INSTRUCTOR INFORMATION:

<table>
<thead>
<tr>
<th>Instructors:</th>
<th>Teaching Assistants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Rick Martin</td>
<td>Name tbd</td>
</tr>
<tr>
<td><a href="mailto:richarjm@usc.edu">richarjm@usc.edu</a></td>
<td>M tbd</td>
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<tr>
<td>Urgent only:</td>
<td>loc tbd</td>
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<tr>
<td>Dr. Leslie King</td>
<td>Tu tbd</td>
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<td>tbd</td>
<td>loc tbd</td>
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<td>Urgent only:</td>
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<tr>
<td>Office Loc: BHE-315</td>
<td>Name tbd</td>
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<tr>
<th>Lecture:</th>
<th>Discussion Sections:</th>
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<tbody>
<tr>
<td>WPH-B27 T, Th 08:00 – 09:20 am</td>
<td>Tu tbd: loc tbd</td>
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<tr>
<th>Office Hours:</th>
<th>W tbd: loc tbd</th>
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<tr>
<td>RM: Th 11:00AM-1:00PM, Th 1:30-2:30PM</td>
<td>W tbd: loc tbd</td>
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<td>LK: W tbd</td>
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TEXT, READING RESOURCES


ISBN# 978-1-25-927990-4

PURPOSE OF COURSE

Catalog Description: General principles underlying heat transfer by conduction, convection, and radiation; steady and transient conditions; heat exchangers. Prerequisite: AME 310. Co-requisite: AME 309 or CE 309.

General. This course is a one-semester introduction to heat transfer for mechanical and aerospace engineering students and others who need a solid understanding of the subject. For students intending to specialize in the thermosciences, advanced courses in convection, radiation, mass transfer, boiling/condensation, combustion, heat exchangers, and computational methods are encouraged.

Background. The course material presented assumes the student has attained competency in physics, chemistry, calculus (including some knowledge of differential equations), engineering thermodynamics, and fluid mechanics. The format will be lecture plus optional discussion sections. There is no lab.

Applications. To emphasize the practical aspects of the subject, the lectures will contain “real world” applications of heat transfer in the engineering profession. Practical application topics may include: utility boilers, industrial freezers, computer chip cooling, coffee makers, camp fires, thermal oxidizers, rotary kilns, temperature sensors, space shuttle tiles, and burn injuries.
**Instructors.** Drs. Martin and King will lecture and provide office hours as a “team”. Students must sit for quizzes and exams during the section in which they are enrolled. Students enrolled in Section 28761 will have their work evaluated primarily by Dr. Martin. Students enrolled in section 28762 will have their work evaluated primarily by Dr. King.

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**Objective:** To introduce the student to the fundamentals of heat transfer by conduction, convection (forced and buoyant) and radiation.

After completing this course, students will be able to:

1. Scrutinize a heat transfer calculation for “obvious” mistakes
2. Analyze 1D steady heat conduction in planar, cylindrical and spherical geometry
3. Use shape factors for 2D conduction and know when shape factors are not applicable
4. Employ numerical methods to derive approximate solutions for 2D conduction problems.
5. Know what the lumped capacitance method for unsteady conduction is, and when it is applicable
6. Know how to compute temperature distribution versus time for slabs, cylinders and spheres.
7. Describe the structure of thermal and momentum boundary layers
8. Understand constant-temperature and constant-heat-flux boundary problems
9. Apply empirical formulas for forced or buoyant convection to compute temperature or heat flow
10. Understand and employ dimensionless parameters to characterize thermal systems.
11. Compute radiation heat transfer between two or more gray surfaces with known shape factors
12. Estimate which mode of heat transfer (conduction, convection, radiation) dominates a system
13. Perform a preliminary design of a heat exchanger.

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Students earn points (1000 possible) by successfully completing the following assignments:

- **Homework** 240 (approximately 1 per week, graded)
- **Scheduled Quiz** 100 (4 per semester, 25 each)
- **Midterm Exams** 300 (2 per semester)
- **Design Project** 60 (1)
- **Final Exam** 300 (1)
- **Pop Quiz** 50 extra credit (2 given at random times during the semester, 25 each)

Final grades are based on absolute scores and calibrated against a normal distribution to ensure fairest treatment for each student. See course schedule for reading and homework assignments.

- **A** (920+), **A-** (880+) (mastered essentially all the material)
- **B+** (850+), **B** (820+), **B-** (780+) (mastered the majority of the material)
- **C+** (750+), **C** (720+), **C-** (680+) (understood the material)
- **D+** (650+), **D** (600+) (only grasped minimum content; consider re-taking course)
- **F** (599 and below) (failed to grasp the material; must re-take course)

_Higher Transfer is a difficult but rewarding subject. Don’t fall behind by failing to complete homework (24% of grade)!_