



**DALHOUSIE
UNIVERSITY**

**Faculty of Science Course Syllabus
Department of Chemistry, Fall 2019**

CHEM 2301 - Physical Chemistry I

Lecturer: Aaron Kelly (aaron.kelly@dal.ca) **Office:** Chemistry 526

Lectures: Tuesday and Thursday, 10:05am - 11:25am **Location:** Chemistry 226

Lab Instructor: Gianna Aleman-Crouse (gianna.aleman@dal.ca)

Laboratories: Wednesday 1:35pm-4:25pm,
Thursday 1:05pm-3:55pm
Friday 1:35pm-4:25pm **Location:** Chemistry 115-118P

Description: The physical principles underlying chemical systems and reactivity are explored, with an emphasis on the forces between molecules and the properties of matter. Principles of thermodynamics are presented, including thermochemistry, entropy and free-energy relationships. Applications include phase equilibria, chemical equilibria, solutions, colligative properties, and electrochemistry.

Prerequisites: CHEM 1011.03/CHEM 1012.03 (or equivalent) and a grade of C- or better in MATH 1000.03 (or equivalent). PHYC 1280.03/PHYC 1290.03 or PHYC 1300.06 is strongly recommended.

Objectives and Learning Outcomes: Upon successful completion of this course, students will have the ability to explain and solve problems relating to: phase diagrams and phase changes, heat, work, and conservation of energy, derivation and prediction of thermodynamic quantities, and entropy, free energy, and conditions for spontaneity of chemical processes.

Course Content: As per laboratories, lectures, course website, and assigned readings.

- Ideal and non-ideal gases, equations of state, the first law of thermodynamics
- Types of chemical processes: isobaric, isochoric, and isothermal
- Enthalpy, heat capacity, and thermochemistry
- Second law of thermodynamics
- Free energy, entropy, and chemical spontaneity
- Thermodynamics of phase equilibria, chemical equilibria, and electrochemistry
- Colligative properties
- Two-component phase diagrams

Suggested Texts: “Physical Chemistry”, by Gilbert W. Castellan
“Elements of Physical Chemistry” by Peter W. Atkins
“Physical Chemistry” by Joseph H. Noggle

Course Assessment:	Labs	Quiz	Final Exam	Assignments	Essay
	20 %	20 %	40 %	15 %	5 %

Quiz Date: October 22.

Final Exam Date: Scheduled by Registrar.

Assignments: Regularly assigned problem sets, due in class.

Essay: 1200 -- 1500 words, due in class November 5. Topic to be announced in class.

Other course requirements:

Students must **complete all experiments and obtain at least 50% overall** in the laboratory portion of the course to pass the course.

Course Policies:

Late assignments will not be accepted and will be assigned a mark of zero, unless students have made prior arrangements.

If a class is cancelled due to weather on the date that an assignment is due, an extension to the following class will be granted to all students.

If a student misses the midterm examination, there will be no opportunity to write a make-up exam. If the exam is missed due to illness or personal emergency, the student must contact the instructor and supply a doctor's note or other appropriate documentation, within 48 hours of the end of the exam. In this situation, the final exam score will be used in the place of the missing midterm mark.

If a student is sick and cannot write the final exam as scheduled, they must contact the instructor before the exam starts. They must also supply a doctor's note within 48 hours of the end of the exam. Students will only be excused from the exam and allowed to write a make-up exam if both these criteria are met. The make-up exam will be scheduled before the end of the exam period.

Use of cellular phones during lectures is strictly prohibited; phones must be turned off and put away before the start of the lecture.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100) **B+** (77-79) **C+** (65-69) **D** (50-54)

A (85-89) **B** (73-76) **C** (60-64) **F** (<50)

A- (80-84) **B-** (70-72) **C-** (55-59)

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Missed or Late Academic Requirements due to Student Absence (policy)

https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>