ME514WS/MT514WS Sustainable Energy

Spring 2023

Textbook: *"Energy Systems Engineering, Evaluation & Implementation"* 3rd Ed., Frances M. Vanek and Louis D. Albright, McGraw-Hill., 2016, ISBN-13: 978-1259585098

Link to Textbook:

http://ezproxy.stevens.edu/login?url=https://www.accessengineeringlibrary.com/content/book/9781259585098

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Grading Scheme:

Homework	35%
Mid-Term	30%
Semester Project	35%

Details for the mid-term exam and the semester project will be announced later. Homework will be assigned weekly. No late submission will be accepted.

Course Calendar:

Week	Topic	Reading (Chapter)
1	Introduction	1
2	Systems Tools for Energy Systems	2
3	Economic Tools, Climate Change Models	3, 4
4	Fossil Fuel Resources	5
5	Combustion	6
6	Carbon Sequestration	7
7	Nuclear Energy	8
8	**Mid-Term Exam**	
10, 11	Solar Energy	9, 10, 11, 12
12	Wind Energy	13
13	Bioenergy and Transportation Energy	14, 15, 16
14	Creating 21st Century Energy System	17
15	**Term Project Due**	

Semester Project

The goal of the semester project is to apply the methods and concepts learned in this course as well as relevant knowledge to be acquired through additional independent research to solve a specific energy system problem or challenge. Your team will begin by defining the problem scenario, and then propose and execute a solution for it based on various considerations including energy performance (efficiency), safety, economics, environmental, regulatory, and other considerations. The term project can be conducted in groups of 3-4 students. In which case, each student will clearly report on their contribution to the project. Approval of the project statement must be obtained from the instructor before starting the project. More details on the project assignment will be provided.

Key Deadlines:

Project Statement	February 12
Progress Reports	April 10
Final Report	May 14

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Course Objectives:

Topics in this course include current and potential future energy systems, fuel resources, conversion of resources, and end-use, with emphasis on meeting local and global energy needs in the 21st century in a sustainable manner. Special attention will be given to the current global energy situation which places great focus on fossil fuels. Various renewable and conventional energy technologies will be presented including nuclear, wind, solar, and hydrogen, and their attributes described within a framework that aids in evaluation and analysis of energy technology systems in the context of political, social, economic, and environmental goals. Systems engineering approach and economic tools will be presented which are critical for the evaluation of competing energy systems.

The overall objectives for the course are as follows:

1. Students will be able to assess the performance and basic design of various energy conversion systems including traditional (combustion and nuclear) and alternative (solar, wind, hydrogen, etc.) approaches.
2. Students will become familiar with environmental issues related to the greenhouse effect and global climate change.
3. Students will perform comparative analysis of various energy conversion systems. The main criteria used for comparison include economic, social acceptability and environmental consequences.

The emphasis is placed on application of quantitative engineering techniques to energy systems, as reflected in objectives 1-3 above. Accordingly, the course will draw on basic material studied in thermodynamics, fluid mechanics, heat transfer and simple electronic theory. Along the way, students will be exposed to the relationships between energy systems and society and the related economic, environmental, ethical, policy and other issues.

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at http://web.stevens.edu/honor/ (Links to an external site.)

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

“I pledge my honor that I have abided by the Stevens Honor System.”

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor (Links to an external site.).

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics (Links to an external site.).

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.