THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Intermediate Heat Transfer

MECHENG 6510

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
In-depth derivation of equations and principles governing heat transfer with an emphasis on formulation of problems. Mass transfer is also introduced.

Prerequisites and Co-requisites:
Prereq: Grad standing in MechEng or AeroEng; or permission of instructor.

Course Goals / Objectives:
- Introduce entering graduate students and advanced undergraduate students to the principle of heat and mass from a graduate perspective
- Teach the fundamentals behind the derivation and meaning of the governing equations in heat transfer
- Teach the fundamentals behind the derivation and meaning of the governing equations in mass transfer

Course Topics:

- Introduction, modes and constitutive relations, conductivity tensor, Maxwell’s heat conduction equation
- Conservation laws, cylindrical and spherical coordinates
- Steady 1-D conduction, fins, unsteady lumped systems
- 2-D conduction, separation of variables, Sturm-Liouville theory
- Convection, thermal energy balance
- Boundary layer theory, thermal boundary layers
- Viscous dissipation, natural or free convection
- Heat transfer in internal flow
- Mass transfer, analogy between heat and mass transfer
- Thermal radiation, view factors, black and gray surfaces
- Radiation exchange between surfaces, enclosures
- Gas radiation

Designation:

Elective