

Physics 451

Thermodynamics (IS)

Fall 2016

Instructor

Scott A. Hill



Assistant Professor of Physics
Ph.D., University of Chicago, 2002

Email: shill@adrian.edu

Instant doogadgit (AIM)

Messaging: physhill (Google Chat)
567-343-2284 (SMS)

Phone: (517) 265-5161 **x4578**

Office Location: Peelle 208

Office Hours: Mondays and Fridays 11am-noon
Tuesdays and Thursdays 1-2pm
or by appointment

Description

Thermodynamics is the study of the bulk macroscopic quantities of systems containing large numbers of individual components. With the use of simple models, we use statistical analysis to derive quantities such as temperature, pressure, and entropy, determine the properties of a material at equilibrium, and analyze the flow of energy, in the form of heat and work, between macroscopic systems.

HLC Credit Hour Statement

The credit hour calculation includes a 1 hour weekly meeting, 2 hours of reading the textbook (including working through derivations and example problems), and 4 hours a week working on homework problems. The course will cover 13 weeks, for a total of $(1+2+4) \times 13 = 91$ hours of effort, sufficient for a two-credit course.

Course Goals

On successful completion of this course, you will be able to do the following:

- Identify and distinguish forms of energy in thermal physics
- Compute energy exchange during thermodynamic processes
- Explain the concept of entropy and its application to many-particle physical systems
- Calculate the probability of many-particle macrostates using statistical methods
- Work with a variety of practical thermodynamics systems and processes
- Solve advanced quantitative problems involving thermodynamic concepts

Required Materials

Textbook

An Introduction to Thermal Physics by Daniel V. Schroeder (2000). ISBN 0-201-38027-7.

Assessment

- **Weekly Participation (20% of grade)**

Each Friday, the student will be given a reading assignment and a set of problems. We will meet on Wednesday at 11am to discuss the reading, and the student will present her initial solutions to the problems. Her preparation each week will be graded on a scale of 3 points:

- 3 points: has made significant progress on all problems and is able to discuss the reading
- 2 points: has made progress on some of the problems
- 1 point: has done the reading, but has not begun the homework in any significant way.
- 0 points: has not prepared

The student is permitted to postpone an assignment until the following week **one time**, by notifying the instructor before 11:15 on Wednesday.

- **Homework (30%)**

The student will submit the completed homework assignment by Friday at 3pm for a grade. Assignments will only be accepted late at the discretion of the instructor.

- **Midterm (25%)**

The midterm exam will be on October 5th (or October 12th if an assignment was postponed a week before then) during the regular meeting hour, and will cover Chapters 1-3 in the book. The student will be permitted two pages of notes, front and back, and a calculator.

- **Final Exam (25%)**

The final exam will be on November 16th during the regular meeting hour, and will cover Chapters 4-5 in the book. The student will be permitted two pages of notes, front and back, and a calculator.

Grade Scale

The minimum percentage required for each letter grade; do not assume that grades are rounded up.

	B+ 87%	C+ 77%	D+ 67%
A 92%	B 82%	C 72%	D 62%
A- 90%	B- 80%	C- 70%	D- 60%

Course Schedule

If the student postpones once week, the dates of successive assignments will be pushed to one week later, and the final exam will be moved to Monday, November 21st, or Wednesday, November 30th, at the student's choice.

Week	Read	Meeting	Homework
1	1.1-1.4	Aug 24	Chapter 1 4, 7a, 8a, 11, 18, 19, 21, 24
2	1.5-1.7	Aug 31	
3	2.1-2.3	Sep 7	
4	2.4-2.6	Sep 14	
5	3.1-3.3	Sep 21	
6	3.4-3.6	Sep 28	
7	MIDTERM	Oct 5	
8	4.1-4.2	Oct 12	
9	4.3-4.4	Oct 19	
10	5.1-5.2	Oct 26	
11	5.3-5.4	Nov 2	
12	5.5-5.6	Nov 9	
13	FINAL	Nov 16	