

**University Of California at Berkeley
Department of Mechanical Engineering**

ME 292E - Advanced Special Topics / Energy Science & Engineering [3 units]

Elective Course

Syllabus

CATALOG DESCRIPTION

This course covers fundamental and practical aspects underlying energy generation, conversion, and storage processes in various energy systems. Following a review of principles of thermodynamics, heat transfer, and microscopic transport theories, the course discusses energy systems for stationary applications such as fossil fuel combustion, nuclear energy, solar energy, and wind energy, and technologies in transportation systems such as batteries and fuel cells.

COURSE PREREQUISITES

ME 151, ME 254, ME 259, or consent of instructor

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

Textbook: Energy Systems Engineering: Evaluation and Implementation, Second Edition, by Francis Vanek, Louis Albright, Largus Angenent, McGraw-Hill, 2012. ISBN-13: 978-0071787789

COURSE OBJECTIVES

To provide students with a sufficient introduction to each of the topics of energy systems so that they will be able to understand the background of the technologies and apply analytical and computational tools to design, evaluate and optimize practical energy systems.

DESIRED COURSE OUTCOMES

ME 292E is a graduate level course that broadens students' understanding of various practical energy systems and offers them the knowledge for system design, evaluation and optimization.

TOPICS COVERED

Review of principles of thermodynamics, heat transfer, and microscopic transport theories. Fossil fuel combustion system, nuclear energy, solar energy, and wind energy systems, vehicle power system, battery and fuel cell technologies.

CLASS/LABORATORY SCHEDULE

Three hours of lecture per week.

CONTRIBUTION OF THE COURSE TO MEETING THE PROFESSIONAL COMPONENT

This course develops students' capability to apply advanced knowledge of thermodynamics, heat transfer, and microscopic transport theories to work professionally in designing, evaluating, and optimizing various energy systems.

RELATIONSHIP OF THE COURSE TO ABET PROGRAM OUTCOMES

An ability to apply knowledge of mathematics, science and engineering. An ability to identify, formulate, and solve engineering problems. An understanding of professional and ethical responsibilities. An ability to function on multi-disciplinary teams. An ability to communicate effectively. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. Knowledge of contemporary issues. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES

This is achieved through class lectures and discussion sections, homework assignments, mid-term exams, and a final project.

PERSON(S) WHO PREPARED THIS DESCRIPTION:

Samuel S. Mao