



JORDAN UNIVERSITY OF SCIENCE & TECHNOLOGY
MECHANICAL ENGINEERING DEPARTMENT
ME 551A SUSTAINABLE ENERGY CONVERSION
Semester

Catalog Data- 2013 : 3 Credit hours (3 h lectures). Identifying and modeling different energy resources. Identifying the systems that generate, convert, utilize and store these resources. The course focuses on energy resources, conversion, storage and utilization. Topics include: solar energy calculations and solar systems such as solar ponds, photovoltaic cells, solar collectors, solar distillers, solar cooling, etc. . . , wind energy, ocean energy, hydropower, oil shale, waste energy, geothermal energy, biogas energy, etc . . .

Text Book(s):

1. Sukhatme, S. P. (1996), Solar Energy, 2nd Edition, McGraw-Hill.
2. Kreith, F. and Kreider, J., Principles of Sustainable Energy, Taylor and Francis 2011.
3. Internet Sites.
4. Class Notes.
5. External references.

References:

- 1) Duffie J. and Beckman, J. (1991), Solar Engineering of Thermal Processes, 2nd ed., John Wiley.
- 2) Boyle, G. (2004), Renewable Energy, 2nd Edition, Oxford University Press.
- 3) Clup, A. W. (1979), Principles of Energy Conversion, McGraw-Hill, Tokyo.
- 4) Krenz, J., (1976), Energy Conversion and Utilization, Allyn and Bacon, Boston.
- 4) Boyle, G., Everett, B. and Ramage, J. (2003), Energy Systems and Sustainability, Oxford Press.

Instructor: _____

Class Schedule: _____

Office Hours: _____

Pre/Co-Requisites: Check the study plan in your department

Objectives:

1. Educate the student about the energy crisis and situation [a, h, i].
2. Familiarize the student with different sources of energy [a, e, f, h, i, j].
3. Familiarize the students with the basics of energy generation, utilization, conversion, storage, transmission, conservation, management and sustainability [a, e, h, i, j].
4. Analyze the solar energy resource and identify many of its applications (solar collectors, photovoltaic cells, solar ponds, desalination, drying, air conditioning, etc...) [a, c, e, h, i, j].
5. Analyze the wind energy resource and design of a windmill [a, c, e, h, i, j].
6. Analyze the hydropower energy resource [a, e, h, i, j].
6. Identify and analyze different ocean energy resources [a, e, h, i, j].
7. Identify and analyze geothermal energy resource, waste energy resource, biomass energy and others . . . [a, e, h, i, j].
8. Identify different energy harvesting techniques (thermoelectric and

piezoelectric generation) [a, e, h, i, j]. .

- Topics Covered:**
1. Introduction and classification of energy resources
 2. Energy situation: data and statistics
 3. Solar radiation 4. Flat plate collectors
 5. Other solar systems: solar ponds, photovoltaic cells, solar distillers, etc . . .
 6. Wind energy 7. Thermoelectric generators.
 8. Hydropower energy 9. Energy from ocean
 10. Geothermal energy 11. Energy Harvesting
 12. Waste energy 13. Biomass energy
 14. Energy storage 15. Other energy resources.

Computer Usage: Search Engines (Internet).

Design None

Activities/Project(s):

Lab. Experiment(s): None

Scientific Visit(s): Energy Sites

Evaluation:	Homework and Attendance	0 %
	Experiment	0%
	1 st Exam	30%
	2 nd Exam	30%
	Final Exam	40%

Relationship of the Course to ME Outcomes:

ABET a – k	√	Mechanical eng. Program Outcomes
a	√	a. Apply knowledge of mathematics, science, and engineering in practice.
b		b. Design and conduct experiments as well as analyze and interpret data.
c	√	c. Design a system, components, or process to meet desired needs.
d		d. Function on multidisciplinary teams.
e	√	e. Identify, formulate, and solve engineering problems.
f	√	f. Understanding of professional and ethical responsibility of an engineer.
g		g. Communicate effectively.
h	√	h. Broad education to understand the impact of engineering solutions in global and societal context.
i	√	i. Recognition of the need for, and possess the ability to engage in, lifelong learning.
j	√	j. Possess knowledge of contemporary issues.
k		k. Use the techniques, skills, and modern engineering tools necessary for engineering practice.

ABET Category:

Engineering Science 3 Credits
 Engineering Design 0 Credits

Prepared By: _____ **Date:** _____