

MIE1212 – Convective Heat Transfer

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Lectures: Wed. 10:00-12:00
GB404

Grading: Assignments 50%
Final 50%

Suggested Text books:

William Kays, Michael Crawford, Bernhard Weigand, "Convective Heat and Mass Transfer", 4th edition, McGrawHill (2005)

Adrian Bejan, "Convection Heat Transfer", 3rd edition, John Wiley (2004)

E.R.G. Eckert, R.M. Drake, "Analysis of Heat and Mass Transfer", McGraw-Hill (1972)

Course Outline:

The basic partial differential equations of material transport by fluid flow is derived along with the most significant analytical solutions of these equations, e.g., fully developed laminar flow and heat transfer in pipes and channels. Prediction of heat and mass transfer rates based on analytical and numerical solutions of the governing partial differential equations. Heat transfer in fully developed pipe and channel flow, laminar boundary layers, and turbulent boundary layers. Approximate models for turbulent flows. General introduction to heat transfer in complex flows. Discussion will be centered on boundary conditions for heat transfer, similarity and dimensionless parameters, and boundary layer approximations.

Content:

1. Introduction
2. Conservation Principles
3. Fluid Stresses and Flux Laws
4. Differential equations for laminar boundary layer
5. Laminar Internal flows
6. Laminar external flows
7. Differential equations for turbulent boundary layer
8. Turbulent external boundary layers
9. Turbulent internal flows

Assignment:

Problems are assigned on bi-weekly basis and will be normally due on Wednesdays.