PHYS 4P41: Statistical Physics II

Winter 2026

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office hours: by appointment only

Brock calendar entry:

Fundamental postulates of equilibrium statistical mechanics and its relation to thermodynamics. Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics are derived and applied in appropriate physical situations of non-interacting and interacting particles; fluctuations; elementary treatment of transport theory.
Prerequisites: PHYS 3P41 and PHYS 3P70.

Textbook:

There is no required textbook for the course. The main source of information will be the lecture notes.

Some suggested reading (cost on Amazon.ca):

C. Kittel and H. Kroemer, *Thermal Physics*, 2nd edition (W. H. Freeman and Company, 2003); cost: $85.11
F. Reif, *Fundamentals of Statistical and Thermal Physics* (Waveland Press, 2009); cost: $43.00
D. V. Schroeder, *An Introduction to Thermal Physics* (Oxford University Press, 2021); cost: $50.27
A. H. Carter, *Classical and Statistical Thermodynamics* (Prentice Hill, 2001); cost: $268.00.

Tutorials:

Tutorial time slots will be used as problem sessions, as needed.

Marking scheme:

4 homework assignments: 40% (10% each)
assignments must be submitted online by 5pm (EST) on the due date
late assignments **will not be accepted**

midterm test (date and mode of delivery TBA): 20%

final exam: 40%
you will need to pass the final exam to pass the course

Note: the final exam will be a **closed book** exam, with only a calculator and one self-prepared formula sheet (letter size, two-sided) allowed.

Online resources:

can be accessed through Brightspace (https://lms.brocku.ca);

submission instructions for assignments can be found at
https://www.physics.brocku.ca/Courses/Homework

Academic integrity policy: https://brocku.ca/academic-integrity

Intellectual property notice:

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Topics covered in the course:[1]

- Basic concepts of statistical physics. Classical statistical mechanics: Gibbs distribution, Maxwell and Boltzmann distributions.
- Quantum statistics: Fermi-Dirac distribution. Electrons in solids.
- Quantum statistics: Bose-Einstein distribution. Photons. Phonons.
- Kinetic theory: Boltzmann equation, transport coefficients.

[1] This list is tentative. Some topics may be removed, while other topics may be added. The examination will be only on the material actually covered in the lectures.