

ME 533: Energy Conversion

Instructor

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Class Time: Tuesday and Thursday, 12:00-2:00 PM.

Classroom: EPC 203

Office Hours: Thursday 2:00-3:00 PM, or by appointment

Course Description:

Thermodynamic and mechanical aspects of modern energy conversion systems, including traditional systems such as steam power plants, gas turbines and internal combustion engines and refrigeration systems, and renewable systems such as solar, wind, geothermal. Combined heat and power and cogeneration are also considered, as well as economic and environmental aspects of energy conversion.

Grading:

Homework	15%
Exam 1	20%
Exam 2	20%
Project	25%
Participation	10%
Discussion Lead	10%

Homework

Homework includes in-class assignments and assigned problem sets and will count for 15% of the final grade. Homework should be turned in during class. Late homework will not be accepted.

Exams

Two exams will be given during the semester. The first will be an in-class exam and will cover material from the first half of the semester. The final exam will be a take home exam.

The final exam will be a five page report discussing your vision for a sustainable energy future. The report must include citations, calculations to support your vision, a discussion of how your project topic fits (or does not fit) into your vision, and the economic implications of your vision.

All exams are to be done individually. Collaboration of any kind will be grounds for a zero on the exam and possible disciplinary action.

Project

The project will focus on learning about state of the art energy conversion technologies. Individuals or teams of 2 students will work together to research a topic related to a new or advanced energy conversion technology. Teams will present their technology in class during a mock poster session for the Energy Conversion Conference held mid-semester. Grading will be based on your abstract, poster, presentation and reviews by your fellow classmates. Details on the project will be given in class.

Participation

Participation includes in-class discussions, asking questions in class, attending office hours, answering questions, and generally being present and making an effort.

Discussion Lead

Teams of 2 will choose a reading relevant to the topic of day and lead a discussion on the reading. Readings should be selected a week before the class and 2 questions should also be assigned. The questions and a PDF of the selected reading should be emailed to Prof. Ryan one week ahead of class. Readings and questions will be posted on Blackboard.

Note: You must have different partners for the project and the discussion lead.

Class Policies:

1. Academic dishonesty will not be tolerated. Students are expected to follow the BU Code of Student Responsibilities (<http://www.bu.edu/dos/policies/student-responsibilities/>)
2. Cell phone use during class or exams is not allowed. This includes phone calls, texting, browsing, calculator functions, etc.
3. Class begins promptly at 12:00PM. Late arrival is not permitted without prior approval.

Course Materials:

Blackboard will be used for all class communications and documents.

Textbook:

J.W. Tester, E.M. Drake, M.J. Driscoll, M.W. Golay, W.A. Peters, *Sustainable Energy: Choosing Among Option*, MIT Press, Second Edition, 2012.

Complementary Readings:

1. K. Weston, *Energy Conversion*, EBook, <http://www.personal.utulsa.edu/~kenneth-weston/>.
2. A.W. Culp, *Principles of Energy Conversion*, McGraw-Hill, 1991.
3. Y.A. Cengel, M.A. Boles, *Thermodynamics*, McGraw-Hill, 2002.

Supplemental Reading:

Selected articles, reports, and book chapters will be assigned throughout class to supplement the textbook. All supplemental readings will be posted on Blackboard.

Topics:

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| 1. Overview of Energy Conversion | 8. Nuclear Power |
| 2. Economics of Power Production | 9. Wind |
| 3. Environmental Impacts | 10. Solar |
| 4. Thermodynamics Review | 11. Ocean/Wave Energy |
| 5. Vapor Power Cycles | 12. Geothermal |
| 6. Gas Power Cycles | 13. Other Renewable Energy Systems |
| 7. Cleaning up fossil fuels | 14. Direct Chemical-Electrical Conversion |