

# Thermodynamics & Statistical Mechanics

Spring 2021 PHY 2541

Tuesday/Thursday 9:25am—10:40am online

Instructor: Roger Mong  
Email: [rmong@pitt.edu](mailto:rmong@pitt.edu)  
Office Hours: Tuesday 10:45—11:30am  
Thursday 10:45—11:30am  
& by appointment

## References

**R. K. Pathria and P. D. Beale, "Statistical Mechanics"**  
H. B. Callen, "Thermodynamics and an Introduction to Thermostatistics"  
K. Huang, "Statistical Mechanics"  
M. Kardar, "Statistical Physics of Particles"

## Course Description

This course will cover classical thermodynamics and statistics of particles.

Topics include:

Heat, work, entropy, free energy.  
Maxwell relations, heat engines, equations of state.  
Phase transitions, Clausius-Clayperon relations.  
Microcanonical & canonical ensembles, partition functions, equivalence of ensembles.  
Paramagnetism, symmetry-breaking, mean-field theory.  
Bose statistics, Bose-Einstein condensate, blackbody radiation, phonons.  
Fermi statistics, Fermi degenerate gas.

## Grading

35%	Homework
5%	Class participation
10%	Class project
20+30%	Midterm + Final exams

## Homework Policy

Homework are due a week after being posted/handed out. Homework must be clearly written out and presented in an organized manner—no credit will be given out if the solutions are difficult to read! Students must contact instructor regarding **late homework** prior to the due date. Students may discuss homework problems with each other, but homework solutions must be written individually. If students do work together, they must acknowledge each other on their homework.

Late homework may be accepted for partial credit. Homework will not be accepted after the solutions have been posted.

## Lecture & Office Hours

The lectures take place every Tuesday, Thursdays beginning at 9:25am. Office hours follow immediately.

Meeting URL: <https://pitt.zoom.us/j/91308502688>

Password: Boltzmann

First day of class is Tuesday, Jan 19. There will be no class on Feb 23. The last class is scheduled on Thursday, Apr 22.

## Exams

There will be two exams. Each exam will have a (take-home) written portion and an oral portion.

The midterm exam will take place TBD (beginning of March).

The written portion of the final exam will take place on Monday, Apr 25. The oral portion will be in the week Apr 25—Apr 29.

# Policies

## Missed Quizzes/Exams

By default, missed quizzes and exams earn a zero grade. If you are aware of an impending conflict with the scheduled time of an exam or other in-class assignment, you should let me know as early in the semester as possible. In such cases, accommodations will be provided as long as the circumstances are reasonable and you can provide appropriate documentation. In cases where prior arrangements have not been made, missed exams can only be made up in cases of documented emergency, prior to or immediately following the missed exam.

## Electronic communication

Students are expected to check Canvas and their pitt.edu email regularly. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of communications.

## Religious Observances and Class Activities:

In case your religious observances conflict with class activities / tests / homework assignments due dates and such, please alert your teacher to such possible conflicts as soon as possible and in advance.

## Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity <http://www.provost.pitt.edu/info/ai1.html>. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries.

Examples of violations include, but is not limited to the following.

- Collaborating or consulting another person during a quiz or an examination (unless explicitly allowed).
- Looking up answer to a graded assignment, quiz, or exam online.
- Submitting another person's work as your own.

## Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu), (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

## Statement on Classroom Recording

Lectures will be recorded for students to view later. These recordings will only be available to students registered for the class. Students may not distribute these recordings to anyone outside of the class, nor may they create their own recordings of the lectures, discussion, and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

## Title IX

"No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance."

As a professor I am a mandatory reporter, and I am required to report violations of Title IX that I observe or am made aware of to the Title IX office [www.titleix.pitt.edu](http://www.titleix.pitt.edu). Title IX violations include, but are not limited to, sexual harassment, sexual violence and verbal or sexual abuse. Within the classroom, behavior in violation might appear as: suggestive jokes or innuendos, inappropriate touching, and unwanted sexual behavior or advances, but my capacity and obligation to report does not end at the classroom.