

Physics 4230: Statistical Mechanics and Thermodynamics

Spring 2007

Lectures: Duane G-131, MWF, 3:00–3:50.

Lecturer: Edward R. Kinney

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Office Hours: T 1-2, W 11:30 am – 1 pm, and by appointment.

Text: *An Introduction to Thermal Physics*, Daniel V. Schroeder, Addison Wesley Longman, 2000.

Web Page: <http://www.colorado.edu/physics/phys4230/>

Grader: Ke Zhao, Duane F-527, Office hour: W 10–11.

Course Description Physics 4230 is a one semester course on the fundamentals of statistical mechanics and thermodynamics, taught from a physicist's point of view, rather than that of a chemist. We will start by reviewing the basic concept of energy, work, and heat with an example system that we will use again and again, the ideal gas. We will then develop the ideas of micro and macro states and learn the basics of state counting which is fundamental to statistical mechanics and more importantly, to the quantity entropy. We will then explore the application of these fundamentals in a number of physical systems, including traditional thermodynamics systems (e.g. engines and refrigerators). In the final third of the course we'll really focus on detailed study of the microscopic systems which follow classical, fermi-dirac, and bose-einstein statistics.

Problem solving will be strongly emphasized throughout the course. This course introduces a large amount of theoretical material and the only way to make sense of it is to work problems.

Course Policies

E-mail Announcements: In this course, I will assume that any e-mail announcement sent out by noon on a given day, is known by everyone by 8am the next morning.

Web Page: The course web page will be used to make announcements or post reminders as well. It is a good idea to check it daily. Solutions to the homework and exams will also be posted there as well as summaries of the lectures. Concept tests and their answers will appear on the web after the lectures.

Reading: Reading is an essential part of this course. Students are expected to have completed the reading assignments prior to lecture. The best practice is to attempt the associated HW problems as you read the relevant material. Try to form a plan of attack and maybe sketch out the solution without doing everything necessary for a complete solution.

Homework Assignments: Weekly homework assignments will be due Fridays at the beginning of class. Make sure that your solutions are organized and legible. Include sketches, variable definitions, and give the primary milestones in the solutions, especially derivations. It is best to imagine that you are writing explanations to a fellow student. You are encouraged to work together on the

homeworks, but each person must write up their own solutions. Do not fall into the trap of working with a group where others routinely provide solutions!

Exams: Two mid-term exams and a final exam will be given, which will test your mastery of material covered in the textbook, lectures, and homework. The actual dates of the midterms will be announced later (roughly, one will be in mid-February and the other just before spring break).

You may be excused from an exam only for a medical or personal emergency beyond your control. You must present written documentation to me no later than one week subsequent to the exam you missed. If you are excused from an exam, your grade will be based upon your remaining exam scores. There are **no** make-up exams given. Calculators with scientific notation will usually be needed. The exams are closed book and no note sheets are allowed; formulas will be provided with the exam.

Grading: The two midterm exams combined will be worth 40% of the total grade, while the cumulative final will contribute 30%. The remaining contributions come from your HW (25%) and “clicker” points (5%). The emphasis in the use of clickers is participation so all answers get the same number of points. I will drop your five “worst” clicker point days, so that if you miss a lecture for whatever reason you do not need to see me about an excuse.

Drop-Add Deadlines: See the CU registration calendar at <http://registrar.colorado.edu> for details of add/drop dates.

Disabilities: If you qualify for accommodations because of a disability, please submit a letter to me from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, or at www.Colorado.edu/disabilityservices.

Absence due to Religious Observance: Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, I ask that you notify me of any conflicts at least two weeks prior to the conflict, so that I can make any accommodations required. See http://www.colorado.edu/policies/fac_relig.html for policy details.

Classroom Behavior: Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student’s legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code and at <http://www.colorado.edu/policies/classbehavior.html>.

Honor Code: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threaten-

ing behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Additional information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>.

Discrimination and Harrassment: The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>.

Disclaimer: Any information in this syllabus is as accurate as is possible at the time of writing. Announcements about changes of any kind will be made via e-mail as well as in class and on the web page, and will take precedence over this syllabus. You are responsible for announcements made in class, whether or not you are in attendance.