Thermal Physics, PHYS 431/831, Fall 2015

Instructor: Prof. Xiaoshan Xu
Office: 310M Jorgensen Hall, E-mail: xiaoshan.xu@unl.edu, Phone: 402-472-6134.
Office hour: MWF 11:20-12:20. You may also contact me by email with your questions.

Textbooks:

1) R. J. Hardy and C. Binek, Thermodynamics and Statistical Mechanics: An Integrated Approach. –With much more details and examples designed for undergraduate students.
2) H. Gould and J. Tobochnik, Thermal and Statistical Physics (http://stp.clarku.edu/notes, and simulations at http://stp.clarku.edu/simulations). –With animated simulations for visualizing the thermodynamic processes.

Lectures: MWF 10:30-11:20, 249 JH

Prerequisites: PHYS 213

Course description:
Thermodynamics describes the behavior of bulk materials in terms of macroscopic variables (such as temperature, pressure, volume, and energy). Statistical mechanics provides an explanation of the principles of thermodynamics in terms of statistical variables describing the collective motion of microscopic particles. This one-semester course focuses mainly on thermodynamics, with some concept of statistical mechanics introduced. The topics covered can be found in chapters 1-14 of Hardy and Binek, and chapters 1-2 from Gould and Tobochnik.

The Learning Goals:
The learning goal of this course for the students are 1) to understand the fundamental principles of thermodynamics (0^{th}, 1^{st}, 2^{nd}, and 3^{rd} laws) and the concepts derived from these principles (e.g. entropy, thermodynamic potentials); 2) to be able to apply the principle of thermal physics to analyze the energy related problems (e.g. reversibility, phase transition, chemical reaction).

Pre-chapter assignments
There will be pre-chapter assignments. You will need to answer a few conceptual and reflection questions online before the deadline and the answers will not only be graded by correctness, but also by effort. These answers will help the instructor adjust the lectures to improve the effectiveness of the lecture.

Homework:
Solving textbook problems is a particularly important way to get a handle on thermodynamics. So you should treat homework assignments as critical parts of your learning. There will be about 10 assignments during the semester. The solutions should be clearly written and explain all the important steps. Homework may be handed in personally in class or placed in my mailbox before the due time. Late homework may be accepted, but it will typically lose 10-25% of the points. Homework is graded by a teaching assistant. If you believe your grade is incorrect or unfair, you may appeal it to me before the due date of the next homework, after which it becomes final.

In-class quick tests will offer short problems or conceptual questions based on recent coursework for about 20 minutes. They may or may not be announced beforehand.

Midterm and Final Exam:

*Midterm exam***:** in class (50 minutes) approximately in the middle of the semester.
Final exam: two-hour, comprehensive, in the final period.
Textbooks, notes, or any other aids will not be allowed.

Missed tests:
You must notify the instructor as soon as practical if you expect to miss or have missed a test or exam for a legitimate reason (illness, family emergency, or job-related absence such as attending a conference). Documentation of the reason may be requested. You will either be given a make-up test, or the weight of the missed test will be reallocated to other assignments, at the instructor's discretion.

Grading: Your total score will be compounded as follows:

1) Pre-chapter assignments 10%
2) Homework 20%
3) In-class quick tests 20%
4) Midterm exam 25%
5) Final exam 25%

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.