Physics 3410: Statistical Mechanics
Winter 2008.

Slot 18.
Tuesday and Thursday. 10:30 – 11:50. Room C-3067.

Prerequisites.
PHYS 3400, PHYS 3750.

Instructor.
Prof. Martin Plumer. Rm C3025. Ph. 737-2679. plumer@mun.ca.

Course web page: http://kelvin.physics.mun.ca/~plumer/P3410

Text.
Thermal Physics, by D.V. Schroeder. (Addison-Weslet-Longman, 2000).

Recommended Reading.
Thermal Physics, by Kittel & Kroemer.
Thermodynamics, Kinetic Theory, and Statistical Mechanics, by Sears & Salinger.
Statistical Physics, by Amit & Verbin.
Equilibrium Statistical Physics, by Plischke and Bergersen.

Evaluation.
Assignments. 25%.
Mid-term Test. 25%
Final Exam. 50%.

Assignments (approximately 5).
- To be turned in during class on the due date.
- If there is no class on the due date, assignments are to be turned in by 3:00 pm to the Main Physics office (C3007) on that day.
- Late assignments will not be accepted after the solutions have been given.
- **Last assignment will be due on the last day of classes: April 4, 2008.**

Mid-term test (only one).
- Date to be announced in class. Students are responsible for showing up at the correct time and day.
- Mid-term test will be closed book.

Final Exam .
- Date to be set by the registrars office. Students are responsible for showing up at the correct time and day.
- Final exam will be closed book.

Outline.

I. Boltzmann Statistics. Chapter 6. (~ 3 weeks)
- Review of Probability and Entropy.
- Boltzmann Factor and the Partition Function.
- Maxwell speed distribution.
- Free Energy.
- Ideal Gas.

II. Quantum Statistics Chapter 7. (~ 5 weeks).
- Gibbs factor and Grand partition function.
- Quantum statistics: Bosons and Ferminons.
- Degenerate Fermi Gas.
- Density of states.
- Blackbody radiation.
- Debye theory of solids: Specific heat.
- Bose-Einstein condensation.

III. Interacting Systems Ch. 8. (~ 4 weeks).
- Weakly interacting gas: Cluster expansion.
- Ferromagnetism: Ising model.
- Mean Field approximation.
- Theory of phase transitions.

Helpful (?) suggestions.
- Read ahead of class.
- Read after class.
- Attend class.
- Ask questions.
- Try some problems in the text *before* the assignments are given.
- Do the assignments.
- Surf the web to get another perspective on a topic (for example, http://en.wikipedia.org/ or simply Google a subject).

*** Please Note the Following ***

14.4 Information Required for Medical Certificates

14.4.1 Students who request permission to drop courses, to withdraw from University studies, to have examinations deferred or to obtain other waivers of University, departmental or course regulations based on medical grounds are required by the University to produce a note from a physician in support of their request. Such notes must be sufficiently specific to allow a proper consideration of the student's case. The University requests that all medical notes be on letterhead, be signed by the physician and include details on the following:

- confirmation of the specific dates on which the student visited the physician.
- the degree to which the illness (or treatment, in the case of medication, for example) is likely to have affected the student's ability to study, attend classes, or sit examinations.
- the length of time over which the student's abilities were likely hampered by the medical condition (e.g., recurring and severe back pain over a two-month period would likely have a more adverse effect on studies than a single episode of back pain requiring bed rest for a week).
- the fitness of the student to resume studies (it is in the student's best interest not to return to studies prematurely).