Syllabus

ENME 2720 --Engineering Thermodynamics II
Autumn 2015

University of Denver
Mechanical and Materials Engineering Department

Meets: 309 CMK, 11:00-11:50 MWF
(3.0 Credit hours), Mechanical Engineering Undergraduate Required Course

Instructor: Dr. Jason Roney
Office: 204 CMK
Telephone: 303-871-2252
Email: jason.roney@du.edu

Course Description:
This course provides a continuation of the topics in Thermodynamics which were covered in ENME 2710 Engineering Thermodynamics I. This course starts with a short review of topics from Thermodynamics I, and continues with Exergy, and applies concepts from both courses to engine, power plant, and refrigeration cycles. Lastly, methods for dealing with gas mixtures and gas-vapor mixtures with applications to air conditioning are studied.

Prerequisites: ENME 2710, Engineering Thermodynamics I

Textbooks:
Cengel, Y.A., Boles, M.A., Thermodynamics: An Engineering Approach, 8th Edition, McGraw Hill Education, 2015. ISBN#:9780073398174

Course Learning Objectives: The student should be able to

- Continue the use of the fundamentals concepts such as 1st Law, 2nd Law, Entropy, and Pure Substance Property Tables.
- Apply the concept of exergy/availability to determine the maximum useful work that can be obtained in a system of processes between two states.
- Analyze the performance of gas power cycles for such cycles as the Otto, Diesel, Stirling, Ericsson, and Brayton cycles (i.e. Spark-Ignition Engines, Diesel Engines, Gas Turbines)
- Analyze vapor power cycles (Rankine cycle) in which the working fluid is vaporized and condensed (i.e. a steam power plant).
- Analyze refrigeration and heat pump cycles.
- Apply the rules for determining mixture properties for ideal-gas and real-gas mixtures.
- Apply concepts related to vapor-gas mixtures and air-conditioning

Approximate Course Schedule: Subject to Change as Quarter Progresses

Dates	Lectures	Approximate Topics Covered and Sequence
2nd Law, Entropy and Exergy		
Sept 14, 16, 18	1, 2, 3	Introductions/Review Thermodynamic Concepts
Sept 21, 23, **25**, 28	4, 5, 6, 7	Exergy
Thermodynamic Cycles		
Sept 30, Oct **2**, 5, 7, **9**, 12	8, 9, 10, 11, 12,13	Gas Power Cycles (Otto, Diesel, Brayton)
Oct 14	14	In-Class Review Session, **Project 1 Assigned (Oct 14 (and Discussed: Due October 28th**
Oct 16	15	Midterm Exam
October 19, 21, **23,** 26	16, 17, 18, 19	Vapor and Combined Power Cycles (Rankine)
October 28, **30**, Nov 2, 4	20, 21, 22, 23	Refrigeration Cycles, **Project 2 Assigned (Oct 28th): Due November 18th**
Thermodynamic Property Relationships and Gaseous Mixtures		
Nov **6**, 9, 11, **13**	24, 25, 26, 27	Gas Mixtures and Air Conditioning
Nov 16	28	In-Class Review Session
November 18	29	*****Comprehensive Final*****

Grading

Weekly Quizzes: 20% (Friday, Marked by Bold Dates)
Project 1: 20% (Exergy)
Project 2: 20% (Thermodynamic Cycles, due Friday, November 20th)
Midterm Exam: 20% (50-55 minutes in-class, October 16th)
Final Exam: 20% (50-55 minutes, last day of class, November 18th)

***Quizzes/Homework*:** Quizzes will be every Friday at the beginning of class for 10-15 minutes. The quizzes will be based on problems that will be assigned from the required textbook each week as well as class content. The homework problems are meant for you to hone your analytical skills and broaden your conceptual knowledge of Thermodynamics, and are not due for a grade. Solutions will be posted with the assignment within the week, and before the Quiz. Your lowest Quiz will be thrown out when calculating the over-all average for your Quiz score.

Projects: Projects are used to synthesize your understanding of Thermodynamics and its practical applications to everyday engineering practice. These projects will require a level of analysis beyond what is required in the homework, and will involve using a computational tool such as Matlab, MS Excel, or similar. The second half of the course will involve solving some problems in this way.

***Late Policy on Projects*:** 10% penalty if not turned in during class period, 25% one calendar day late, 50% two calendar days late, no late work after three calendar days.

Exams: There will be one exam during the quarter at midterm to help chart your progress in being able to solve Thermodynamics II problems. These types of exams will test your analytical skills and your conceptual knowledge. The exams will be in-class and the problem types will resemble in-class examples, quizzes, and assigned homework. An 8.5 x 11 crib sheet and a calculator are allowed for the exam.

Final: The final exam will be given on the last day of class. The final exam is scheduled for November 18th at 11:00 to 11:50 p.m. in 309 CMK. The final exam will focus on material since the midterm, but is comprehensive. An 8.5 x 11 crib sheet and a calculator are allowed for the exam.