Spring **Yun Wang**

MAE91 INTRODUCTION TO THERMODYNAMICS

Catalog Data: **Introduction to Thermodynamics** Thermodynamic principles; open and closed systems representative of engineering problems. First and second law of thermodynamics with applications to engineering systems and design. Prerequisite: Physics 7C, Mathematics 2D.

Textbooks: Claus Borgnakke, Richard E. Sonntag, Fundamentals of Thermodynamics, 2012.

References: Yunus A. Çengel, Michael A. Boles, Thermodynamics: An Engineering Approach, 1989.

Instructor: Prof. Wang (office TBD) email: yunw@uci.edu Office Hour: 5-10 min in class

Course Outcomes:

1. Identify the control mass and control volume in a thermodynamics problem
2. Calculate properties of pure substances (in three phases) and ideal gases, and use Tables of properties
3. Map different processes on T-v and P-v diagrams
4. Apply the first law of thermodynamics (conservation of energy) to control mass and control volume processes
5. Map different processes on T-s (temperature-entropy) diagram for control mass and control volume
6. Understand the Carnot (ideal) thermodynamic cycle and the limits on the thermal efficiency of real thermodynamic cycles
7. Apply both the first law and second law

Prerequisites By Topic:

Calculus in Two- and Three Dimensions
Fundamental Physics

Lecture Topics:

Concepts, definitions, units
Pressure, specific volume
Temperature: equality, inequality, Zeroth Law
Pure substance, T-v, P-v, P-v-T phase diagrams
Ideal gas, Equation of state
Work, Heat
First law for a system
First law for a control volume
Steady and unsteady flow processes
Reversible and irreversible processes
The entropy concept and the second law
Entropy as a property
Macroscopic evaluation of entropy
Second law for a control mass
Entropy relations

Grading Criteria:

Homework: 15%
Midterm: 0%
Attendance: 5%
Quiz: 10%
Participation: 5%
Final Exam: 65%
Total: 100%