



Mechanical Engineering Dept. Department

Syllabus

ME 440: Convective Heat/Mass Transfer (3-0-3)

Course Catalog Description:

Boundary layers; laminar boundary layer heat transfer; turbulent boundary layer heat transfer; free convection boundary layers; enclosures; convection mass transfer; boiling and condensation; pool boiling; two-phase flow; laminar and turbulent film condensation.

Course Pre-requisites:

- ME 315: Heat Transfer

Course Objectives:

1. Be able to analyze convective heat transfer problems: Internal and external flow, laminar or turbulent flow, free or forced convection heat transfer.
2. Be able to sketch the control volume analysis with all boundary and initial conditions
3. Be able to solve the constricted mathematical model analytically, or numerically, using the existing tools and software.
4. Be able to analyze and interpret the results and developing mathematical correlations.
5. Be aware of emerging technologies such as computational fluid mechanics, heat and mass transfer software such as FLUENT

Course Learning Outcomes:

CLO1. Be able to analyze convective heat transfer problems: Internal and external flow, laminar or turbulent flow, free or forced convection heat transfer.

CLO2. Be able to sketch the control volume analysis with all boundary and initial conditions

CLO3. Be able to solve the constricted mathematical model analytically, or numerically, using the existing tools and software.

CLO4. Be able to analyze and interpret the results and developing mathematical correlations.

CLO5. Be aware of emerging technologies such as computational fluid mechanics, heat and mass transfer software such as FLUENT

Learning Resources:

- Fundamentals of Heat and Mass Transfer, Incropera and D DeWitt, John Wiley Publications, 6 Ed.
- 1. Heat Transfer-Professional Version Lindon C. Thomas, Capstone Publisher. 2. Heat Transfer Y.A. Cengel, WCB/McGraw-Hill

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Major Exam 2	11	20.0%
Project	15	10.0%
Final Exam	16	30.0%
Major Exam 1	6	20.0%
Quizzes	Various	10.0%
Homework assignments	Various	10.0%

Lecture Weekly Schedule:

Week#	Topics
1	Boundary Layers; Laminar boundary layer heat transfer
2	Boundary Layers; Laminar boundary layer heat transfer (Continue)
3	External convective heat transfer
4	External convective heat transfer (Continue)
5	Internal convective heat transfer
6	Internal convective heat transfer (Continue)
7	Free convection boundary layers; enclosures
8	Free convection boundary layers; enclosures (Continue)
9	Boiling and condensation
10	Boiling and condensation (Continue)
11	Boiling and condensation (Continue)
	Turbulent boundary layer heat transfer
12	Turbulent boundary layer heat transfer (Continue)
13	Turbulent boundary layer heat transfer (Continue)
	Mass transfer
14	Mass transfer (Continue)
15	Mass transfer (Continue)