ME 556 Solar Energy Conversion

Lecture 1
Course Syllabus

Solar Energy Conversion ME 556
Spring 2016

Prerequisites: Mechanical Engineering 452 (Heat Transfer), Mechanical Engineering 351 (2nd Semester Thermodynamics), and Engineering Mechanics 340 (Fluid Mechanics)


Class Hours: T/Th 7:00 PM to 8:15 PM, PS 130.

Course Attendance Students are expected to attend each class and to be actively engaged in listening, offering comments and examples, and answering questions if called upon. Repeated absences may result in a lowering of your grade.
Absences: Please notify me in the first two weeks of the course if you will miss a class period due to a religious holiday or a University approved event (e.g., a sporting event, field trip, etc.).

Credit: 3 units credit

Contact Info: E 323J Engineering Building
Tel. 619-594-5791, fax 619-594-3599
fletcher.miller@sdsu.edu

Office Hours: Tuesday/Thursday 2:30 to 3:30 PM. Other times by advance appointment (please send e-mail).
Course Syllabus

Textbook:  
*Solar Engineering of Thermal Processes, 4th ed.* by Duffie and Beckman.

On-line Resource:  

Software:  
Students are expected to have access to Excel or Matlab, since some assignments will be given that require calculations or graphs best done with a spreadsheet. We may also be downloading or using web-based specialized solar software that will be described in class.

Homework:  
There will be about 8 homework sets during the semester and count toward your grade as below. Homework should be undertaken on your own, but I encourage you to ask questions of me or your classmates as needed. Directly copying an assignment from someone else is not permitted and will result in a zero for you both on that assignment.
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Examinations: There will be one midterm examination during the semester and a comprehensive final examination. There will also be a few short, closed-book quizzes during class.

Final Exam: Thursday, May 12th, 7:00 PM to 9:00 PM

Grading:

- Homework 25%
- Quizzes 20%
- One examination during the semester 20%
- Final examination 35%

(See also statement about participation above)
Course Syllabus

Course Description from the Catalogue:
Application of thermodynamics, fluid mechanics and heat transfer to the thermal design of solar energy conversion systems. Computer simulations utilized.

Course Purpose:
The purpose of the course is to introduce the student to the fundamentals of solar thermal conversion for a variety of applications. The students will apply knowledge they gained in earlier courses covering fluid dynamics, thermodynamics, and heat transfer to analyze solar energy systems. In addition, specialized topics such as optics and apparent solar motion will be introduced. The course will cover the solar resource, heat transfer specific to solar energy systems, the basics of popular solar collectors, system calculations, and applications such as building heating and cooling (both passive and active), water heating, concentrating solar systems, photovoltaics, and design methods.
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Classroom behavior:
Use of electronics (laptops, cell-phones, music players, etc.) is prohibited during class time, except as approved as part of the lesson. Please turn cell-phones off during the class; advance permission to keep them on with a justifiable reason can be requested. Eating during class is also prohibited, drinks ok.

Americans with Disabilities Act (ADA) Accommodation:
The University is committed to providing reasonable academic accommodation to students with disabilities. The Students Disabilities Services office provides university academic support services and specialized assistance to students with disabilities. Individuals with physical, perceptual, or learning disabilities as addressed by the Americans with Disabilities Act should contact Students Disabilities Services for information regarding accommodations. Please notify me in private or via e-mail so that reasonable efforts can be made to accommodate you. If you expect accommodation through the Act, you must make a formal request through Students Disabilities Services Calpulli Center, Suite 3100, Telephone: (619) 594-6473 or (619) 594-2929 (TDD/TTY).
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Computer/internet access requirement:
At San Diego State University, computers and communications links to remote resources are recognized as being integral to the education and research experience. Every student is required to have his/her own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. In the curriculum and class assignments, students are presumed to have access to a computer workstation and the necessary communication links to the Internet and the University’s information resources.

Syllabus is Subject to Change:
This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent.
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**Student Learning Outcomes**

Ability to calculate the solar resource for a given location and time period, for a specific application.

Understanding of the basic modes of heat transfer as they apply to solar energy systems.

Specialized understanding of radiation from the sun and how to capture it while minimizing losses.

Working knowledge of basic solar collector types and concentrating optics.
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**Student Learning Outcomes**

Ability to select and design solar energy storage systems.

How to choose and analyze the best solar water heating system for a given application.

Evaluate and perform top-level design of passive vs. active building heating systems.

Understanding of the various ways concentrated solar power can be used to generate electricity.

General knowledge of photovoltaic systems.