all class meetings, participation in class discussions, and appropriate care of equipment.

Graduate Students

Depending on class composition of graduate/undergraduate numbers, each graduate student will be assigned a team of an undergraduate to lead. It is expected that coordination and project work will be evenly distributed among team members.

VII. Course Evaluation Methods

Evaluation will be based on written and practical exam, laboratory work and assigned projects. Grades will be distributed as follows:

Assigned problems	25%
Exercises, Laboratory Activities & Attendance	20%
Mid-Term examination	25%
Final Examination	25%
Electronic Portfolio	5%
Graduate Student	15%

Grades:

Letter grades will be earned as follows:

A	94 – 100	C+	77 - 79
A -	90 – 93	C	74 – 76
B+	87 – 89	C-	70 - 73
B	84 – 86	D	60 - 69
B-	80 – 83	F	0 – 59

Laboratory Sessions:

Laboratory reports are due a week after each experiment/activity. Each student/student group is responsible for accomplishing these experiments/activities during open lab times. Make sure you keep up with your laboratory work.

Attendance/Participation:

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Attendance is crucial especially considering the density of facts, concepts, principles, and procedures covered in each class. Missing even one class could set you seriously behind. Realize that if you are absent, even for valid reasons, you are responsible for the material and assignments discussed in each and every class. In addition, I expect each participant to take an active role by contributing and sharing thoughts and ideas, taking initiative, and seeking to help other members of the class. Each participant is expected to remain open to new ideas and different points of view.

Attendance records will be recorded at the beginning and at the conclusion of each class meeting. *Your grade in this class will be dropped 3% points for two (2) unexcused absence and you will be removed from the class role after three (3) unexcused absences. In addition, tardiness will result in a 3% point reduction in grade if more than three (3) unexcused tardy attendances occur.*

Late Assignments:

I expect assignments to be completed on time. My standard policy regarding assignments is 10% penalty for late assignments turned in within 1 week of the due date and 50% penalty for assignments turned in thereafter until the end of the course (defined as the last regular class session). I use this system even in the event of "excusables," such as minor sicknesses or other unforeseen conflicts. However, any exceptions to this policy are made at my discretion.

Honesty:

Cheating on class assignments, examinations, or other serious forms of academic activities will result in a grade of an "F" (and a required report to University officials). Persons "borrowing" someone else's work on an assignment will receive a zero on that assignment if it is the first offense. A second offense will be considered a serious form of academic dishonesty. (Borrowee is equally subject to penalties.) Refer to UGA's [A Culture of Honesty: Policies and procedures on academic honesty](#).

Withdrawal/Drop Policy:

Drop policy is as described in the university's undergraduate bulletin, page 45.

VIII. Course Materials

Required Instructional Materials:

Text:

Godfrey, B., Everett, B., and Ramage, J. (2003). Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press. ISBN 0-19-926179-2

Reference Textbooks/Materials:

http://www.ucsusa.org/assets/documents/clean_energy/Renewablesready_fullreport.pdf

Thermodynamics for Scientist and Engineers

Equipment and Materials:

1. Scientific Calculator
2. Engineering design notebook
3. Safety awareness

IX. Ways to Contact Professor

Please refer to office hours and e-mail or phone instructor to make other arrangements.

- Project 1: Energy generation: Find a bio-source that produces the greatest energy [fruit, bio mass, ..] – design a project to be able to determine amount of voltage and current that is produced and a rate of consumption [4 weeks]
- Project 2: Personal energy audit – determine (usage of energy per day per person in the USA) [3 weeks]
- Project 3: Rates of consumption [3 weeks]
- Project 4: Renewable energy for sustainability in the USA – solar, photovoltaic, [3 weeks]

