

THERMAL ENVIRONMENTAL ENGINEERING
ME 5103
FALL, 2009
4 CREDITS

- Prerequisites: ME 3331, 3332, and 3333 (Thermal Science I, II, and III)
or equivalent background in engineering thermodynamics, fluid
mechanics, and heat transfer
- Text: THERMAL ENVIRONMENTAL ENGINEERING, by Kuehn,
Ramsey and Threlkeld, 3rd Edition, Prentice Hall, 1998.
- References: ASHRAE Handbook Series, American Society of Heating,
Refrigerating and Air Conditioning Engineers, Atlanta, GA.
- Instructor: T.H. Kuehn, 3101C ME, 625-4520, kuehn001@umn.edu
- Office Hours: to be determined

Course Material

- Chapter 1: Introduction
Chapter 2: Review of Thermodynamics, Heat Transfer and Fluid Mechanics
Chapter 7: Thermodynamic Properties of Moist Air
Chapter 8: Psychrometric Processes and Applications
Chapter 9: The Psychrometer and Humidity Measurement
Chapter 12: Human Thermal Comfort and Indoor Air Quality
Chapter 14: Winter Design Heat Loss
Chapter 13: Solar Radiation
Chapter 15: Instantaneous Heat Gain
Chapter 16: Instantaneous Cooling Load
Chapter 17: Energy Estimation Methods

Students are encouraged to work some of their homework problems on a program called Engineering Equation Solver (EES). Macintosh and Windows versions of the software are available to students free of charge. Manuals are available in PDF format. The software is available on the machines in the IT Instructional Computer Laboratories.

Grading

Homework	20%
2 Hour exams	40% (20% @)
Final Exam	<u>40%</u>
	100%

All mechanical engineering students must take the class A-F.

Any non-ME student taking the class S-N must perform a minimum of C-level work to receive an S.

Grades will be determined strictly on the basis of examinations and homework.

Homework will be graded 70% on correct technical solutions and 30% on written communication skill (e.g. neatness, clear organization, referencing sources for equations, constants and other data).

A grade of Incomplete, "I", will be given only when "due to extraordinary circumstances a student is prevented from completing the coursework on time." (See Grading and Transcript Policy in the Undergraduate Catalogue.) An "I" grade will be considered only when a student has completed all but a small portion of the work. Written arrangements for receiving an "I" grade and details on how the incomplete will be made up must be **completed before the last class period of the semester.**

Examinations

There will be 2 hour-long examinations during the semester plus a final exam. All exams will be open book and open notes. A typical hour exam has three problems plus some short answer problems.

EXAM DATES:

Exam1: Monday, Oct. 19 (Chapters 7, 8, 9 and 12)

Exam 2: Wednesday, Nov. 18 (Chapters 13 and 14)

Final Examination: 8:00-10:00, Tuesday, Dec. 22.

The use of programmable calculators is allowed. However, to receive full credit for any exam problem, the appropriate equations and numerical substitutions must be presented on the exam paper. The final numerical answer and units must also be correct.

Topic Outline

Subject	No. of Periods
Introduction	1
Psychrometric properties and processes	13
Humidity measurement	2
Human thermal comfort and indoor air quality	4
Exam #1	1
Winter design heat loss	19
Moisture transfer in buildings	3
Solar radiation	6
Exam #2	1
Instantaneous heat gain	8
Instantaneous cooling load	5
Degree day and bin energy estimation methods	3
Summary	1