ME 2233 THERMODYNAMIC PRINCIPLES
(Fall 2012)

Class Meeting: TuTh 2:00 – 3:15 pm, Classroom Building (CB) 302
Instructor: Tai-Hsi Fan
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Office Hours: TuTh 10 am – 12 noon
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Teaching Assistant: Javier Martinez Email: jmartrubio@gmail.com
Office: EII-313 Office Hours: MW 9:30 am – 11:30 am


Course Description and Policy

Objectives ME2233 is a sophomore-level engineering thermodynamics. The prerequisites are undergraduate courses in general physics and multivariable calculus. The specific goals of this course for students to achieve are: (1) To learn the basic principles of engineering thermodynamics; (2) To use thermodynamic principles in engineering practices; (3) To be familiar with the language of engineering analysis; (4) To prepare a foundation for advanced thermal-fluid courses including fluid mechanics, thermodynamics II, and heat and mass transfer.

Homework Homework assignments will be made on an approximately biweekly basis. Students are encouraged to discuss homework problems with classmates or the teaching assistant, but the collected works must be individual efforts. Homework must be clearly written on only one side of the paper, and stapled. Using solution manual from the textbook publisher or other resources to prepare the homework is strictly prohibited. Any evidence of using the solution manual will result in a failing grade for the course. Homeworks will be graded by the teaching assistant.

Quiz and Exam There are several 20 minute long quizzes from time to time during the semester. There will be a midterm exam and a final exam. All of the exams and quizzes are closed book and closed note. If needed, the thermodynamic tables will be attached to the exam or quizzes.

Computer and Software There will be no computer programming involved in this course. Access to interactive software and any web-based student resources from the publisher is NOT required.

Absences and Missed Work Class participation is essential for learning thermodynamics. No late homework, makeup quiz, or makeup exam will be accepted unless the missed work is “resulting from extra-curricular/co–curricular activities performed in the interest of the university and/or those that support the scholarly development of the student”. In such case, the student should inform the instructor in advance for further arrangement.

Grade Determination The course grade will be determined based on homework (20%), quizzes (20%), mid-term (30%), and comprehensive final exam (30%).
Course Outlines

• Basic Concepts and Definitions in Engineering Thermodynamics (Ch.1)
  Thermodynamic system, property, state, and process
  Temperature scale, pressure, basic dimension and units
  Thermal equilibrium and thermodynamic equilibrium
  The zeroth law of thermodynamics
  Open system and closed system

• Energy and the First Law of Thermodynamics (Ch. 2)
  Energy, work, and heat transfer
  Point function and path function
  The first law of thermodynamics
  Quasi-equilibrium, polytropic, isolated, isothermal, adiabatic, and cyclic processes
  Performance of a cyclic process

• Thermodynamic Properties (Ch.3)
  State principle
  Simple compressible substance
  T-v, P-v diagrams
  Ideal gas model
  Internal energy, enthalpy, and specific heats

• Midterm (2:00 − 3:15 pm   CB 302)

• Control Volume Analysis (Ch.4)
  Mass and energy conservation for the control volume analysis
  Steady state and transient analyses of open and closed systems

• The Second Law of Thermodynamics (Ch.5)
  Clausius inequality
  The second law of thermodynamics
  Irreversible process
  Kelvin temperature scale
  Carnot corollaries, Carnot cycle and thermal efficiency

• Using Entropy (Ch.6)
  The physical origin of entropy
  Entropy analysis for closed and open systems
  Tds Relations
  Isentropic efficiencies
  Frequently seen devices in thermodynamics

• Exergy Analysis (Ch.7)
  Definition of exergy
  Exergy analysis for closed and open systems

• Final Exam (2 to 3 hrs, schedule to be arranged)