

ME 315
Spring 2008
Heat Transfer Laboratory

Class Schedule: Section 1 – Tuesday 11:15-2:15, 221 Reber
Section 2 – Thursday 11:15-2:15, 221 Reber

Text: Fundamentals of Heat and Mass Transfer by Incropera and DeWitt, (1996 and 2002) (4th or 5th Edition). (Optional)

Lab Manual (available on course website)

Course Website: www.mne.psu.edu/me315

Prerequisite: ME 320, ME 345, ME 410

Course Leader: Prof. Stefan Thynell
128 Reber Building
thynell@psu.edu

TA: David Santarelli
221 Reber Building
djs458@psu.edu
Office Hours: Monday 4-5, after class, or by appointment

ME 315 Course Philosophy

The course consists of six experiments. Each experiment is spread over a period of two weeks. In the first week, the theory pertaining the experiment is covered in the ‘prelab.’ The actual experiment is conducted the following week. The experiments include:

- Time Dependent Heat Conduction
- Natural Convection from a Vertical Flat Plate
- Pool Boiling in a Saturated Liquid
- Analysis of Enhanced Concentric Tube and Cross Flow Heat Exchangers
- Forced Convection from a Circular Cylinder Subjected to Cross Flow
- Radiation Heat Transfer in Vacuum from a Hot Cylinder

ME 315 Course Objectives

This course is designed to provide seniors in Mechanical Engineering an opportunity to learn how to perform basic measurements of heat transfer. It also serves as a method for applying and reinforcing material covered in the classroom. At the end of course, students will be able to:

1. Analyze thermal and fluid systems.
2. Understand basic thermal and fluid measurement techniques.
3. Work effectively in teams.
4. Prepare and present clear and concisely written lab reports.

General Notes

- You must have a PC Studio Account to log onto the computers in the heat transfer laboratory. See Matt Lindenberg in 222 Reber if you do not have an account. (See General Laboratory Information section of the Lab Manual for additional computer information).
- Bring the lab manual and text to each lab period.
- Students will work in groups of 3-4, but each student is expected to turn in an original lab report.

Reports and Grading

The average of the six lab reports will be used to compute the final grade. Each lab report is divided into the following sections:

- *Abstract* (10%): Brief summary of the objective of the lab, the results of the lab and their validity.
- *Theoretical Development* (30%): The part completed in the 'prelab.'
- *Outline* (5%): Outline the lab procedure.
- *Data* (25%): Include **all** data obtained during the experiment and a **complete** sample calculation for each type of calculation performed in the data reduction.
- *Results* (15%): In the form of graphs, tables etc. as required.
- *Discussion* (10%): Use the points suggested at the end of the experiment to organize your discussion.
- *Neatness* (5%): The report should be neat and legible. The text of the reports is to be prepared using word processing software. The sample calculations may be handwritten, but the entire data reduction (i.e., data placed in the graphs and tables) must be performed with data processing software, such as MathCAD or a spreadsheet such as Excel.

Individual lab reports are due in lab a week after the laboratory session in which they were completed. The penalty for late submission of a lab is 10 points per day unless permission for late submission is obtained in advance from the TA for a valid excuse. If you are unable to attend a lab for any reason (interview, etc.), please get permission from the TA and reschedule the lab **before** you miss the class. Failure to do so will result in a grade of zero being assigned for the work that was to be completed during the lab period. The last lab will not be accepted after 5 PM on the last day of class (Friday, April 25th). **Failure to turn your lab in by 5 PM on Friday, April 25th will result in a grade of 0.**

Academic Integrity

You are encouraged to discuss the labs with your peers. *However, each individual is responsible for submitting their own unique laboratory reports.* It is essential to your success in ME 84 that you make a mature effort to understand the laboratory assignments. Careful consideration of each problem, even if by trial and error, develops your ability to solve the real-world problems facing you upon graduation. Your group will help you, but ultimately the responsibility is your own; you cannot take your lab group to work!

You will be expected to act in accordance with the academic integrity standards set by the University and the College of Engineering. For more information, please refer to the academic integrity policy available on the web at <http://www.engr.psu.edu/CurrentStudents/acadinteg.asp>.

Course Schedule

Week	Section 1		Section 2		Report Due?
	Date	Topic	Date	Topic	
1	1/15	Introduction	1/17	Introduction	
2	1/22	Prelab Session 1	1/24	Prelab Session 1	
3	1/29	Lab Session 1	1/31	Lab Session 1	
4	2/5	Prelab Session 2	2/7	Prelab Session 2	LAB 1
5	2/12	Lab Session 2	2/14	Lab Session 2	
6	2/19	Prelab Session 3	2/21	Prelab Session 3	LAB 2
7	2/26	Lab Session 3	2/28	Lab Session 3	
8	3/4	Prelab Session 4	3/6	Prelab Session 4	LAB 3
9	3/18	Lab Session 4	3/20	Lab Session 4	
10	3/25	Prelab Session 5	3/27	Prelab Session 5	LAB 4
11	4/1	Lab Session 5	4/3	Lab Session 5	
12	4/8	Prelab Session 6	4/10	Prelab Session 6	LAB 5
13	4/15	Lab Session 6	4/17	Lab Session 6	
14	4/22	No Class	4/24	No Class	LAB 6
15	4/29	No Class	4/31	No Class	

Section 1 Week	Section 2 Week	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1	1	Introduction					
2 & 3	2 & 3	Exp 2	Exp 4	Exp 5	Exp 7	Exp 8	Exp 9
4 & 5	4 & 5	Exp 4	Exp 5	Exp 7	Exp 8	Exp 9	Exp 2
6 & 7	6 & 7	Exp 5	Exp 7	Exp 8	Exp 9	Exp 2	Exp 4
8 & 9	8 & 9	Exp 7	Exp 8	Exp 9	Exp 2	Exp 4	Exp 5
10 & 11	10 & 11	Exp 8	Exp 9	Exp 2	Exp 4	Exp 5	Exp 7
12 & 13	12 & 13	Exp 9	Exp 2	Exp 4	Exp 5	Exp 7	Exp 8