Course Outline

Session 1, 2015

MECH9720

SOLAR THERMAL ENERGY DESIGN

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COURSE OUTLINE

1. CONTACT DETAILS

Primary contact for course questions

1) Online discussion board (Moodle)
2) Email (all course inquires): unsw.mech.9720@gmail.com

Course Convenor

Dr. Robert A Taylor*
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Additional Lecturers

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Head Demonstrator

Edward Law
TETB Bldg., Lvl. 1
Email: edward.law@student.unsw.edu.au

2. COURSE DETAILS

Units of credit

This is a 6 unit-of-credit (UoC) course, which includes 3-4 hours per week of face-to-face contact (depending on the laboratory schedule).

budget above indicates the time expected to be spent on various course activities for an average student aiming for a credit grade. Various factors, such as ability, target grade, etc., will influence the time needed in your case.

Aims of the course

This course focusses on the terminology, principles and methods used in solar thermal engineering. Engineering heat transfer analysis will be used to solve much of the quantitative components of the course (Mech3601). This course aims to train students who intend to take more classes, or pursue a career, in renewable energy and/or the thermal sciences.

The course deliberately stays away from photovoltaics and focuses on the conversion of solar energy into heat. This heat can then be used for a wide variety of applications ranging from domestic solar water heating at 70^{o}C to processing minerals (e.g. Aluminium) at >1000^{o}C.

In this course you will cover the following topics: solar radiation theory and measurements, solar thermal collector systems and materials selection, thermal analysis of solar collectors and systems and system testing.

Lecture periods

This course generally involves a 2 hour lecture and a 1 hour problem solving session, but small group laboratory solar thermal testing (times TBD) will be scheduled for weeks 4-9.

> Lectures: Fridays 12:00-14:00 // Electrical Engineering Building G24 (K-G17-G24)
> Problem solving sessions: Fridays 14:00-15:00 (Starts Week 2) // Multiple rooms (Check Your Enrollment)

Expectations of the students

This course involves 3-4 hours per week of face-to-face contact, and it is expected that you will put in, on average, an additional 6-7 hours per week of your own time (including stuvac and exams). Note that the laboratory sections will be scheduled outside of the designated class time. The 6-7 hours of your own time should be spent in revising the lecture material and further reading, completing the set assignment and problem solving session problems, and revising and learning for the examinations.

(b) capable of initiating as well as embracing change
(c) collaborative team workers

3. Professionals who are:
(a) capable of independent, self-directed practice
(b) capable of lifelong learning
(c) capable of operating within an agreed Code of Practice

4. Global Citizens who are:
(a) capable of applying their discipline in local, national and international contexts
(b) culturally aware and capable of respecting diversity and acting in socially just/responsible ways
(c) capable of environmental responsibility

= Developed in this course

In this course, you will be encouraged to develop the noted graduate attributes by undertaking the selected activities and knowledge content. These attributes will be assessed within the prescribed assessment tasks, as shown in the assessment table on Page 6.

You will be supported in developing the above attributes through:
i. the design of academic programs;
ii. course planning and documentation;
iii. learning and teaching strategies; and
iv. assessment strategies.

3. RATIONALE FOR INCLUSION OF CONTENT AND TEACHING APPROACH

This course is included to give you an understanding of how solar thermal systems are designed, constructed and operated by showing you some examples of each, and to give you the general tools necessary to analyse their thermal and fluid flow conditions.

The content reflects the experience of the lecturer in research and development of these systems and some of the practical examples drawn from that experience are used throughout the lectures and problem solving sessions.

Effective learning is supported when you are actively engaged in the learning process and by a climate of enquiry, and these are both an integral part of the lectures and problem solving sessions.

Submission

Although there is no official mark for problem solving session questions, student wanting feedback on their solutions can turn them in at the start of the problem solving session session in the week following when they were assigned. Late submissions will not receive feedback.

Online quizzes are due and

Final exam notes

10/April	Mid-Semester Break: No lecture, *no problem solving session, no laboratory*
6 17/April	Heat transfer in flat plate solar collectors. Solar collector test methods and standards. Selective surfaces, integrated radiation properties. *Problem solving session, laboratory*
7 24/April	**Test *(laboratory held, but no problem solving session)***
8 1/May	Test review. Solar and long

9. COURSE EVALUATION AND DEVELOPMENT

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final problem solving session class for the course, and the Sch Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, revised problem solving session and lecture notes will be included for students. In addition, a demonstrator will be available to support and construct liaise between course convenor and student for continual and further improvement.

10. ADMINISTRATIVE MATTERS

You are expected to have read and be familiar with *Administrative Matters*, available on the School website. This document contains important information on student responsibilities and support, including special consideration, assessment, health and safety, and student equity and diversity.

As a lab course, information on relevant Occupational Health and Safety policies and expectations: www.ohs.unsw.edu.au

General Laboratory Safety

All staff and students must observe all safety requirements in the laboratory. You must come to the laboratory dressed for work, NO LOOSE OR BAGGY CLOTHING, NO SANDALS, and NO BARE FEET. Before beginning any experiment you will be inspect all equipment and the surroundings on the solar lab for potential hazards. While using laboratory equipment keep alert for any developing hazard, other students working, any unusual noise, vibration, unusual data trends, etc.

Dr. Robert A. Taylor
January 2015