Physics 340 Thermal Physics
General Information, Fall 2020

August 16, 2020

Subject matter: Basic principles of thermodynamics, kinetic theory, and statistical mechanics, with emphasis on applications to classical and quantum mechanical physical systems.
Prerequisites: (PHY 013 or PHY 021 or PHY 023) and (MATH 023 or MATH 032 or MATH 052)

Instructor: H. Daniel Ou-Yang, professor of physics.
Office: Physics Fairchild Lab 206 and Lewis Lab 124.
Email: hdo0@lehigh.edu (I check email regularly. This is the best way to contact me.)
Phone: x83920 (Office) (Please leave a voice message, but this is slower than emails.)

General Plan: The class meets three times per week for 50 minutes each, in Lewis Lab 512, 9:20 to 10:10, Monday, Wednesday, and Friday.

Office Hours: 3 hourly zoom meetings per week (schedule TBA)

Individual interactions outside the regular class meetings:

1) Please schedule at least two individual zoom meetings with the instructor during the semester
2) Additional individual zoom meetings can be scheduled by emails to the instructor.

COVID-19 Safety Rules and Regulations:

Students should follow government and university COVID-19 safety rules and regulations announcement from the Health and Wellness Center.
https://mail.google.com/mail/u/0/#search/Lehigh/WhctKJVzcLlRFggpdkckxPvbNLznjwCcjlrrbsrmXjNFLNkjQWTxqWQbNkNwlxVXbHSMmNV

Specifically, students are expected to follow the simple safety rules:

1. Wear a facemask whenever there is possibility to encounter another person within a distance of 6 feet.
2. Avoid crowded environment at all times and especially crowded indoor environment.
3. Wash hands with soap for at least 20 seconds after you have touched surfaces that might have been contaminated.
4. Self-monitor symptoms (complete the self-screening tool if coming to campus) and absolutely stay-at-home if you don't feel well or have other symptoms.

Textbook: "Thermal Physics" by Ralph Baierlein (Wesleyan University)
Cambridge University Press, 1999 (Selected topics from Chapters 1 to 12)
Other books:
Kittel, Elementary Statistical Physics, 1967
Kittle and Kroemer, Thermal Physics, second edition, Freeman, 1980
Reif, Fundamentals of Statistical and Thermal Physics, Waveland Press, 2009
Swendsen, An Introduction to Statistical Mechanics and Thermodynamic, Oxford, 2012
Tabor, Gases, Liquids and Solids, 3rd Edition, Cambridge, 1991

Goals for the course:

The students are expected to learn the physical concepts of, and the necessary mathematical tools to solve, the following problems:

1) The first law of thermodynamics: internal energy, energy exchange by heating and energy exchange by doing work.
2) The second law of thermodynamics: multiplicity, entropy and temperature
3) Entropy in Quantum and Classical Systems
4) Canonical Probably Distribution: how partition function leads to calculation of energy, entropy, pressure and other thermodynamic functions
5) Photon Statistics: thermal radiation
6) Helmholtz Free Energy, Gibbs Free Energy, Chemical Potential
7) Fermion and Boson statistics
8) Van der Waals Equation of State: Phase Transition

Grading and grade distributions:

Homework/attendance/Quiz: 20%, Hour Exam I: 20%, Hour Exam II: 20%, Final Exam: 40%

Homework and Quizzes:

Purposes: To encourage preview course materials before the lectures
to learn how to formulate and solve the problems using methods and examples learned from the textbook, lectures, and class discussions.

(1) Quiz: pop quiz during class meetings
(2) Homework: assigned approximately once per week
(3) Instructor's homework solutions: provided before the due date of the next homework.
(4) Grading: based on the effort as well as the correctness of the answers.
(5) Collaboration with others: students are encouraged to work with each other on homework assignments.
(6) Consultation with the instructor: the students are encourage to discuss with the instructor
(7) Academic ethics: copying from others in class, from solution sets from previous years or published solution manual are considered an act of cheating.

Exams: two hour test and a final exam

All exams will be conducted in class during zoom meeting
Notes and Equation Sheet: The exams are open book.

Copying from papers of other students, collaborating on exams, and use of notes or references that are not explicitly permitted, are obvious forms of cheating that will be dealt with by referral to the Discipline Committee.

No Makeup Exams: No make-up exams for hour tests or the final exam are given under any circumstance. If an hour exam is missed for a legitimate reason, the corresponding portion of the final exam that covers the same course materials will be counted toward the grade for the missed exam. It will be an incomplete if a final exam is missed.

Attendance Policy: Attendance to the lectures is required. Students must show their face during zoom class meetings.

Disability: The Office of Academic Support Services in the Dean of Students office addresses requests for accommodations for learning and/or physical disabilities for undergraduate and graduate students. For more information, I encourage you to visit the web site at: http://www.lehigh.edu/%7Einacsup/disabilities/

In addition, Maria Zullo, Assistant Dean of Students, would be pleased to discuss the program with your department. She may be reached at 84152 or maz317@lehigh.edu. Lehigh University is committed to diversity, inclusion and engagement [http://www.lehigh.edu/diversity]. That commitment is captured in The Principles of Our Equitable Community. The Principles have been endorsed across Lehigh and by the Board of Trustees.