MEGR3112 - Thermodynamics II

Catalog Data	General thermodynamic relations; equations of state and generalized charts. Combustion, dissociation and chemical equilibrium. Introduction to power cycles.
References	M. J. Moran and H. N. Shapiro, Fundamentals of Engineering Thermodynamics, Any Edition, John Wiley and Sons, Inc. 2010. See Notes below.
Goals	The objective of this course is to provide the students with an understanding of the application of the fundamental ideas of thermodynamics to power and refrigeration cycles and to chemically reacting mixtures of ideal gases, including systems with condensation or evaporation.
Prerequisite	MEGR3111 with a grade of C or better.
Class Topics	A complete review of all equations and concepts from thermodynamics I Vapor power cycles Refrigeration cycles Gas power cycles Mixtures of ideal gases Mixtures of gases with a condensing component Chemical reactions
Outcomes	After successful completion of this course, the student should be able to do the following: 1. Do a complete thermodynamic analysis of a non-ideal Rankine power cycle with reheat and regeneration. 2. Do a complete thermodynamic analysis of a non-ideal vapor-compression refrigeration cycle. 3. Do a complete thermodynamic analysis of a non-ideal air-standard Brayton cycle with regeneration and reheat. 4. Calculate cycle efficiency for an ideal air-standard Otto or Diesel cycle using non-constant specific heats. 5. Given the thermodynamic properties of the components of a mixture of ideal gases, calculate the thermodynamic properties of the mixture. 6. Calculate the rate of heat transfer for a process involving a mixture of ideal gases with a condensing component. 7. Analyze a combustion process using conservation of mass and the first law of thermodynamics, including calculation of heat release or adiabatic flame temperature.
Computer Usage	Combustion software.
Laboratory	None
Design Content	None

Grading

The course grade is based on the student's performance on three one-hour tests, homework, quizzes and a comprehensive final exam weighted as follows:

Three tests at 20% each:	60%
Long quizzes and homework:	12%
Final exam:	20%
Two-minute quizzes	8%

Follow-up Courses

This course is a prerequisite for Automotive Power Plants, Thermal-Fluids Design, and some courses in the energy concentration.

Academic Integrity

Students have the responsibility to know and observe the requirements of the UNCC Code of Student Academic Integrity (http://legal.uncc.edu/policies/up-407). This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty.

Notes

Since homework problems will not be assigned from the text, any edition of the test book may be used. The text will be used mostly as a reference for you. I will periodically refer to figures in the book.

Course Policy

Homework will be assigned in class, typically one problem per class, and will be due via Canvas before the next class. Due date and time will appear on Canvas. No hard copy or late submissions will be accepted for any reason.

Other than calculators and computers used for note taking, the use of electronic devices (cell phones, mp3 players, iPods, etc.) is not allowed. ***Do not have your phones out during class. Absolutely no texting.***

Calculator Policy

The only calculators allowed for use on tests, quizzes, or on the final exam are those listed on the National Council of Examiners for Engineering and Surveying (NCEES) site at http://ncees.org/exams/calculator-policy. These are the same calculators allowed on the FE exam.

Office Hours

Monday - Thursday: 3:00 – 4:00
Other Times By Appointment