

ENGR 3203 – Thermodynamics

Spring 2009

Department of Engineering and Physics

University of Central Oklahoma

Location	Howell Hall 100
Time	MWF 9:00 – 9:50 a.m.
Instructor	Evan Lemley, Ph.D.; Prof., Department of Engineering and Physics
Office	Howell Hall 221L
Web	http://evan.lemley.org/
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Phone	(405)974-5473
Office Hours	MTW 10:00 – 11:00 a.m. or by appointment.
Final	W May 6, 2009 9:00 a.m. - 10:50 a.m.

Course Description

This course provides an introduction to the laws of thermodynamics. Thermodynamic properties are defined that describe the behavior and state of systems. The laws of thermodynamics are applied to control masses and control volumes. Thermodynamic analysis is applied to a variety of standard thermodynamic devices and cycles.

Prerequisites

ENGR 3203D Thermodynamics Drill (co-requisite enrollment)

PHY 2014 - Physics for Scientists and Engineers I and Lab

MATH 3103 - Differential Equations (or concurrent enrollment)

CHEM 1103 - General Chemistry I

Drill Session

The drill session is designed to give time to work on problem solving with guidance from someone with experience in solving Thermo problems. The drill session for Thermo is Tuesdays from 9:00 a.m. to 9:50 a.m. in Howell Hall 100.

Textbook

Fundamentals of Thermodynamics, 7th ed., Sonntag, Borgnakke, and Van Wylen, Wiley, 2008, ISBN = 978-047004192-5.

Topics Covered:

1. Thermodynamic properties for pure, simple, substances
2. Work and Heat Calculations
3. First Law of Thermodynamics closed and open systems
4. Reversibility/Irreversibility in mechanical systems
5. Entropy

6. Second Law of Thermodynamics for open and closed systems
7. Availability (time permitting)
8. Power Cycles and Vapor Compression Cycles (time permitting)

Calculator

For exams in this course (unless specifically indicated otherwise) you may use any calculator on the following list:

<http://www.ncees.org/exams/calculators/index.php#approved>

Engineering Paper

Engineering Paper -- available from the UCO bookstore and at Thompson's Bookstore. Please use engineering paper for all handwritten homework assignments.

Internet & E-mail

Access to the Internet and ability to send and receive E-mail are required for the class. If you do not have a computer at home or a laptop you can use machines on the UCO campus: Look at

<http://technology.ucok.edu/support/microcomplab.htm>

for a full list of available general use computers on campus.

Note: E-mails directed to the entire class such as class announcements will go to your official UCO e-mail address (the address that ends in *ucok.edu*).

Portable Electronic Devices - including cell phones/pmp's/laptops

Please turn off any portable electronic devices during class. You may not access any portable electronic device during exams except calculators that are on the approved list.

Laptops

Access to laptop computers during lectures is not prohibited. If it appears you are using your laptop for reasons other than those related to the lecture or class activities you will be asked to put the laptop away. Abuse of this privilege could result in a complete ban of laptops in the course.

Instruction Techniques

Lecture will be used three days per week and a drill session one day per week.

Class Polices

- Prepare before you arrive in class by reading sections ahead of time.
- Come to class (some lecture info will be placed on the course website – which you should review as well as attend class). Attendance in lecture sessions is **very strongly recommended and VVVVI**. This is not the only one way you learn, but come prepared for the session and you will learn as much as possible.
- Take notes.

- Listen carefully.
- Keep background conversation and noise to a minimum in class and lab.
- You are responsible for paying attention to all class announcements and notes. Sometimes the course web-site may not have the latest announcements.
- Attendance is mandatory for all exams or other graded activities (e.g. project competitions or presentations).
- Cheating or academic dishonesty of any kind will not be tolerated (see Code of Student Conduct – [http://www.uco.edu/ssvp/conduct/New%20Conduct%20Documents/CSC\(2007-2008\).htm](http://www.uco.edu/ssvp/conduct/New%20Conduct%20Documents/CSC(2007-2008).htm))

Errors

It is possible given the amount of information covered that the instructor may occasionally make a mistake in a lecture or there will be either a poorly grasped or poorly explained topic. The instructor will attempt at the earliest possible opportunity to either correct the mistake or issue a different or better explanation of a particular topic.

Homework/Team Design Project/Programming Projects

Working HW problems in a timely manner is the best way to do well on exams and in the class as a whole. Homework is due at the beginning of the class period on the due-date or due-day. Each HW problem you turn in is worth ten points. Some problems will be graded on detailed solutions and others will be graded on effort. I will **not** tell you ahead of time which or how many problems will be graded relative to a detailed solution, but on the returned and graded HW paper a check mark next to the problem number will indicate full effort (or ten points) and a numerical score (e.g. 8/10) next to the problem number will be used on those problems under more scrutiny.

Paper Homework

Homework papers should be folded length-wise with your name written on the outside of the folded pages before turning it in. Each problem should fit all of the following criteria: clearly labeled, **one problem per sheet of paper**, legible and organized. HW papers that do not fit these criteria will be penalized accordingly. See the following link (http://evan.lemley.org/courses/hwk_format.php) for details on the presentation of HW problems. You may also visit the following site for an electronic version of the homework format requirements:

Electronic Assignments

These may be homework, design projects, or programming projects. What will need to be turned in will vary, but whatever documents you need to submit should be attached to an e-mail message to Dr. Lemley. File names should be distinct from other students – following is the general format for file names:

date_assignment_lname.ext

where

date =

current date in MMDDYY format
assignment = assignment (e.g. *hwk* for a homework & *dpr* for design project)
lname = last name
ext = file extension that indicates the type of file (e.g. *c* for program source, *xls* for a spreadsheet, *ppt* for a PowerPoint presentation, etc...)

For example if your last name is Jones, you have completed an assignment called design project 1, you are submitting on 09/12/07, and you are submitting a report (a MS Word document for example) about the project, then your filename needs to be:

091207_dpr1_jones.doc

Late Homework/Assignments

Homework is generally due at the **beginning of class**. HW turned in after this time will have 20% deducted per late class period. For example: if a paper is turned in one minute after class begins on the day it is due, 20% will be deducted. If it is turned in one minute before the next class meeting time after the assignment is due, 20% will also be deducted. Dr. Lemley will check e-mail just before class – any electronic assignment must be received by the due date/time, or 20% will be deducted.

Project

There will be a project in this course which will constitute a significant portion of your grade. More information will be given to you at the time the project assignment is made.

Grading Policies

The following table shows the breakdown of credit for this course.

HW & Misc.	10%
Exams (3)	15%
Project	20%
Final	25%
Total	100%

Tentative Grading Scale

90-100% -- A, 80-90% -- B, 70-80% -- C, 60-70% -- D, <60% -- F

Final Exam Policy and Exam Attendance

The final exam in this course will be comprehensive and will take place as shown in the tentative schedule

included in the syllabus. In the case that a student scores higher on the final exam than their lowest regular exam, the lowest regular exam score will be replaced by the final exam score. In no event will the final exam score be discarded. Attendance for all exams is required unless an event beyond the student's control intercedes. A missed exam may be excused if the student notifies the instructor as soon as possible (before the exam occurs if possible). Official notification of the reason for the missed exam should be sent via e-mail.

STUDENT INFORMATION SHEET / SYLLABUS ATTACHMENT

Go to: <http://www.uco.edu/academicaffairs/FORMS/StudentInfoSheet.pdf>

DISABILITY SUPPORT SERVICES

http://www.ucok.edu/disability_support/

ENGR 3203 Tentative Schedule for Spring 2009			
Week	Date	Day	Planned Activities
1	01/12/09	Mon	Syllabus & Intro / Thermo Concepts
	01/14/09	Wed	Thermo Concepts
	01/16/09	Fri	Thermo Concepts
2	01/19/09	Mon	NO CLASS – MLK Day
	01/21/09	Wed	Thermo Concepts
	01/23/09	Fri	Properties of pure substances
3	01/26/09	Mon	Properties of pure substances
	01/28/09	Wed	Properties of pure substances
	01/30/09	Fri	Properties of pure substances
4	02/02/09	Mon	Properties of pure substances
	02/04/09	Wed	Work & Heat
	02/06/09	Fri	Work & Heat
5	02/09/09	Mon	Work & Heat
	02/11/09	Wed	Exam 1
	02/13/09	Fri	Work & Heat
6	02/16/09	Mon	FLT – Closed Systems
	02/18/09	Wed	FLT – Closed Systems
	02/20/09	Fri	Enthalpy
7	02/23/09	Mon	Constant Pressure/Volume Specific Heats
	02/25/09	Wed	Properties for Ideal Gases
	02/27/09	Fri	Control Volume Analysis for FLT
8	03/02/09	Mon	Control Volume Analysis for FLT – Steady-State
	03/04/09	Wed	Control Volume Analysis for FLT – Steady-State
	03/06/09	Fri	Control Volume Analysis for FLT – Steady-State
9	03/09/09	Mon	Control Volume Analysis for FLT – Steady-State
	03/11/09	Wed	Control Volume Analysis for FLT – Transient
	03/13/09	Fri	Exam 2
10	03/16/09	Mon	NO CLASS – Spring Break
	03/18/09	Wed	NO CLASS – Spring Break
	03/20/09	Fri	NO CLASS – Spring Break
11	03/23/09	Mon	Heat Engines & Refrigerators
	03/25/09	Wed	Reversibility & Irreversibility
	03/27/09	Fri	Carnot Cycle
12	03/30/09	Mon	Carnot Cycle
	04/01/09	Wed	Entropy
	04/03/09	Fri	Entropy – Generation (last day to drop)
13	04/06/09	Mon	Entropy
	04/08/09	Wed	Entropy – Generation
	04/10/09	Fri	Entropy changes of solids, liquids, and gases
14	04/13/09	Mon	Entropy changes of solids, liquids, and gases
	04/15/09	Wed	SLT for Control Volumes
	04/17/09	Fri	SLT for Control Volumes
15	04/20/09	Mon	SLT for Control Volumes
	04/22/09	Wed	Exam 3
	04/24/09	Fri	Irreversibility & Availability
16	04/27/09	Mon	Irreversibility & Availability
	04/29/09	Wed	Power and Refrigeration Systems
	05/01/09	Fri	Power and Refrigeration Systems
17	05/06/09	Wed	FINAL – 9:00 – 10:50 a.m. HOH 100