# MECH3310 Heat Transfer

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| **Course Code:** MECH 3310 | **Course Title:** Heat Transfer |
| **Required Course Or Elective Course:** Required | **Terms Offered (Credits):** Fall (3 credits) |
| **Faculty In Charge:** Shuhuai Yao | **Pre/Co-Requisites:** MECH 2310, MECH 3210 |
| **Course Structure:** Lecture: 2 sessions/week, 80 minutes/session | |
| **Textbook/Required Material:**<br>(1) Textbook: Fundamentals of Heat Mass Transfer, Incropera et al.<br>(2) Class notes. | |
| **Course Description:**<br>Steady-state and transient heat conduction; forced and natural convection; radiation exchange; multimode heat transfer analysis; Introduction to numerical methods. | |
| **Course Topics:**<br>1. Introduction (modes of heat transfer, relationship to thermodynamics)<br>2. Steady-state conduction (thermal circuit, extended surfaces)<br>3. Transient conduction (lumped capacitance model)<br>4. Introduction to numerical methods in multi-dimensional heat conduction<br>5. Forced convection (momentum and heat boundary layer analogies, empirical correlations)<br>6. Natural convection (scaling and correlations)<br>7. Introduction to phase change<br>8. Radiation (radiative properties, radiation exchange between surfaces) | |
| **Course Objectives:** | 1. To provide our students with a fundamental understanding of heat transfer processes.<br>2. To provide our students with the ability to apply knowledge of mathematics and science to solve engineering problems in heat transfer.<br>3. To provide our students with the ability to identify a suitable model and formulate scientific analysis for practical problems in heat transfer.<br>4. To inspire students to understand the nature (wind chill) and man-made (heat sink) system involving heat transfer using the knowledge obtained in classes. |
| **Course Outcomes:** | On successful completion of this course, students are expected to be able to:<br>A. Explain the basic concepts of conduction, convection, and radiation heat transfer.<br>B. Formulate and solve simple conduction heat transfer problems, using techniques including both closed form and numerical methods.<br>C. Apply empirical correlations for both forced and natural convection to determine values for the convection heat transfer coefficient.<br>D. Examine blackbody and gray surface radiation, and evaluate radiation exchange between surfaces.<br>E. Apply the principles of conduction, convection and radiation heat transfer to analyze natural phenomena. |

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| **Assessment Tools:** | Homework problems Regular homework assignments | 15% |
| | Class participation and quiz | 5% |
| | Mid-term and final examinations | 80% |