

ME 449/549  
Spring 2006

Thermal Management Measurements  
PSU Mechanical and Materials Engineering

### Course Objectives

ME 449/549 is a course on laboratory techniques for diagnosing and documenting thermal management problems in electronic equipment. Direct laboratory experimentation is used as a complement to analysis in the design of thermal management solutions. We limit our discussion to air-cooled systems as this encompasses the widest range of electronic equipment, and it allows us to deal with a manageable number of topics. The course involves lectures and laboratory experience, with a strong emphasis given to hands-on activity in the lab. Students who take this course will

- gain direct experience with sensors for temperature, pressure, and flow measurements,
- work with instrumentation suitable for temperature, pressure, and flow measurement in electronic systems,
- perform experiments on systems experiencing conduction, forced convection, free convection, and radiation heat transfer,
- make measurements on system components such as fins, inlet grills, fans,
- gain experience with mock-up systems useful in the prototype design phase,
- test and diagnose existing electronic equipment with thermal management problems.

### Prerequisites

Senior or graduate standing, EAS 361, ME 323

### Textbooks

There is no required textbook for the course. Class notes will be distributed during lecture and posted on the class web site. As a reference text you might consider the book edited by Azar:

Kaveh Azar, ed., *Thermal Measurements in Electronics Cooling*, 1997, CRC Press, Boca Raton, FL.

### Instructor

Gerald Recktenwald, Associate Professor, Mechanical Engineering Department  
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Web site for the course: <http://www.me.pdx.edu/gerry/class/ME449>

### Grading

Cumulative grades will be based on the following weights: Lab Notebook 15%, Weekly Laboratory Assignment 25%, Midterm Exam 30%, Final Project 30%.

## **Policies**

One midterm exam will be given. Please discuss any potential conflicts *well before the exam dates*.

Students are expected to turn in homework assignments and laboratory reports that are substantially the result of their own work. Study groups, discussion of assignments among students, collective brainstorming for solutions, and sharing of advice is encouraged. Copying of assignments, computer files, graphs, or other means of duplicating material that is turned in for grading is *expressly* forbidden. *Cheating on exams will result in a zero grade for the exam.*

If you have a disability and are in need of academic accommodations, please notify me (G. Recktenwald) immediately to arrange needed supports. If you need information about disabilities, please contact the Disability Resource Center on campus at 503-725-4150.