ENFP312 – Heat and Mass Transfer

Marino di Marzo

E-mail: marino@umd.edu
JMP – Room 3104D
Office hours: Tuesday, Wednesday from 12:30 to 2 pm

Course objectives:

- To provide a physical understanding of conduction, convection and radiation, phase change heat transfer and mass transfer phenomena
- To develop a sound methodology enabling the formulation and solution of a broad variety of related engineering problems

Textbook: T.L. Bergman, A.S. Lavine, F.P. Incropera & D.P. DeWitt, Fundamentals of heat and mass transfer, 7th edition, Wiley, 2011

EXAM SCHEDULE

Midterm ONE	**Wednesday, October 5**
Midterm TWO	**Wednesday, November 9**
Final exam	**Saturday, December 17 (0800 – 1000)**

Course content:

Introduction Chapter 1

- Modes of heat transfer
- Energy balances
- Problem solving methodology
- Units & dimensions

Conduction Chapter 2, Chapter 3, Chapter 4, Chapter 5

- Thermal properties
- Diffusion equation
- One and two dimensional steady state
- Internal generation
- Extended surfaces
- Lumped capacitance transient conduction
- Semi-infinite solid transient conduction

Convection Chapter 6, Chapter 7, Chapter 8, Chapter 9

- Boundary layer concept
- Dimensional analysis
- Heat & mass transfer analogy

- Evaporative cooling
- External flow convection
- Cylinders in cross flow
- Impinging jets
- Pipe and duct flow
- Free convection
- External free convection flows
- Free convection in channels
- Free convection in enclosures
- Mixed convection
- Convective mass transfer

Boiling and condensation Chapter 10

- Boiling modes
- Pool boiling
- Flow boiling
- Film condensation
- Dropwise condensation

Heat Exchangers Chapter 11

Radiation Chapter 12, Chapter 13

- Radiation intensity
- Black body radiation
- Surface emissivity, absorption, reflection, transmission
- Kirchhoff's law
- Gray surfaces
- View factors
- Black body radiation exchange
- Radiation exchange between surfaces
- Additional effects

Specific goals for the course are:

This courses focuses on two SOs:

- SO1 - an ability to apply knowledge of mathematics, science, and engineering
- SO5 - an ability to identify, formulate, and solve engineering problems

Grading:

10 Homework, 10 points each	25%
2 Numerical Problems, 10 points each	20%
2 Midterm Exams, 30 points each	30%
Final exam: 50 points	25%

Course Related Policies: http://www.ugst.umd.edu/courserelatedpolicies.html

Homework and Numerical Problems policies:

The homework will be submitted via email to the TA by the due date COB as a pdf file.
The file will be named: <last name><first name initial><homework number>.pdf
The file for homework number 3 by Joe Smith will be named: smithj3.pdf

Numerical Problems will be submitted via email to the TA by the due date CPB as a pdf File. The name of the students in each group will be on the first page of the document.

Tardiness will result in one point deduction per each working day after the deadline.

If you have a registered disability that requires accommodation, please see me immediately