

## AA 419 COURSE DETAILS

<b>TITLE:</b>	Aerospace Heat Transfer
<b>CREDITS:</b>	3
<b>FORMAT &amp; SCHEDULE:</b>	Lecture, 3 hours / week
<b>FACULTY CONTACT:</b>	Uri Shumlak

### **COURSE DESCRIPTION (Catalog Short Form, 50 words Max):**

Fundamentals of conductive, convective, and radiative heat transfer with emphasis on applications to atmospheric and space flight.

### **COURSE OVERVIEW & LEARNING OBJECTIVES:**

Course Objectives:

1. Students will be able to derive the governing equations of heat transfer.
2. Students will be able to analytically and numerically solve problems of heat conduction and convection.
3. Students will be able to analytically solve problems of radiative heat transfer.

## COURSE REQUIREMENTS

**PREREQUISITES:** 1) MATH 307  
2) PHYS 123

**REQUIRED TEXTBOOK:** Bergman, Lavin, Incropera, DeWitt. Fundamentals of Heat and Mass Transfer, 7th Edition, Wiley, 2011

## COURSE SCHEDULE

### Topics

Motivation, Context, Fundamental Physics, Modes of Heat Transfer

Governing Equations, Nondimensional Parameters --  $Fo, Bi, Pr$

Heat Conduction, Thermal Diffusion, 1D Steady-State, Boundary Conditions, Fins

Thermal Resistance, Axisymmetric Geometries, 2D/3D Steady-State, Separation of Variables

Transient Conduction, Lumped Capacitance, Numerical Methods

Heat Convection, Conservation Laws, Similarity Analysis, External Flows, Internal Flows

Fully Developed, Laminar & Turbulent Flows, Free Convection, Heat Exchangers

Heat Radiation, Blackbody, Kirchhoff's Law, Absorptivity/Reflectivity, Opacity

Radiative Transfer Between Surfaces, View Factors