# MECH3310 Heat Transfer

<table>
<thead>
<tr>
<th>Course Code: MECH 3310</th>
<th>Course Title: Heat Transfer</th>
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<tr>
<td>Required Course Or Elective Course: Required</td>
<td>Terms Offered (Credits): Fall (3 credits)</td>
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<tr>
<td>Faculty In Charge: Shuhuai Yao</td>
<td>Pre/Core-Requisites: MECH 2310, MECH 3210</td>
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**Course Structure:** Lecture: 2 sessions/week, 80 minutes/session

**Textbook/Required Material:**
2. Class notes.

**Course Description:**
Steady-state and transient heat conduction; forced and natural convection; radiation exchange; multimode heat transfer analysis; Introduction to numerical methods.

**Course Topics:**
1. Introduction (modes of heat transfer, relationship to thermodynamics)
2. Steady-state conduction (thermal circuit, extended surfaces)
3. Transient conduction (lumped capacitance model)
4. Introduction to numerical methods in multi-dimensional heat conduction
5. Forced convection (momentum and heat boundary layer analogies, empirical correlations)
6. Natural convection (scaling and correlations)
7. Introduction to phase change
8. Radiation (radiative properties, radiation exchange between surfaces)

**Course Objectives:**
1. To provide our students with a fundamental understanding of heat transfer processes.
2. To provide our students with the ability to apply knowledge of mathematics and science to solve engineering problems in heat transfer.
3. To provide our students with the ability to identify a suitable model and formulate scientific analysis for practical problems in heat transfer.
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:
A. Explain the basic concepts of conduction, convection, and radiation heat transfer.
B. Formulate and solve simple conduction heat transfer problems, using techniques including both closed form and numerical methods.
C. Apply empirical correlations for both forced and natural convection to determine values for the convection heat transfer coefficient.
D. Examine blackbody and gray surface radiation, and evaluate radiation exchange between surfaces.
E. Apply the principles of conduction, convection and radiation heat transfer to analyze natural phenomena.
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<tr>
<th>Assessment Tools</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework problems Regular homework assignments</td>
<td>15%</td>
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<tr>
<td>Class participation and quiz</td>
<td>5%</td>
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<td>Mid-term and final examinations</td>
<td>80%</td>
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