

**ENGR 3203 – Thermal Fluid Engineering I (ECL version 2 – Jan. 10, 2007)**

Spring 2007

Department of Engineering and Physics

University of Central Oklahoma

<b>Location</b>	Howell Hall 100
<b>Time</b>	MW 1:00 – 2:15 p.m.
<b>Instructor</b>	Evan Lemley, Ph.D.; Assoc. Prof. of Engineering and Physics
<b>Office</b>	Howell Hall 221L
<b>Web</b>	<a href="http://evan.lemley.org">http://evan.lemley.org</a>
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<b>Phone</b>	(405)974-5473
<b>Office Hours</b>	MWF 10:00 - 10:50 a.m. or by appointment.
<b>Final</b>	F May 4, 2007 from 1:00 – 2:50 p.m.

**Course Description**

This course provides an introduction to the laws of thermodynamics applied to control volumes, definitions of thermodynamic properties, behavior of ideal gases, modes of heat transfer, fluid statics, and use of Bernoulli's equation to solve basic fluid flow problems.

**Prerequisites**

PHY 2014 - Physics for Scientists and Engineers I and Lab

MATH 3103 - Differential Equations (Concurrent enrollment)

CHEM 1103 - General Chemistry I (Concurrent enrollment)

**Textbook (Required)**

Michael J. Moran, Howard N. Shapiro, Bruce R. Munson, David P. DeWitt, *Introduction to Thermal Systems Engineering: Thermodynamics, Fluid Mechanics, and Heat Transfer*, ISBN: 0-471-20490-0, Publisher: Wiley, 2002

**Topics Covered:**

1. Thermodynamic properties for pure, simple, substances
2. Introduction – fluid properties and definitions, and units Equations of Motion for Particles
3. Fluid statics
4. First Law of Thermodynamics closed and open systems
5. Fluid Flow – Integral Formulation and use of Bernoulli's Equation
6. Second Law of Thermodynamics
7. Fourier's law, the diffusion equation, and the energy equation
8. Mechanisms of heat transfer
9. Steady state conduction problems with energy generation
10. Transient Heat Conduction

### Calculator

You must own a scientific calculator – see *the list of allowed calculators for exams in the Department of Engineering and Physics* . **Please bring your calculator to class for each meeting.**

### Engineering Paper

Engineering Paper -- available from the UCO bookstore, Thompson's Bookstore, and Triangle A&E at Broadway Ext. and 63rd. Please use engineering paper for all homework assignments.

### Internet & E-mail

Access to the Internet and ability to send and receive E-mail. If you do not have a computer at home 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)

Please turn off any portable electronic devices (esp. cell phones) during class. You may not access any portable electronic device during exams except calculators that are on the approved list for Engineering and Physics courses.

### Instruction Techniques

Lecture will be used predominantly although sometimes recitation periods will be employed. Lectures often involve examples and are encouraged to be as interactive as possible.

### Class Polices

Attendance is not required, but you will responsible for any announcements or notes from class (and quizzes).

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.

### Homework

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. Homework should be neatly written on only one side of your paper, 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 web-page:

[http://evan.lemley.org/courses/hwk\\_format.php](http://evan.lemley.org/courses/hwk_format.php)

for details on the presentation of HW problems.

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.

### Project

There will be a Team Design Project in this course. The project will constitute a significant portion of your grade. More information will be given to you as project assignments are made.

### Grading Policies

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

HW and Misc.	15%
Exams (x2)	15%
Project	25%
Final Exam	30%
<b>Total</b>	<b>100%</b>

### Tentative Grading Scale

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

### STUDENT INFORMATION SHEET / SYLLABUS ATTACHMENT

See separate handout or go to:

<http://www.busn.ucok.edu/academicaffairs/FORMS/Student%20Information%20SheetSPR07.pdf>

<b>Tentative Class Schedule for Thermal-Fluid Engineering I Spring 2007</b>				
<b>Week #</b>	<b>Day</b>	<b>Date</b>	<b>Topic Covered</b>	<b>Notes</b>
1	M	01/08/07	Syllabus and Introduction	
	W	01/10/07	Thermo Properties and First Law	
2	M	01/15/07	MLK Day – No Class	
	W	01/17/07	FLT	
3	M	01/22/07	Work and Heat	
	W	01/24/07	Work and Heat	
4	M	01/29/07	FLT – Closed Systems	
	W	01/31/07	Properties of pure substances	
5	M	02/05/07	Properties of pure substances – Ideal Gases	
	W	02/07/07	Control Volume Analysis for FLT	
6	M	02/12/07	Control Volume Analysis for FLT	
	W	02/14/07	Control Volume Analysis for FLT	
7	M	02/19/07	SLT for Cycles	
	W	02/21/07	Entropy	
8	M	02/26/07	SLT for Closed Systems	
	W	02/28/07	<b>Exam #1</b>	
9	M	03/05/07	SLT for Control Volumes	
	W	03/07/07	SLT for Control Volumes	
10	M	03/12/07	SLT for Control Volumes	
	W	03/14/07	Fluid Properties	
11	M	03/19/07	Spring Break – No Class	
	W	03/21/07	Spring Break – No Class	
12	M	03/26/07	Fluid Statics	
	W	03/28/07	Fluid Statics	
13	M	04/02/07	Integral Momentum Equation	
	W	04/04/07	Bernoulli Equation	
14	M	04/09/07	Applications for Mechanical Energy Equation	
	W	04/11/07	Applications for Mechanical Energy Equation	
15	M	04/16/07	<b>Exam #2</b>	
	W	04/18/07	Steady Heat Conduction	
16	M	04/23/07	Steady Heat Conduction	
	W	04/25/07	Steady Heat Conduction	
17	F	05/04/07	<b>Final Exam 1:00 – 2:50 p.m.</b>	