ME 231 Thermodynamics
Spring 2012

Course Instructor: Dr Matt Hagge
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Office Hours: M W R 9:00-11:00
Call cell phone to meet other times

Class Hours: M W F 1:10-2:00 PM
Class Location: Hoover 1312
Textbook: Online, Hagge 2012 - will be available for free electronically

Course Description: Fundamental concepts based on zeroth, first, and second laws of thermodynamics. Properties and processes for ideal gases and solid-liquid-vapor phases of pure substances. Applications to vapor power cycles.

Prerequisites: Math 265, Phys 222, Chem 167

Homework: Assigned problems
Quizzes: Throughout the semester
Final Exam: In normal classroom – Date available online based on 1st contact

Grading: Homework 20%
Quizzes/Class Activities 10%
Exams/Final Project 70%

Topics:

Thermodynamic definitions: internal energy, enthalpy, entropy, specific volume, work, energy, power, etc
Open and Closed Systems, Property Balances, and Rate Balances (Mass, Energy, and Entropy)
Single Components: Pumps, Turbines, Compressors, Nozzles, Diffusers, Heat Exchangers, Expansion Valves
Cycles: Refrigeration, Heat Pumps, Power --- Brayton, Rankine, Combined, Cogeneration
*** Note that psychrometrics, combustion, and compressible flow through converging-diverging nozzles are covered in ME 332 at Iowa State University. ME 332 is part of the required ME curriculum at ISU.

Format:

The focus of the course is on understanding of how mass/energy/entropy enters and leaves a control volume, and how to write the correct set of equations to solve any thermodynamics problem. Basic understanding does not require students to have seen a given problem before. As such, students will be REQUIRED to interact with the instructor on a regular basis to help clarify common misconceptions and misunderstandings. Students are graded based on their understanding, and students who simply copy solutions should expect to do poorly.
Course Outcomes: After taking this course, students will be able to:

- Use thermodynamic terminology to discuss relevant problems
- Follow a 6 step engineering solution process
- Obtain an understanding of how thermodynamic related components and cycles operate
- Understanding a simple set of concepts that can be used to solve any thermodynamics problem
- Master a given set of skills needed to solve thermodynamics problems (unit conversion, interpolation, etc)
- Become competent in mass and energy conservation for a control volume for open and closed systems for both ideal gases and liquid-vapor substances.
- Use EES Software to solve systems of equations and to easily modify problems to learn how changes in pressures, temperatures, etc will affect the performance of a given component
- Work in a team environment and communicate technical topics

- Appreciate thermodynamics in the context of contemporary issues and the interplay of technological, social and political factors in resolving or exacerbating problems facing society.

- If you have a disability and require accommodations, please contact me as soon as possible so that your learning needs may be appropriately met. You will need to provide documentation of your disability to the Disability Resources (DR) office, main floor of the Students Services Building, Room 1076, 515-294-6624.