

Course Outline
CHEM 2103 – PHYSICAL CHEMISTRY 1: CHEMICAL THERMODYNAMICS
Fall 2016

Professor	Dr. John Murimboh KCIC LL34 john.murimboh@acadiau.ca		
Office Hours	F 1:30 – 4:30 pm, KCIC LL34		
Lectures	M/W/F 11:30 am – 12:30 pm, ELL 320		
Labs	W 1:30 – 4:30 pm, ELL 302		
Prerequisite	CHEM 1023 or CHEM 1123 with a grade of C- or higher, MATH 1023		
Textbooks	<i>Physical Chemistry</i> , 10 th edition Peter Atkins and Julio de Paula WH Freeman & Co: New York 2014 ISBN-10: 019969740X ISBN-13: 978-0199697403		
Grading	Labs	20% [†]	
	Assignments	10%	
	Quizzes	5%	
	Midterm1	10% [‡]	Friday, October 7, 2016
	Midterm2	10% [‡]	Friday, November 18, 2016
	Final Exam	45%	
	TOTAL	100%	

The laboratory is an integral part of the course. **You must earn a passing grade in the laboratory to pass the course. Attendance at the lab sessions is mandatory.** Unexcused absences will result in a grade of zero for that particular laboratory session. **If you have more than one unexcused absence from the laboratory, you will be assigned a failing grade for the course.**

Students are required to analyze their laboratory data in Excel. All laboratory reports must be submitted as Excel files.

†The penalty for late lab reports and assignments is a deduction of 20% of the maximum grade for every extra day.

‡There are no makeup midterm exams or quizzes. Students with a valid excuse (as determined by the Registrar) will have the weight of the midterm added to the final exam.

Assignments	The assignments are regarded as a teaching aid and are a key part of successfully completing CHEM 2103.
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Description An introduction to chemical thermodynamics and its application to common chemical situations. Students are expected to be proficient with elementary calculus and to be able to use it in solving problems.

Unit 1: Properties of Gases

- a) Intermolecular forces
- b) Equation of state of real gases

Unit 2: First Law—Concepts

- a) Heat, work, internal energy, enthalpy
- b) Work, heat, and heat capacity under different conditions

Unit 3: First Law—Machinery

- a) State functions and differentials
- b) Manipulating the first law, heat capacity
- c) Isothermal, adiabatic, reversible, irreversible processes
- d) Thermochemistry

Unit 4: Second Law—Concepts

- a) Entropy
- b) Gibbs energy

Unit 5: Second Law—Machinery

- a) Combining 1st and 2nd laws: master equations
- b) Aspects of Gibbs energy, pressure, temperature dependence
- c) Chemical potential; fugacity of real gases

Unit 6: Physical Transformations of Pure Substances

- a) Examples of phase diagrams of pure substances
- b) Derivation of equations for phase diagram

Unit 7: Simple Mixtures

- a) Thermodynamics of ideal solutions
- b) Henry's Law, Raoult's Law, fractional distillation

Unit 8: Phase Diagrams

- a) Liquid-vapour phase diagrams
- b) Solid-liquid phase diagrams

Unit 9: Chemical Equilibrium

- a) Equilibrium constants as a function of temperature and pressure
- b) Equilibrium calculations

Accessible Learning Services

Students with a documented disability who require support or accommodations, please contact Dr. Abu Kamara, Coordinator, Accessible Learning Services at 902-585-1291, abu.kamara@acadiau.ca or Kathy O'Rourke, Disability Resource Facilitator at 902-585-1823, disability.access@acadiau.ca. Accessible Learning Services is located in Rhodes Hall.

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, tests, labs, or assignments is subject to serious academic penalty. The full description of the penalties associated with academic dishonesty is outlined in the 2016/2017 Undergraduate Calendar.