COURSE SYLLABUS

MAE 315 HEAT AND MASS TRANSFER

SUMMER SEMESTER 2015

Lectures:

3:30-6:55p.m. Tuesdays & Thursdays, KDH 124

Credits:

3 Semester Hours (Lectures-3 hrs. Lab-None)

Prerequisites:

MAE 303 Mechanics of Fluids
MAE 311 Thermodynamics I

Instructor:

Dr. A. 0. Demuren
Office: KDH 238K
Tel: 683-6363
Office Hours: By Appointment

Teaching Assistant:

Elias Yazdanshenas
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OFFICE HOURS: Tues & Thur, 12:00--3:00 p.m. & By Appointment

Text:
Heat and Mass Transfer by Y. A. Cengel & A. J. Ghajar
(McGraw Hill, 5th Edition, 2014)

References:

Principles of Heat Transfer by Frank Keith and Mark Bohn
(Brooks/Cole, 6th Edition, 2001)

Heat Transfer by A. F. Mills (Irwin, 1992)

Heat Transfer by L. C. Thomas (Prentice Hall, 1992)

Grading:

Group Problems Pop Quizzes/Computer Projects 50%
Exams 50%

Grading Scale:

A- to A 90--100%
B- to B+ 80--89%
C- to C+ 70--79%
D- to D+ 60--69%
F 0--59%

Objectives:

The goal of the course is to introduce the student to the science and practice of Heat and Mass Transfer. It is intended to develop an understanding for the basic mechanisms of heat transfer and their

governing equations. Physical understanding and fundamental approaches are emphasized through the course. Analogy of heat and mass transfer to flow of electrical current is developed. Students are expected to develop problem solving skills using analytical tools are as well as computer programs. Relation of physical laws to practical applications is required.

Program Outcomes:

(a) An ability to apply knowledge of mathematics, science and engineering.
(b) An ability to design a system, component, or process to meet desired needs.
(c) An ability to identify, formulate, and solve engineering problems.
(d) The broad education necessary to understand the impact of engineering solutions in a global and societal context.
(e) An ability to use techniques, skills, and modern engineering tools necessary for engineering practices.
(f) To apply the knowledge of differential equations, and multivariate calculus to mechanical engineering design and analysis problems.
(g) Ability to write computer programs, and to use already developed software in analysis and design of engineering systems.

General Guidelines:

Regular class attendance is expected. Unless otherwise informed, all homework is due by the next class. Special assignments and computer projects are due after 1 week. Late submissions will be penalized, and will not be accepted once solutions are posted or assignments returned. To obtain full marks, the solution to all problems must contain full workings. Statistics and common sense indicate that failure to submit all assignments usually result in poorer grades.

Responsibilities:

It is the responsibility of the instructor to present the lecturers and assignments as clearly as possible and to help the students to understand the subject to the best of his ability. He must be fair in his dealings with the students. It is the responsibility of the students to attend lectures regularly and make concerted effort to understand the subject. Students must ask questions when they do not understand some subject matter despite making reasonable effort to do so. Students are expected to participate fully in class discussions and to submit all homework and project assignments on time. The students must be fair in their dealings with their colleagues and the instructor.

Course Content:

Fundamental Laws of Heat Transfer by Conduction, Convection and Radiation; Boundary Layer Concepts; Simultaneous Heat, Mass and Momentum Transfer.

COURSE OUTLINE

WEEK NOS.	Description
	Chapter 1 -Basic modes of Heat Transfer: Fundamental Concepts; Heat Conduction; Convection; Radiation; Combined modes; Concepts of Thermal lnsulation.
1-2	Chapters 2-4 - Heat Conduction: The Conduction Equation; Steady Heat Conduction; Transient Heat Conduction.
	Exam 1
3	Chapter 5 - Numerical Analysis of Heat Conduction: 1D Steady Conduction; 1D Unsteady Conduction.
4-5	Chapter 6 - Analysis of Convection Heat Transfer: Fundamental Concepts; Dimensionless parameters; Convection Heat Transfer Coefficient.
	Chapter 8- Forced Convection Inside Tubes and Ducts: Laminar Forced Convection; Turbulent Forced Convection; Cooling of Electronic Devices.
	Exam2

Chapter 7- Forced Convection over Exterior Surfaces: Flow and Heat Transfer over Bluff Bodies, Cylinders, Spheres and Other Shapes; Tube Bundles in Crossflow.

6 Chapter 11 -Heat Exchangers: Types of Heat Exchangers; Analysis Methods. Selection of Heat Exchangers.

Exam3

7 Chapter 12 - Heat Transfer by Radiation: Thermal Radiation; Blackbody Radiation; Radiation Properties; Application to Real-Bodies.