

PHYS 467 / 667 – Thermodynamics

Prof. Carl Haster

Spring 2023

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Class Hours: Tu/Th 13:00-14:15
Class Room: BPB 248

Course Outline

This course combines elements of classical thermodynamics and statistical physics including:

- Fundamentals of thermodynamics, equations of state, laws of thermodynamics, entropy
- Heat engines and refrigerators
- Free energy and classical thermodynamics
- Boltzmann statistics
- Quantum statistics of ideal gas and simple solid

The course will primarily follow the first 7 chapters of the Schroeder book mentioned below, and we'll spend approximately 2 weeks per chapter.

Recommended Materials

- An Introduction to Thermal Physics - 1st Edition (Daniel V. Schroeder)
ISBN-13: 978-0192895554
- Statistical Physics of Particles - 1st Edition (Mehran Kardar)
ISBN-13: 978-0521873420
- Statistical Mechanics - 2nd Edition (Kerson Huang)
ISBN-13: 978-0471815181
- Statistical Physics - 2nd Edition (Frantz Mandl)
ISBN-13: 978-0471915331

The course will be mainly based around the Schroeder book, but with a fair amount of inspiration taken from the Kardar book as well. The books by Huang and Mandl should be considered as complements for those who want alternative explanations and examples provided for the covered topics.

Prerequisites

PHYS 182

Credit Hours

3

Learning outcomes

After completing this course, each student should:

- understand the fundamental principles for thermal physics
- know how to apply these principles to various applications
- understand the statistical basis for thermodynamics
- understand the difference between classical and quantum statistics

Course Structure

Class Structure

The class will be done as a mix of “normal” lectures and flipped classroom sessions. The Thursday session each week will be primarily devoted to a lecture in which new concepts are presented. After the Thursday session, a set of problems related to this week’s topic(s) will be provided. A subset of these problems are to be handed in as a homework assignment at the following Tuesday session, in which the remainder will be the basis of a student-led “workshop” where we will cover the previous Thursday’s concepts again. Attendance at all sessions is required.

Assessments – Exams

In addition to the homework problem sets mentioned above, there will be two midterm exams (each covering a subset of the entire course load) and one final exam covering the entire set of materials from the course. All exams will be in-class.

Grading Policy

A letter grade will be assigned to each student for the course based on the performance in all the components with roughly A~ 85%, B~ 70%, C~ 55% and D~ 40%, from

Assignments	20%	(Including homework and active participation in workshop sessions)
Midterm Exams	40%	(20% per exam)
Final Exam	40%	

Modifications may be made to each contribution or to the percentage for each letter grade based on the progress of the class.

UNLV Policies

Public Health Directives

Face coverings are currently optional for all faculty and students in the classroom. Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at [“Health Requirements for Returning to Campus”](#). Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the [UNLV Student Conduct Code](#), including being administratively withdrawn from the course.

Disability Resource Center (DRC)

For all accommodation determinations allowed under the Americans with Disabilities Act, please contact the [Disability Resource Center](#), located in the Campus Resource Center (CRC) 1st Floor, telephone (702) 895-0866 or email drc@unlv.edu.

Academic Misconduct

Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. For more detail see the [Student Academic Misconduct Policy](#).

Religious Holidays Policy

Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please refer to the “Missed Classwork” section in the [2022-2023 Undergraduate Catalog](#)

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violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found [here](#).

UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found [here](#).

Tutoring and Coaching

The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895- 3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.