MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

2.52 Modelling and Approximation of Thermal Processes

COURSE INFORMATION
Fall Term 2007

1 Credit and Content

During this academic year, 2.52 is being offered as a 6-unit H-level subject. The prerequisite for this course is an advanced undergraduate course in heat transfer, such as 2.51. (Course 2.006 is not a sufficient preparation.)

This course focuses on teaching students how to model thermal transport processes in typical engineering systems such as those found in manufacturing, machinery, and power production. Simplified modelling techniques and experimental interfacing are included. The course is divided into successive modules that cover basic modelling tactics for particular modes of transport, including steady and transient heat conduction. An innovative design project will incorporate many of the concepts.

2 Classes

Lectures: Mondays and Wednesdays from 11:00 am to 12:30 pm during September and October in Room 1-246

Instructors:

Lecturers:	Professor L.R. Glicksman	5-418	x3-2233	glicks@mit.edu
	Professor J.H. Lienhard	3-162	x3-3790	lienhard@mit.edu

Textbook: The course is based primarily on the material given in the lectures. Any comprehensive heat transfer text should suffice. One option is *A Heat Transfer Textbook*, 3/e, by Lienhard and Lienhard (2006), which is available without charge in .pdf format at: *http://web.mit.edu/lienhard/www/ahtt.html*.

3 Exams and Grading

The grade will be based on one exam (40%), a term project (35%), homework and class participation (25%). The exam will be open book. It will cover material from the lectures and the homeworks.

Homework assignments paralleling the lectures will be distributed. These problems will apply the material covered in lectures and are essential to learning that material. They will involve theory, modelling, and design exercises. *It is very strongly recommended that you do all the homework yourself.* Some of these problems will also be worked in class, prior to the final date for the remainder of the homework set; those problems will be identified in class.

4 Lecture Schedule

Lecture	Date†	Topic	Hmwk‡
1	Sept 5	Introduction to modelling	
2	Sept 10	Resistances, order of magnitude	
3	Sept 12	Analogies, bounding estimates	
4	Sept 17	Fins	
5	Sept 19	Multidimensional conduction	
✳	Sept 24	*No class (Vacation day)*	
6	Sept 26	Thermal radiation	#1
7	Oct 1	Transient conduction: Capacity & resistance	
8	Oct 3	Series and chart adaptations	
✳	Oct 8	*No class (Holiday)*	
9	Oct 10	Series and chart adaptations	
10	Oct 15	Semi-infinite body models	
11	Oct 17	Semi-infinite body models	
12	Oct 22	Scaling analysis of transient conduction	#2
❦	Oct 24	Exam	
✳	Oct 29	*No class*	
13	Oct 31	Term project presentations	Project

†Dates and coverage may vary.
‡Some individual homework problems will be due *before* the final due dates listed for the problem sets.