

**ME 306: Heat Transfer**  
**Spring Semester Only**

<b>Type (check one):</b>	Required:    ✓            Elective:
<b>2005-2006 Catalog Data:</b>	An introductory treatment of conduction, convection, and radiation heat transfer. Analysis of <u>steady and unsteady heat conduction</u> in simple geometries, boundary layer analysis and empirical correlations for convection, and basic theory of radiation heat transfer. <i>One semester; three credits</i>
<b>Prerequisites:</b>	ME 313
<b>Co-Prerequisites:</b>	MATH 329
<b>Textbook:</b>	Incropera, F P & DeWitt, D P, <i>Fundamentals of Heat &amp; Mass Transfer, 5<sup>th</sup> Ed</i> , John Wiley, 2002
<b>Other Required Materials:</b>	None
<b>Other References:</b>	None
<b>Instructor:</b>	Dr. Ray W. Brown, Professor of Mechanical Engineering
<b>Course Objectives:</b>	<ol style="list-style-type: none"><li>1. Develop understanding of engineering heat transfer</li><li>2. Develop understanding of finite-difference analysis of thermal systems</li></ol>
<b>Prerequisites by Topics:</b>	<ol style="list-style-type: none"><li>1. Thermodynamics</li><li>2. Fluid mechanics</li><li>3. Differential equations</li><li>4. Numerical methods</li></ol>
<b>Topics:</b>	<ol style="list-style-type: none"><li>1. Fourier's law</li><li>2. 1D steady conduction</li><li>3. Series and parallel resistances</li><li>4. Heat sources and heat generation</li><li>5. Conduction and convection</li><li>6. Multidimensional systems: analytical and numerical solutions</li><li>7. Unsteady conduction: analytical and numerical solutions; lumped methods</li><li>8. Empirical correlations for free and forced convection</li><li>9. Thermal radiation fundamentals</li><li>10. Radiation shape factors</li><li>11. Black and gray surfaces; emissivity</li><li>12. Network analysis for thermal radiation</li></ol>
<b>Class Schedule:</b>	Three 50-minute sessions per week
<b>Prepared by:</b> Dr. Ray W. Brown	<b>Date:</b> Oct 19, 2005

**Professional Component:  
ME 306 – Heat Transfer**

Category (check one)	<p>Math/Basic Science</p> <p><input checked="" type="checkbox"/> Engineering</p> <p><input type="checkbox"/> General Education</p> <p><input type="checkbox"/> Other</p> <p><input type="checkbox"/></p>
Design (check one)	<p>Significant</p> <p><input type="checkbox"/> Some</p> <p><input checked="" type="checkbox"/> None</p> <p><input type="checkbox"/></p>
Realistic Constraints (check all that apply)	<p>Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input type="checkbox"/> Sustainability</p> <p><input type="checkbox"/> Manufacturability</p> <p><input type="checkbox"/> Ethical</p> <p><input type="checkbox"/> Health &amp; Safety</p> <p><input type="checkbox"/> Social</p> <p><input type="checkbox"/> Political</p> <p><input type="checkbox"/></p>

**Relationship to Program Outcomes:**

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
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