Physics 4230: Thermodynamics and Statistical Mechanics  
Spring 2010

Instructor: Professor James Nagle  
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Lectures: Monday, Wednesday, Friday, 3:00 – 3:50 pm, Duane Physics G131

Textbook and other required materials: The text is An Introduction to Thermal Physics, by Daniel V. Schroeder. You will also need an “iClicker,” since answering clicker questions will be an important part of participation in lecture and will count for extra credit.

Web page: http://www.colorado.edu/physics/phys4230  
Updates to the syllabus may be made on the webpage.

Office Hours: Monday 11:00 am - noon (in my office), Tuesday 2:30 - 4:00 pm (in the Physics Help Room - Duane 2B level), or by appointment.  
(** may be modified during the term **)

Course description and outline: In this course, you will learn about the fundamentals of thermodynamics and statistical mechanics. These areas are the basic conceptual framework for understanding behavior of large (or, macroscopic) physical systems, made up of many constituents (e.g. atoms). The course will start with thermodynamics and will move toward statistical mechanics. Thermodynamics has to do with the basic concepts and quantities needed to understand the behavior of macroscopic systems. It tells us how quantities such as energy, entropy, temperature, etc. are related very generally, independent of which specific system we are studying. Statistical mechanics, on the other hand, gives us a means to calculate thermodynamic quantities for particular systems. We’ll start by developing the concepts of thermodynamics and how they fit together. To help us understand these concepts, we’ll introduce and study some simple macroscopic systems along the way (using some simple statistical mechanics), especially the ideal gas and the Einstein model of a solid. In the last part of the course, we’ll turn our attention more fully to statistical mechanics, learn what a partition function is and what it’s good for, and learn about the quantum statistical mechanics of identical particles.

Prerequisites: The prerequisites for the course are Quantum Mechanics I (PHYS 3220) and Differential Equations and Linear Algebra (APPM 2360, or MATH 3130 and 4430). If you haven’t taken these courses, please come see me – you don’t necessarily need them for this course, but in that case I would like to know more about your preparation.
Lectures: I expect students to attend lecture and actively participate by asking and answering questions, and thinking about the material.

Reading: Reading the textbook (Schroeder) will be an important part of the course. Each week I will assign reading that I will expect you to complete. The purpose of these assignments is to get you thinking about the material before lecture, so we can have a more useful discussion.

Clicker questions: I will ask clicker questions during lectures – these will count for your grade purely as extra credit. 3/4 of your clicker score will be for simply answering questions; the 1/4 will be for answering correctly.

Homework: There will be weekly homework assignments due on Wednesdays just before lecture at 3:00 pm (to be handed into the Wooden Box on the Duane 2B level just outside the Physics Help Room). Because solutions will be posted online after each assignment is due, late homework cannot be accepted – but, your lowest homework score will be dropped. I encourage collaboration on homework, but the work you hand in should in the end be your own, reflecting your own understanding.

Exams: There will be two midterm exams and one final exam. The midterms will be held during class periods (and the dates announced well ahead of time). The final exam is scheduled for Thursday, May 6, 2010 from 10:30 am - 1:00 pm.

Grading: The course grade will be determined by weekly homework assignments (25%), clicker scores (5%), two midterm exams (15% each), and a final exam (40%).
Disabilities: If you qualify for accommodations because of a disability, please submit to me a letter 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, and

http://www.colorado.edu/disabilityservices

Religious observances: 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, please let me know as soon as possible if you have a conflict with any part of the course. If you have a conflict with one of the exams, please inform me within the first two weeks of the course, so that I have time to make an accommodation. For full details of the campus policy, see

http://www.colorado.edu/policies/fac_relig.html

Classroom Behavior Policy: Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. 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 the following:

http://www.colorado.edu/policies/classbehavior.html
http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

Statement from the Office of Discrimination and Harassment: 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

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 threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). 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). Other information on the Honor Code can be found at the following:

http://www.colorado.edu/policies/honor.html
http://www.colorado.edu/academics/honorcode/