CONTACT INFORMATION

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Office: HSH 213
Office hours: (by appointment) in person or via MS Teams

Students are strongly encouraged to ask questions by email (accompanied by a photo of any work done on a problem). Responses can be expected within approx. 24 hours. If more detailed explanations are needed, feel free to request an appointment in person or virtually.

ONLINE TEXTBOOKS (OPTIONAL)

1. Chemistry 2e OpenStax [https://openstax.org/details/books/chemistry-2e]
2. Principles of General Chemistry v1.0 (Averill and Eldredge)
3. Chemistry Virtual Textbook (Stephen Lower, Simon Fraser University)

LEARNING, TEACHING, AND ASSESSMENT INFORMATION

Assessment	Weight	Notes
Self-Check Lesson Quizzes	5%	On Moodle (no penalties for incorrect attempts, unlimited attempts)
Assignments	10%	On Moodle (10% penalty for incorrect answers, 10 attempts/question)
Timed Tests	15%	On Moodle (time limit, one attempt/question)
Midterm	25%	Proctored in-person (2 hours, hand-written)
Final Exam	45%	Proctored in-person (3 hours, hand-written)

Total	100%	

The midterm and final exam will be proctored in-person and will be hand-written (with part-marks for work shown). The exams are closed-book, but students are provided with cover pages containing a Periodic Table, list of constants, and a list of formulae. The dates and times of the exams will be arranged between the student and course instructor. Students not living near Wolfville can arrange to write exams with a proctor near them from a list approved by Acadia University (https://www2.acadiau.ca/academics-overview/online/current-students/exams/offsite-exam-proctors.html). After the proctor has been scheduled, students must email openacadiaexams@acadiau.ca to request the exam. For more information, please see Open Acadia s exam policies for online courses: https://www2.acadiau.ca/online/current-students/exams.html

ONLINE LEARNING

This course is self-paced, so there are no deadlines or due dates for self-check quizzes, assignments, or timed tests; however, it is highly recommended that you complete the units and lessons in chronological order, as the content from each unit often builds upon that from the previous unit. **The midterm is to be written after completion of Unit 4 (Equilibrium)**. The final exam is cumulative, but more focus is placed proportionally on questions from Units 5-7.

Lessons and Self-Check Quizzes
There are 7 units in the course, each consisting of several lessons. Lessons contain recorded lecture videos to watch, as well as a few self-check questions to help you test your understanding of the material. There are no penalties for incorrect attempts on self-check questions, and you can re-do the questions as many times as you want in order to learn the material. To start a lesson, just click on the desired topic, and then click 'Attempt Quiz Now' (the videos are embedded in the quiz).

Assignments
The assignments test understanding of the material from the unit with minimal penalty for incorrect responses. You have 10 attempts per question with a 10% deduction for each incorrect attempt. You can work on the assignments at your own pace, as the system will save your progress and you can resume it at any time. It is highly recommended that you try the Introduction to Moodle Assignments quiz before starting the first assignment in order to familiarize yourself with formatting your answers for the various question types.

Timed Tests
The timed test for each unit is graded like a typical test in that you only get one attempt, and won't receive any immediate feedback. The allotted time for each test is usually 1-2 hours, depending on the size of the unit. The test will submit automatically when the set time has expired, after which time you cannot make any more changes. The timed tests are open-book.

Supplementary Materials
Each unit also contains the PowerPoint notes from the lecture videos, as well as some summary slides that review key concepts, equations, and things to memorize from the lessons. Most units also contain extra practice problems and reference data.

Practice Assignments
For additional practice problems, you can re-try old assignments and timed tests (not for credit). Most calculation-based questions will randomize the numbers, so you won't get exactly the same values as in your first attempt.

COURSE DESCRIPTION

An introductory treatment of chemical kinetics and equilibria, thermochemistry, entropy and free energy, electrochemistry, phase equilibria and properties of solutions, and structure and properties of solids.

Assessment will be by assignments and examination.

This course covers a lot of material and will require students to dedicate a significant amount of time to complete. As there are no deadlines for any of the assessment items, it is very important for students to pace themselves well.

TOPICS

Unit 1: Kinetics
Unit 2: Thermochemistry
Unit 3: Spontaneity
Unit 4: Chemical Equilibrium
Unit 5: Electrochemistry
Unit 6: Phase Equilibrium and Solutions
Unit 7: Solids

LEARNING OUTCOMES

Content Specific

- Calculate the relative rates of change of reactant/product concentrations
- Determine reaction order using the method of initial rates
- Use integrated rate laws to calculate reactant concentrations or time elapsed
- Use the Arrhenius equation to determine rate constants at a different temperature
- Understand and label energy profile diagrams
- Calculate heat transfer, work, and total internal energy of a system
- Use heating/cooling curves to calculate total heat absorbed/removed to heat/cool a substance
- Calculate $\Delta_r H$ using Hess Law, enthalpies of formation, bond dissociation enthalpies, and stoichiometry
- Use coffee cup calorimetry and bomb calorimetry
- Describe the 2nd and 3rd laws of thermodynamics
- Calculate entropy change and Gibbs energy change
- Predict the direction of a reaction under a given set of conditions
- Inter-convert between $\Delta G°$and K; ΔG and Q
- Predict the effects on the equilibrium position of changing concentrations, pressure, or temperature
- Use ICE tables to calculate concentrations or the equilibrium constant, K
- Calculate the solubility of a salt and determine the effect of common ions and pH on solubility
- Balance redox reactions
- Represent an electrochemical cell using short-hand notation
- Interconvert between E , ΔG and K; E, ΔG and Q
- Use the Nernst equation to calculate E_{cell} for an electrochemical cell with non-standard concentrations
- Calculate vapour pressures and boiling points with the Clausius-Clapeyron equation
- Understand and label phase diagrams
- Quantify colligative properties: vapour pressure lowering, boiling point elevation, freezing point depression, osmotic pressure
- Identify different types of solids and their properties
- Calculate lattice energy or $\Delta_f H$ for ionic compounds using the Born-Haber cycle.

Scientific Practices and Critical Thinking Skills

- Formulate strategies for solving a problem and investigating the properties of a chemical system.
- Draw conclusions that are appropriate given the information provided, for example, by recognizing whether calculations or conclusions make sense .
- Combine knowledge of different chemical processes to understand and characterize chemical systems.
- Solve problems in chemistry while following standard practices such as reporting the correct number of significant figures, using appropriate units, notation, and symbols, sketching diagrams, making and stating appropriate approximations and simplifications, and comparing results with other known quantities.
- Recognize appropriate methods to analyze data and evaluate the significance of experimental results.

ACCESSIBLE LEARNING SERVICES

If you are a student with documentation for accommodations or if you anticipate needing supports or accommodations, please contact Gillian Hastey (Accessibility Resource Facilitator) or Marissa McIsaac (Manager) at 902-585-1823, accessible.learning@acadiau.ca. Accessible Learning Services is located in Rhodes Hall, rooms 111-115, 207, 207A.

EQUITY AND DIVERSITY

Acadia University is committed to becoming a culturally safe and anti-oppressive community. This can only be achieved where there are simultaneous efforts to eliminate all forms of discrimination and harassment from our campus community, including the elimination of all discrimination, harassment and violence based on one s identity, including but not limited to, gender, race, class, ethnicity, sexual orientation, disability, gender identity, gender expression, and Indigeneity.

The Equity, Diversity and Inclusion Officer is available to **students, staff, and faculty**. The fundamental objective of the Equity Office is to **prevent discrimination, sexual harassment, and personal harassment** from occurring, in part by managing Acadia s Policy Against Harassment and Discrimination. For more information, as well as for resources for students who believe they may have experienced or witnessed discrimination, sexual harassment, or personal harassment please contact Acadia s Equity, Diversity and Inclusion Officer, Polly Leonard, MSW, RSW (she/her/hers) at equity@ACADIAU.CA, and check out the website.

ACADEMIC INTEGRITY

It is your responsibility to acquaint yourself with the university policy on academic integrity. Academic dishonesty such as cheating, and plagiarism are not tolerated. Any form of academic dishonesty in examinations or tests is subject to serious academic penalty. The full description of the penalties associated with academic dishonesty is outlined in the Academic Calendar.

- Cheating is copying or the use of unauthorized aids or the intentional falsification or invention of information in any academic exercise.
- Plagiarism is the act of presenting the ideas or words of another as one's own. Students are required to acknowledge and document the sources of ideas used in their written work.
- Self-plagiarism is also a form of plagiarism. It is the presentation of the same work in more than one course without the permission of the instructors involved.
- A student who knowingly helps another commit an act of academic dishonesty is equally guilty.
- Penalties are levied in relation to the degree of the relevant infraction. They range from failure on that piece of work, to failure in the course, to dismissal from the university.

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