

# PHYS417- Statistical Mechanics and Thermal Physics

## Fall 2017

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**Lecture Hours:** M/W/F 11:30 AM - 12:30 PM, CB 4122

**Office Hours:** T/TH 1 PM – 5 PM M/W/F 1 - 4 PM

### Textbook

R. Baierlein, *Thermal Physics* (available in the bookstore)

**Syllabus** Thermodynamics deals with the physical descriptions of nature by macroscopic variables. This course examines the mathematical basis, as well as the microscopic basis, of macroscopic thermodynamics. Tentatively, the following topics are covered:

1. Introduction: heat and temperature, gas relations, 1<sup>st</sup> law. (Chapter 1).
2. Second Law of Thermodynamics: entropy and the 2<sup>nd</sup> law. (Chapter 2)
3. Thermodynamics Cycles: Carnot cycle, engines, reversibility. (Chapter 3)
4. Microscopic Basis: discrete states and entropy, microscopic definition of temperature, magnetic systems (Chapter 4 and 5).
5. Free Energy: Helmholtz and Gibbs free energy, enthalpy, grand potential, chemical potential, minimum of free energy, applications (Chapter 7, 10, 11).
6. Quantum Systems: phonons, photons, quantum gases. (Chapter 6 and 8).

### Marking Scheme

Problem sets (about 6)	: 20%
Quiz (late September)	: 10%
Midterm (Middle of October)	: 20%
Final exam	: 50%

### Online Resources

Solutions to problem sets in PDF format will be posted on my webpage:

<http://physics.lakeheadu.ca/facNstaff/api/P4171.htm>

Other useful materials and information will also be posted on this webpage.

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