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PHYS 3P41: Statistical Physics 1/PHYS 5P11: Theoretical Foundations of Materials Physics I

Course Outline 2022 (FW 2022 D2)

What this course is about:

This course will provide an introduction to concepts in Thermal and Statistical Physics. The course will have three major sections: Kinetic Theory, Classical Thermodynamics and an introduction to Statistical Mechanics.

Requirements:

Prerequisite for PHYS 3P41: PHYS 2P50

Learning Objectives/Outcomes:

To establish the vocabulary and concepts of introductory thermal and statistical physics. To analyze and solve problems using oral and written reasoning skills both independently and in a group setting.

Topics covered:

Introduction

- Heat, Heat Capacity
- Review of Probability
- Statistical Interpretation of Temperature

Kinetic Theory of Gases

- Maxwell Boltzmann Distribution
- Gas Laws
- Effusion, Flux
- Collisions
- Transport Properties
- Thermal Diffusion Equation

Classical Thermodynamics

- The First Law of Thermodynamics
- Isothermal and Adiabatic Processes
- The Second Law of Thermodynamics, Heat Engines
- Entropy
- Thermodynamic Potentials, Maxwell's Relations
- Applications
- The Third Law of Thermodynamics

Statistical Mechanics

- Equipartition of Energy
- Partition Function, Functions of State
- Chemical Potential, Grand Partition Function
- Further Examples (time permitting)

Required Textbook:

Concepts in Thermal Physics, 2nd Edition by Stephen J. Blundell and Katherine M. Blundell (Oxford University Press, 2010).

Times and Locations:

Lectures:

- Mon and Thurs 4:00-5:30 pm (Th 257)

Tutorial:

- Wed 12:00-1:00 pm (MC H300)

Note: In person classes at Brock University end ten minutes ahead of the hour or half hour to facilitate transfer time.

Instructor:

[Maureen Reedyk](#) (MC B205, ext. 3877, e-mail: mreedyk@brocku.ca)

Tutorial Leader:

Mahdieh Gol Bashmani Moghadam, e-mail: mg1811@brocku.ca)

Course Communications:

For class communications monitor your Brock email.

The marking scheme:

Component	Weight	
Reading quizzes	15%	Done in Webwork. Based on readings in the textbook as assigned on the Sakai course site.
Tutorial Work Sheets	10x2%=20%	Completed during Tutorial hour.
Homework Assignments	3x5%=15%	Will consist of a selection of problems based on the 'Suggested Problems' listed in the Sakai modules.
Midterm Test	15%	Thursday October 27 during lecture time slot. The test will be in one or more of handwritten and/or Webwork and/or oral formats at the discretion of the instructor.
Examination	35%	You must obtain a grade of 40% or greater on the final exam in order to pass the course. The exam will be in one or more of handwritten and/or Webwork and/or oral formats at the discretion of the instructor.

Webwork:

Reading quizzes are done using Brock's WeBWorK system, which can be accessed at [WeBWorK](#). Scroll down the displayed list of courses, click on the course that you are enrolled in (PHYS3P41PHYS5P11D02FW2022) and log on using your Brock username (of the form ab18cd) and password.

Important Dates:

The last date for withdrawal from this course without academic penalty is Nov 8 2022. For other important dates see the Office of the Registrar's [sessional or important dates](#).

Notes:

- Must be present in-person in tutorial to obtain credit for tutorial work.
- No late Work will be accepted.
- Tests and the examination will be based on material covered during lectures, tutorials and homework assignments.
- Assignments, Tests and Examination may be different for PHYS 3P41 and PHYS 5P11.
- Topics may be covered in lectures, tutorials, assigned readings and/or homework problems.
- If your grade is less than 40% on the final exam your final grade can be no greater than 45, according to Registrar's Office policy. In this case, your reported final grade will be either your calculated final grade or 45, whichever is less.

Academic Policies:

Academic Integrity:

All students must comply with Brock's [academic misconduct policies](#). Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section VII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the Undergraduate Calendar, available at <http://brocku.ca/webcal>. Information on what constitutes academic integrity is available at <https://brocku.ca/academic-integrity/>.

Intellectual Property Notice:

All slides, presentations, handouts, tests, exams, and other course materials created by the instructor in this course are the intellectual property of the instructor. A student who publicly posts or sells an instructor's work, without the instructor's express consent, may be charged with misconduct under Brock's Academic Integrity Policy and/or Code of Conduct, and may also face adverse legal consequences for infringement of intellectual property rights.

Special Accommodation:

The University is committed to fostering an inclusive and supportive environment for all students and will adhere to the Human Rights principles that ensure respect for dignity, individualized accommodation, inclusion and full participation. The University provides a wide range of resources to assist students, as follows:

- a) If you require academic accommodation because of a disability or an ongoing health or mental health condition, please contact [Student Accessibility Services](#).
- b) If you require academic accommodation because of an incapacitating medical condition, you must, as soon as practicable, inform your instructor(s) of your inability to complete your academic work. You must also submit a Brock University Student Medical Certificate (found at <https://brocku.ca/registrar/toolkit/forms>). The University may, at its discretion, request more detailed documentation in certain cases. If you are unable to write a scheduled examination due to an incapacitating medical condition, you must follow the process set out in the Faculty Handbook III:9.4.1.
- c) If you are experiencing mental health concerns, resources can be found [here](#).
- d) Information regarding the Student Wellness and Accessibility Centre can be found [here](#).
- e) If you require academic accommodation on religious grounds, you should make a formal, written request to your instructor(s) for alternative dates and/or means of satisfying requirements. Such requests should be made during the first two weeks of any given academic term, or as soon as possible after a need for accommodation is known to exist.
- f) Information regarding Human Rights and Equity can be found [here](#).

COVID 19:

All students are expected to comply with Brock Covid-19 policies. Information can be found [here](#).