

ME 119a - Heat Transfer: Conduction and Radiation
Tuesday, Thursday, 1:00-2:25 pm
Location: Thomas Building, Room 306

- Instructor:** Prof. Austin Minnich, 323 Thomas
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Admin: Maria Koeper, 321 Thomas, mkoeper@caltech.edu
- TA:** Gerry Della Rocca
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- Class Website:** <https://courses.caltech.edu/course/view.php?id=781>
(ME119a on courses.caltech.edu)
- Prerequisites:** Basic principles of thermodynamics, vector calculus, some experience with first and second-order ODEs, and linear PDEs.
- Reference Texts:** “**A Heat Transfer Textbook**”, J. H. Lienhard. Available for free at <http://web.mit.edu/lienhard/www/ahtt.html>
“**Fundamental of Heat and Mass Transfer**”, F.P. Incropera & D.P. DeWitt
“**Basic Heat & Mass Transfer**”, A. F. Mills
“**Thermal Radiation Heat Transfer**”, R. Siegel & J.R. Howell
“**Radiative Heat Transfer**”, 2nd ed, Michael Modest
- Exams:** *Midterm:* Oct 26 – Nov 1 Take home
Final: Dec 7 – 9 Take home
- Problem Sets:** Weekly problem sets will be assigned on Thursday and are due by Thursday of the following week. You may discuss homework problems with other students, but each student must turn in work that represents his/her own efforts. Late work is accepted with valid excuses, but must be discussed well in advance with the instructor.
- Problem sets are due in class. Solutions will be posted online.
- Grades:** Problems: 25 %
Midterm Exam: 30 %
Final Exam: 45 %
- Honor Code:** All members of the Caltech community are expected to adhere to the Honor Code, which states, “No member of the Caltech community shall take unfair advantage of any other member of the Caltech community.” Honor Code violations will be reported to the appropriate governing body. Students are also reminded “every member must share the responsibility of protecting the Caltech community and perpetuating the Honor System.”

Schedule of Lectures and Other Events

<u>WEEK:</u>	<u>LECTURES + EVENTS</u>	<u>PROBLEM SETS DUE</u>
Sep 26	Introductory concepts; gas kinetics	
Oct 3	Gas kinetics; Conservation equations	Th, Oct 6
Oct 10	Steady heat conduction; thermal resistance, fins	Th, Oct 13
Oct 17	Transient heat conduction, lumped capacitance, one-term approximation	Th, Oct 20
Oct 24	Multi-dimensional heat conduction; numerical methods; transforms	Th, Oct 27
Oct 26 – Nov 1	Midterm exam period	
Oct 31	Introduction to radiation Black bodies, photon gas	-----
Nov 7	Diffuse surface transfer, enclosures, viewfactors	Th, Nov 10
Nov 14	Equation of radiative transfer; absorbing media	Th, Nov 17
Nov 21	Coupled problems – radiation+conduction	Tu Nov 29
Nov 28	Heat transfer at short length and time scales; review	Th, Dec 1
Dec 7 – 9	Final exam period	