Statistical Physics - Spring 2008

PHYS 912 **MWF 10:30-11:20** **Brace 118**

Instructor: Prof. Kirill Belashchenko
Office: 214B Ferguson. Phone: 472-2396. E-mail: kdbel@unlserve.unl.edu
Office hours: MWF 11:20-12:20 or by appointment. I am often available if you just stop by.
You are always welcome to email me with your questions. I will respond by email or in class.

Prerequisites: PHYS 911, 916 (grades C or better), or permission. Basic knowledge of thermal physics at the introductory (2xx) level is also expected. Prior courses in thermal and statistical physics will help, but we will develop all concepts from scratch.

Textbooks: H. Gould and J. Tobochnik, Thermal and Statistical Physics, available online at http://stp.clarku.edu/notes, and simulations at http://stp.clarku.edu/simulations.

E. Fermi, Thermodynamics.

Additional sources: There are many good books on statistical physics. Here are a few suggestions:

R. K. Pathria, Statistical Mechanics. - This is a popular graduate textbook.
K. Huang, Statistical Mechanics. - Another common textbook.
L. D. Landau and E. M. Lifshitz, Statistical Physics. - A superb textbook if you like its style.
E. Schrödinger, Statistical Thermodynamics. - Discussion of the foundations of statistics.
C. Kittel and H. Kroemer, Thermal Physics. - An undergraduate textbook.

Course description: This course covers the basic principles of thermodynamics and statistical physics including some applications, largely following chapters I-V from Fermi and chapters 1-4 and 6-7 from Gould and Tobochnik (not in order, and there is some overlap). This includes the following topics: thermodynamics (first and second laws, free energies, phase equilibria, phase diagrams, etc.), foundations of statistical physics and its connection with thermodynamics, canonical ensembles, ideal classical gas, Fermi and Bose gases, black-body radiation. Additional topics may be added (time permitting).

Homework: There will be approximately 10 assignments during the semester. All homework problems have an equal weight of 10 points unless indicated otherwise. The solutions should clearly explain all the important steps. You are encouraged to discuss ideas and approaches with other students after you have spent some time thinking about these problems. However, you are required to complete all the technical steps yourself. You are not allowed to copy the work of others or use problem solutions obtained from any source. If you have benefited from discussions with others, you must acknowledge these people in your homework (Example: “I learned this idea from John Smith.”). Remember that homework is an important part of your learning. You will very likely fail your exams if you don’t do it carefully.

Homework may be handed in personally, placed in my mailbox, or scanned and emailed as an attachment. Late homework will be accepted only if the solutions have not been posted on the Blackboard website, and it will typically lose 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 conceptual problems based on recent coursework for 15-20 minutes at the end of a class. They may or may not be announced beforehand. There will be 5-6 of these tests during the semester.

There will be **two one-hour exams** during the semester, and a **comprehensive two-hour final exam** at the end. The first midterm exam will cover thermodynamics and the second one the foundations of statistics. You should only bring a pen to these exams. Textbooks, notes, calculators or other aids will not be allowed. Scratch paper will be provided in sufficient quantity.

Make-up tests: If you miss a test or exam for a legitimate reason, you will be given an opportunity to make it up. Let me know as soon as possible.

The participation grade will reflect your contribution to our everyday work in the classroom. Everyone is expected to take an active role in discussions. I encourage you to ask questions and offer comments at any time. In this grade I will include such factors as answering questions, asking relevant questions, showing preparation and understanding of the assigned material, critical thinking about the course content, and other manifestations of active learning. As a general rule, you need to contribute at least one thoughtful question or comment during every class meeting in order to get full credit for participation. Don't wait to be called upon.

Grading: Your total score will be compounded as follows (subject to change if the schedule of assignments is significantly modified):

Homework	15%
In-class quick tests	25%
Two one-hour exams	25%
Final exam	30%
Participation	5%

The scores for all assignments will be posted on Blackboard. Total scores for all students may be scaled at instructor's discretion. Based on the total score, the final grades will be determined as follows: A+ [92-100], A [88-92], A- [85-88], B+ [82-85], B [79-82], B- [76-79], C+ [72-76], C [67-72], C- [62-67], D+ [56-62], D [50-56].

Changes: This syllabus represents the general outline from which we may deviate if necessary.

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.