

**PHYS 302: Thermal Physics**  
**MWF 11-11:50 AM, Taylor 110**  
**The College of Wooster**  
**Fall 2012**

Instructors: Karen Lewis and Cody Leary

Dr. Lewis' Office Hours: T 1-2 PM, Wed 2:30-3:30 PM, Thurs 4-5 PM, and by appointment

Dr. Leary's Office Hours: Wed 4-5 PM, Thurs 10:00-11:00 AM, 4-5 PM, and by appointment

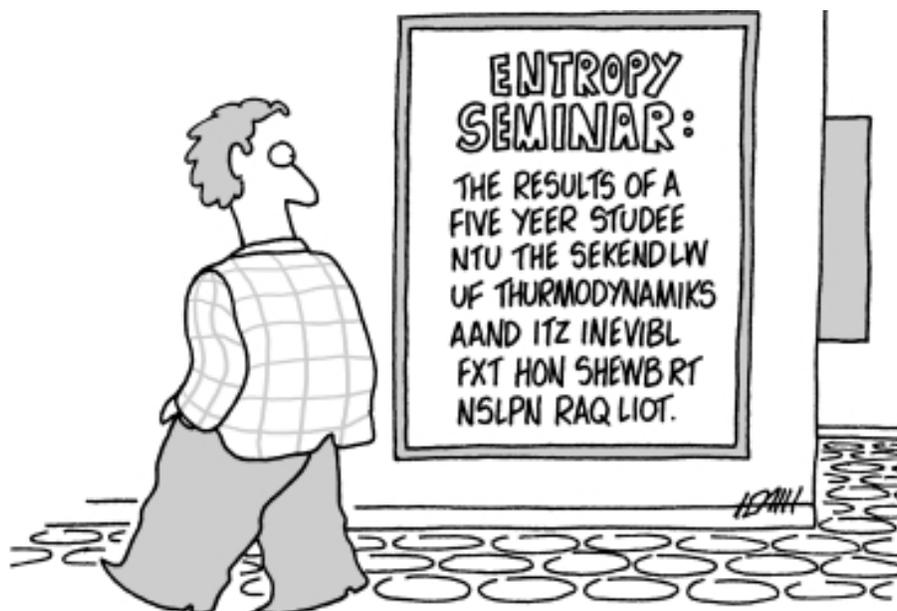
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Text: Thermal Physics, Daniel V. Schroeder

Course Website: <http://woodle.wooster.edu>



## About This Course

We live in a macroscopic world that is governed by microscopic laws. For example, an empirical relationship between temperature, pressure, and density in an ideal gas has been known since the 18th century, but why does this relationship exist? To answer this question, we must look to the properties of the very atoms themselves. Thermal Physics provides the powerful bridge from microscopic atoms to any macroscopic systems which involve large numbers ( $10^{23}$ ) of particles, whether proteins, superfluids, or white dwarf stars.

Throughout this course, we will cover foundations and applications of thermal physics, allowing you to:

- Understand and apply the three laws of thermodynamics and understand their statistical foundation.
- Refine your understanding of thermodynamics concepts introduced in Introductory physics (such as thermodynamic equilibrium, temperature, work, heat, entropy, and heat capacities) and be able to define and appropriately use new concepts (such as enthalpy and free energy) in solving problems in classical thermodynamics.
- Use the principles of statistical mechanics to connect the macroscopic properties of a large ensemble of particles with the microscopic properties of its constituents.
- Continue developing the capacity to break complex problems into solvable pieces.
- Continue developing the ability to explain complicated concepts as clearly as possible both orally and in written homework.

## Grading

Your grade will be calculated as follows:

Homework:	30%
Exam 1:	20%
Exam 2:	20%
Final Exam:	30%

Final Grade:

A to A- 90.0-100%, B- to B+ 80.0-89.9%, C- to C+ 70.0-79.9%, D 60.0-69.9%, F 0-59.9%

You are not competing against each other; it is possible for everyone to earn an A in this course. If we find that we have made the exams more difficult than we intended, we may relax the above final grade standards slightly, but they will not be raised.

## About Homework

In order to really understand thermal physics, one must spend a considerable amount of time working through problems about thermal physics. We encourage you to work problems together with your peers and clarify any remaining questions with us outside of class. However, the homework solutions you hand in must be your own work.

When writing your problem solutions, being able to explain what you have learned is an essential step in the learning process. Thus, for all homework your thought process should be clear. Neatness and clarity both count toward each assignment grade. Your steps should be explained using short phrases. Any sketches or graphs should be clearly labeled.

Table 1: **Preliminary Class Schedule**

Week	Week of	Reading	Topic
1	8/27	Ch 1	Course Intro, Review, Heat Capacities
2	9/3	Ch 2	Thermodynamic Systems, Multiplicity, Ideal Gas
3	9/10	Ch 2–3	Entropy and Temperature
4	9/17	Ch 3	Predicting Heat Capacities, Macroscopic Entropy, Paramagnetism
5	9/24	Ch 3	Equilibrium, Pressure, Thermodynamic Identity, Chemical Potential
6	10/1	Ch 5	Free Energy, Work, and Equilibrium ( <b>Exam #1 on 10/3</b> )
7	10/8	Ch 6	Boltzmann Factor, Partition Function, Equipartition Theorem
8	10/15	Ch 6	Fall Break, Maxwell-Boltzmann Distribution
9	10/22	Ch 6	Partition Functions, Free Energy, Composite Systems, Ideal Gas
10	10/29	Ch 7	Gibbs Factor, Bosons
11	11/5	Ch 7	Fermions, Degenerate Fermi Gases ( <b>Exam #2 on 11/7</b> )
12	11/12	Ch 7	Blackbody Radiation, Debye Theory of Solids
13	11/19	Ch 7	Debye Theory, Thanksgiving Break
14	11/26	TBA	TBA
15	12/3	TBA	TBA

**Cumulative Final Exam: Mon 12/10 at 2:00 PM**

## Woodle

We will regularly update the Woodle course website (available through <http://woodle.wooster.edu>) with homework assignments and general course information. You should be automatically enrolled in this Woodle course within 24 hours of the time when Wooster's Registrar officially adds you to this course, as this syncing occurs around midnight each day. Once enrolled in the Woodle course, your login username and password for Woodle should match that of your Wooster email account.

## Getting Help

### Office Hours

We really enjoy teaching physics, and we are happy to help you outside of class, with either individual attention or in groups. If you would like help, please feel free to drop by our offices during regular office hours, or any other time you see our doors open. If your schedule conflicts with our office hours, you can contact one of us about making an appointment outside of these times.

### Learning Center

The Learning Center (ext. 2595) offers services designed to help all students improve their overall academic performance. The Learning Center also offers a variety of services and accommodations to students with disabilities based on appropriate documentation, nature of disability, and academic need. Any student with a documented learning disability needing academic accommodations is requested to speak with us and with Pam Rose, Director of the Learning Center (ext. 2595), as early in the semester as possible. All discussions will remain confidential.

# **Campus-Wide Policies**

## **Academic Honesty and the Code of Academic Integrity**

The academic program at the College seeks to promote the intellectual development of each student and the realization of that individual's potential for creative thinking, learning, and understanding. In achieving this, each student must learn to use his/her mind rigorously, independently, and imaginatively.

The College's understanding and expectations in regard to issues of academic honesty are fully articulated in the Code of Academic Integrity as published in *The Scot's Key* and form an essential part of the implicit contract between the student and the College. The Code provides a framework at Wooster to help students develop and exhibit honesty in their academic work. You are expected to know and abide by the rules of the institution as described in *The Scot's Key* and the Handbook of Selected College Policies at [www.wooster.edu](http://www.wooster.edu).

Dishonesty in any of your academic work is a serious breach of the Code of Academic Integrity and is grounds for an "F" for the entire course. Such violations include turning in another person's work as your own, copying from any source without proper citation, crossing the boundary of what is allowed in a group project, submitting an assignment produced for a course to a second course without the authorization of all the instructors, and lying in connection with your academic work. You will be held responsible for your actions. Particular attention should be directed to the appropriate use of materials available through the internet. Whether intentional or not, improper use of materials is a violation of academic honesty. If you are unsure as to what is permissible, please contact your course instructor.

## **Policy Regarding Conflicts with Academic Responsibilities**

The College of Wooster is an academic institution and its fundamental purpose is to stimulate its students to reach the highest standard of intellectual achievement. As an academic institution with this purpose, the College expects students to give the highest priority to their academic responsibilities. When conflicts arise between academic commitments and complementary programs (including athletic, cultural, educational, and volunteer activities), students, faculty, staff, and administrators all share the responsibility of minimizing and resolving them.

As a student you have the responsibility to inform the faculty member of potential conflicts as soon as you are aware of them, and to discuss and work with the faculty member to identify alternative ways to fulfill your academic commitments without sacrificing the academic integrity and rigor of the course.

## **Policy Regarding Final Examinations**

The College sets the final exam date, and professors are not authorized to grant exceptions. Students who wish to reschedule a final exam must petition the Dean for Curriculum and Academic Engagement in writing in advance of the examination. The student must confer with the instructor before submitting a petition, and the instructor should indicate to the Dean if he or she supports the petition. Normally, such petitions are granted only for health reasons. If other reasons necessitate a request for a change in a final exam, the request must be submitted three weeks in advance of the examination.