

Physics 3400, Winter 2019, Course Information

Winter 2019 SLOT 6

Monday, Tuesday, and Thursday, 13:00-13:50, room C2045

INSTRUCTOR: Dr. M. R. Morrow
Room: C3012
Phone: 864-4361
Email: mmorrow@mun.ca

OFFICE HOURS:

The instructor is available at most times outside of class. Students are encouraged to contact the instructor by e-mail to confirm availability for a meeting.

COURSE TEXT: Daniel V. Schroeder. An Introduction to Thermal Physics. Pearson.
ISBN-10: 0201380277 • ISBN-13: 97802013802794

CALENDAR ENTRY:

3400 Thermal Physics covers central concepts in thermodynamics and statistical mechanics, including temperature, entropy, the laws of thermodynamics, the Einstein model of solids, paramagnetism, Helmholtz and Gibbs free energies, chemical potential, thermodynamic identities, Boltzmann statistics, the partition function, and quantum statistics.

PR: Mathematics 2000, PHYS 2053 and PHYS 2750 (or 2056)

EVALUATION:	Assignments (8)	16%	
	Mid-term Tests (2)	40%	
	Final Exam	44%	(The final exam will be 2.5 hours)
	There is no supplementary examination in this course.		

MID-TERM TESTS: Thursday February 14, 2019 and Thursday March 14, 2019.

There will be no deferred midterm tests. Students prevented from writing a mid-term test by illness or bereavement or other acceptable cause, duly authenticated in writing, may apply, in writing and with supporting documents, for an alternate evaluation which will normally be a reassignment of the test weight to the final examination. Normally, this application must be made within one week of the original date of the examination or deadline to the course instructor.

ASSIGNMENTS:

There will be 8 assignments over the course of the semester.

Assignment problems from the text will be assigned as the relevant material is covered in class.

The problems comprising a particular assignment will be those assigned during each specified set of classes.

Assignment 1 due Tues. Jan. 15, 2019. Problems assigned from Jan. 3 to Jan. 10 inclusive
Assignment 2 due Tues. Jan. 22, 2019. Problems assigned from Jan. 14 to Jan. 17 inclusive
Assignment 3 due Tues. Jan. 29, 2019. Problems assigned from Jan. 21 to Jan. 17 inclusive
Assignment 4 due Tues. Feb. 5, 2019. Problems assigned from Jan. 28 to Jan. 31 inclusive
Assignment 5 due Tues. Feb. 12, 2019. Problems assigned from Feb. 4 to Feb. 7 inclusive
Assignment 6 due Tues. Mar. 5, 2019. Problems assigned from Feb. 11 to Feb. 28 inclusive
Assignment 7 due Mon. Mar. 11, 2019. Problems assigned from Mar. 4 to Mar. 7 inclusive
Assignment 8 due Thurs. Mar. 21, 2019. Problems assigned from Mar. 11 to Mar. 19 inclusive

P3400, Winter 2019, Course Outline:

Chapter and section numbers refer to *An Introduction to Thermal Physics* by D. V. Schroeder

0. Introduction: 0.5 lecture

1. Chapter 1 - Energy in Thermal Physics (Review): 3.5 lectures

1.1 Thermal Equilibrium; 1.2 The Ideal Gas; 1.3 Equipartition of Energy; 1.4 Heat and Work; 1.5 Compression Work; 1.6 Heat Capacities; 1.7 Rates of Processes

2. Chapter 2 - The Second Law (Review): 3 lectures

2.1 Two-state systems; 2.2 The Einstein Model of a Solid; 2.3 Interacting Systems; 2.4 Large Systems; 2.5 The Ideal Gas; 2.6 Entropy

3. Chapter 3 - Interactions and Implications: 5.5 lectures

3.1 Temperature; 3.2 Entropy and Heat; 3.3 Paramagnetism; 3.4 Mechanical Equilibrium and Pressure; 3.5 Diffusive Equilibrium and Chemical Potential; 3.6 Summary and a Look Ahead

4. Chapter 5 – Free Energy and Chemical Thermodynamics (part 1): 5.5 lectures

5.1 Free Energy as Available Work; 5.2 Free Energy as a Force toward Equilibrium; 5.3 Phase Transformations of Pure Substances

5. Chapter 6 – Boltzmann Statistics: 6 lectures

6.1 The Boltzmann Factor; 6.2 Average Values; 6.3 The Equipartition Theorem; 6.4 The Maxwell Speed Distribution; 6.5 Partition Functions and Free Energy; 6.6 Partition Functions for Composite Systems; 6.7 Ideal Gas

6. Chapter 7 – Quantum Statistics: 9 lectures

7.1 The Gibbs Factor; 7.2 Bosons and Fermions; 7.3 Degenerate Fermi Gases; 7.4 Blackbody Radiation; 7.6 Bose-Einstein Condensation

7. Chapter 5 – Free Energy and Chemical Thermodynamics (part 2): 3 lectures

5.4 Phase Transformations of Mixtures; 5.5 Dilute Solutions; 5.6 Chemical Equilibrium

Students are expected to be familiar with the following important information:

DEFERRAL OF THE FINAL EXAMINATION FOR MEDICAL OR OTHER REASONS:

Regulations regarding the writing of final examinations are found in the University Calendar at <http://www.mun.ca/regoff/calendar/sectionNo=REGS-0628>.

Students should take particular note of Section 6.8.2.4 which is quoted below for convenience.

For a student who is prevented from writing a final examination by illness, bereavement or other acceptable cause, duly authenticated in writing, the application to defer this examination should be made via telephone or in writing through the student's University approved e-mail account to the head of the appropriate academic unit (or delegate) and the course instructor. This application should be made in advance of the examination wherever possible, but no later than 48 hours after the original date of the examination. If application is made by telephone, written confirmation must then be received by the head of the appropriate academic unit (or delegate) within seven calendar days of the original date of the examination. The following supporting documentation is required:

- For illness or medical conditions, medical documentation from a health professional is required. Students should provide the health professional with a copy of the Student Medical Certificate (http://www.mun.ca/regoff/STUDENT_MEDICAL_CERTIFICATE.pdf).
- For bereavement or other acceptable cause, official documents or letters that support the reason for the request (e.g. death certificate, letter from employer, etc.) are required.

ACADEMIC INTEGRITY:

Students are expected to conduct themselves in all aspects of the course at the highest level of academic integrity. Any student found to commit academic misconduct will be dealt with according to University practices as outlined at <http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748> .

STUDENT CODE OF CONDUCT:

Students are also encouraged to consult Memorial University's Code of Student Conduct at <http://www.mun.ca/student/conduct> .

INCLUSION AND EQUITY:

Students who require physical or academic accommodations are encouraged to speak privately to the instructor so that appropriate arrangements can be made to ensure your full participation in the course. All conversations will remain confidential.

The university experience is enriched by the diversity of viewpoints, values, and backgrounds that each class participant possesses. In order for this course to encourage as much insightful and comprehensive discussion among class participants as possible, there is an expectation that dialogue will be collegial and respectful across disciplinary, cultural, and personal boundaries.

STUDENT ASSISTANCE:

Student Affairs and Services offers help and support in a variety of areas, both academic and personal. More information can be found at www.mun.ca/student .

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES:

Information about the accommodation of students with disabilities can be found at <http://www.mun.ca/blundon/about/index.php> .