MEC 398 THERMODYNAMICS II

Instructor: Dr. Juldeh Sesay.
Office: Room 226, Heavy Engineering,
Contact: Telephone: (631) 632-8493,
Email address: Juldeh.sessay@stonybrook.edu
Instructor office hours: Mondays and Wednesdays: 10:00AM-11:30AM or by appointment

Course Description:
The course begins with a brief review of the basic concepts introduced in Thermo I, followed by a discussion of exergy. A large portion of the classes falls into the general topic of thermodynamic cycles, discussing the operating principle of common cycles as well as practical applications. HVAC applications are another major topic, along with the topic of equilibrium thermodynamics and its application to mixture, chemical reaction and combustion.

Course Prerequisites: Mass and Heat Transfer
Fluid Mechanics I
Thermodynamics I

Textbook:
Thermodynamics; An Engineering Approach, Ninth Edition by Yunus A. Cengel, Michael A. Boles, Mehmet Kanoglu (McGraw-Hill)

Reference:
Fundamentals of Engineering Thermodynamics, Eighth Edition by Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey (Wiley)

Class schedule:
Lectures: Tuesdays and Thursdays: 2:30PM to 3:50PM,Frey Hall 216

Grading and Class Policies:
Final grade is based on your performance in the following areas
Homework: 10%
Quizzes: 10%
Midterm 1: 25%
Midterm 2: 25%
Final: 30%

Course Topics

Week 1: Lecture 1: Entropy
The concept of entropy, the principle of the increase of entropy, Gibbs' development of equilibrium thermodynamics on the basis of the entropy principle

Week 2: lecture 2: Exergy
Gibbs free energy, the concept of exergy, derivation of the exergy
equation and reduction of the exergy equation to the Carnot formula on the one hand and Gibbs free energy on the other hand

Week 3: Lecture 3: Gas power cycles
Assumptions, Otto cycle, Diesel cycle, Brayton cycle

Week 4: Lecture 4: Vapor power cycle
Rankine cycle, advanced Rankin cycle, cogeneration

Midterm 1: Lectures 1 - 4

Week 5: Lecture 5: Heat pump cycle
Vapor compression heat pump cycle, refrigeration application, the operational issues of heat pump for heating

Week 6: Lecture 6: Thermodynamic relations
Equilibrium thermodynamics, thermodynamic relations

Week 7: Lecture 7: Gas mixtures
Ideal gas mixtures, Dalton's law, Gibbs theorem

Midterm 2: Lectures 5 – 7

Week 8: Spring Break

Week 9: Lecture 9 : Gas-Vapor mixtures and air conditioning
Dry and atmosphere air, specific and relative humidity of air, dew point temperature, The psychrometric chart, air conditioning

Week 10: Lecture 10: Chemical reactions
Fuels and combustion, enthalpy of formation and enthalpy of combustion, energy analysis of reacting and adiabatic flame temperature

Week 11: lecture 11: Combustion
quasi-static chemical reaction processes, equilibrium criterion and the equilibrium constant, law of mass action

Week 12: Lecture 12: Special topic

Final: Lectures 9 - 12

Course Policies:
1. Lecture notes will be posted on the blackboard prior to class.
2. Blackboard will be used for posting lectures, making course announcements, grading, and communicating with the class.
3. Lectures are held on Tuesdays and Thursdays from 02:30PM to 03:50PM
4. No late homework (HW) is accepted and zero grade will be assigned. Each homework will consist of four to six problems. Homework must be submitted in

class immediately after lectures on the due dates. All procedures must be shown in homework's, projects, and tests.

4. The first homework page has to have heading; your name, identification number, course & HW number (MEC 398, HW-2, for example)
5. Submitted homework for grading has to be your own work. You have to show all work or give related references. No makeup tests will be given. If you do homework with someone else, you have to understand and stand behind the submitted work on your own. If it is determined that you are not familiar with the homework you may be responsible for plagiarism and cheating, and therefore loose all credits for that homework and all other homeworks to follow.
6. There are three exams and will be based directly on homeworks and materials covered in class

Instructor expectation:

Be regular in class attendance
Arrive on time
Be attentive and participate in classroom discussions
Come prepared to lectures/recitations
Be up to date on previously cover material
Allocate sufficient time every week to study for this course
Be prepared to work hard and learn

Pet Peeves:

Being distracted or distracting others in class
Not willing to work hard or put an honest effort into learning
Coming to me late in the semester for grade changes, extra credit, etc.
Arguing over partial credit on homework/test grades
Doing other tasks during lectures (including sleeping)
Cellular phones ringing during lectures

Special Needs/Disabilities

If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Disabled Student Services office (DSS), ECC (Educational Communications Center) Building, Room 128,(631)632- 6748. DSS will review your concerns and determine with you what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

Statement on Academic Dishonesty

"Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work is not originally yours. Examples include, *but are not limited to*, copying or plagiarizing class assignments including homework, reports, design, computer programs, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its

administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted to the fullest via the CEAS CASA committee. For you, the honest student, academic dishonesty results in lower class curves, hence a depression in your GPA and class standing, while cheapening the degree you earn."

Calculator Policy

"Effective Spring, 2008 only the following calculators will be permitted to be used on all midterm and final exams in the department of Mechanical Engineering. There will be no exceptions! This list of calculators is identical to that allowed for the National Council for Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) Exam that many of you will take in your senior year, as well as the professional Engineering (PE) exam that you may take several years now. The sooner you become comfortable on one of these calculators, the better.

NCEES Allowed calculators as of spring, 2008:

► Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name

► Hewlett Packard: The HP 33s and HP 35s models, but no others.

► Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.

The NCEES policy on calculators can be found here: http://www.ncees.org/exams/calculators/."