

MEC 501: Convective Heat Transfer and Heat Exchange

Fall 2022

Class hours: Friday 12:30 pm to 15:20 am

Course Description: Derivation of governing equations in differential and integral forms from mass conservation, laws of motion, and laws of thermodynamics. Exact and approximate solutions by scale analysis, integral method, and similarity solutions. Topics include laminar external boundary layer flow and heat transfer, laminar internal flow and heat transfer, natural convection, and turbulent flow and heat transfer.

Learning Objectives: This course is designed for students to acquire the ability of estimating convective heat transfer rate of engineering systems and man-made systems, and to be prepared for conducting independent research project in convective heat transfer problems.

Prerequisites: None

Textbook: *Convection Heat Transfer* by Adrian Bejan, 4th edition (John Wiley and Sons, New York 2013)

Course Topics:

0. Introduction
1. Fundamental Principles and Governing Equations
2. Laminar External Boundary Layer Forced Convection
3. Laminar Duct Flow Forced Convection
- Midterm Exam
4. Natural Convection
5. Turbulent Flows and Heat Transfer
6. Special Topics in Convection
- Final Exam.

Grades:

Homework	20 points
Presentation	20 points
Midterm Exam	30 points
Final exam.	30 points