

CHEM 234: Physical Chemistry I: Thermodynamics Syllabus for Fall 2017 Term

GENERAL INFORMATION

This 3-credit course introduces the student to the principles governing the energy exchanges that accompany physical and chemical transformations. It has the following prerequisites: CHEM 205 and 206 (Gen. Chem. I & II); PHYS 204, 206, 224 and 226 (Mechanics & Waves and Modern Physics + Labs); and MATH 203 and 205 (Calculus I & II).

Course Format: Lectures and tutorials

Instructor: **Dr. Guillaume Lamoureux**

Office: SP-201.09

Office Hours: Wednesdays from 10:00 to 11:00 (after the lecture)

Any other time: By appointment

Email: guillaume.lamoureux@concordia.ca

(Please put "CHEM 234" in the subject of your email.)

Websites: Access from <http://moodle.concordia.ca/moodle/>
(also <http://faculty.concordia.ca/glamoure/teaching.html>)

Lectures: Wednesdays and Fridays from 8:45 to 10:00

Location: CC-115

Tutorials:

Section 01T: Mondays from 13:15 to 14:30 (CC-425)

Section 02T: Tuesdays from 13:15 to 14:30 (CJ-1.121)

Section 03T: Wednesdays from 13:15 to 14:30 (CJ-1.121)

Section 04T: Thursdays from 13:15 to 14:30 (CJ-1.121)

Section 51T: Tuesdays from 18:00 to 19:15 (CJ-1.121)

Textbook: **Atkins & De Paula, *Atkins' Physical Chemistry*, 10th Ed., Volume 1.**

(available at the Concordia Bookstore)

The textbook is sold as a package that includes access to the book's website. It is highly recommended.

Review Material: In preparation for the course, please review the following chapters from **Zumdahl & Zumdahl, *Chemistry*, 8th Ed.** (or the equivalent chapters from any other General Chemistry textbook, such as Kotz & Treichel):

- Stoichiometry (Chapters 3 & 4)
- Gases (Chapter 5)
- Thermochemistry (Chapters 6 & 17)
- Liquids and Solids (Chapter 10)
- Properties of Solutions (Chapter 11)
- Chemical Equilibrium (Chapter 13)

COURSE OUTLINE

The following topics will be covered: (1) properties of gases, (2) internal energy, enthalpy & the First Law, (3) entropy, free energy & the Second and Third Laws, (4) phase equilibrium, (5) simple mixtures, (6) chemical equilibrium.

COURSE GRADE

The final grade for the course is composed as follows: **20% for the tutorials, 20% for the first midterm exam, 20% for the second midterm exam, and 40% for the final exam.** The minimum passing grade for the course is 50%.

EXAMINATIONS

The midterm exams will be held on **September 29** and **October 27**. The final exam date is set by the Examinations Office. If a student is absent from a midterm, he/she must produce a written excuse appropriately signed (e.g., by a doctor or an employer) on letterhead paper. This letter must be delivered to the instructor **no later than one week after the exam**. If the absence is not valid, the student will receive a mark of zero for the exam. If it is valid, the two other exams will be worth 80% of the final grade.

TUTORIALS

Attendance at the tutorials is mandatory. For any missed tutorial, a doctor's note or other official note for the day of the tutorial is the only acceptable excuse. No supplemental quizzes or other graded course work will be scheduled in case of a missed tutorial, but marks will be re-distributed equally.

CLICKERS

The iClicker system will be used during lectures and tutorials for discussion questions and short quizzes. **Clicker answers will not be graded during the lectures but will be graded during the tutorials.** You need to bring your own, registered clicker/device in order to participate. You also need to register your clicker at the myConcordia portal. **Clicker usage will start on the second week of classes.** No accommodations will be made for forgotten devices.

MANDATORY SEMINAR AND QUIZ

As part of this course, you are **required** to i) attend a Chemistry and Biochemistry Departmental Seminar on the academic conduct code and the appropriate use of information sources and ii) pass the online quiz associated with this seminar. (Note: The passing grade for the quiz is 100%.) (Note: This is not the University's quiz you may have been asked to take when you first registered and logged into the myConcordia portal; the one you must take is similar, but graded by the Department of Chemistry and Biochemistry, and you cannot take it until after you have attended the seminar.) The aim of this seminar is to clarify the academic conduct code in terms of what practices will be considered unacceptable with regards to work submitted for grading in Chemistry and Biochemistry courses. **You are only exempt from repeating the seminar and the quiz if you have done both in Fall 2012 or more recently**, otherwise you are required to repeat both this term. (You are exempt if you can find your ID in the PDF file located on the Departmental web site: <http://www.concordia.ca/content/dam/artsci/chemistry/docs/compliance-list.pdf>.) Dates and times at which you can attend the seminar will be posted in the Departmental office (SP-201.01) and you will have to sign up to your preferred time. If you do not complete this course requirement, your final grade for the course may be lowered by one full letter grade with an "incomplete" ("INC") notation until this requirement is completed. Please refer to the Undergraduate Calendar (section 16.3.6) for details on removal of an "INC" notation.

PLAGIARISM AND OTHER FORMS OF ACADEMIC DISHONESTY

The academic code of conduct can be found in section 17.10 of the Undergraduate Calendar (<http://www.concordia.ca/academics/undergraduate/calendar/current/17-10.html>). Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. The mandatory seminar is a clear and fair opportunity to learn what our Faculty regards as academic misconduct. Failure to take part in this learning opportunity and thus ignorance of these regulations is no excuse and will not result in a reduced sanction in any case where academic misconduct is observed.

READING MATERIAL AND PRACTICE PROBLEMS

The student is expected to read the appropriate sections of the textbook—ahead of time, ideally (to get the most out of the lectures). There are no graded assignments for the course, but a list of suggested practice problems from the book will be provided with each section. It is the student's responsibility to use these problems to practice in applying the course material.

CALENDAR OF LECTURES

Please note that this calendar may change as the semester proceeds. The chapter numbers refer to the 10th edition of the textbook.

Date	Topics	Reading
Sep. 6	Introduction, The perfect gas	1A & 1B
Sep. 8	Real gases	1C
Sep. 13	The First Law	2A & 2B
Sep. 15	The First Law (cont'd)	
Sep. 20	Thermochemistry	2C
Sep. 22	Thermochemistry (cont'd)	
Sep. 27	Problems in class	
Sep. 29	Midterm Exam #1 (covers Chapters 1 and 2)	
Oct. 4	The Second and Third Laws	3A & 3B
Oct. 6	The Second and Third Laws (cont'd)	
Oct. 11	Helmholtz and Gibbs energies	3C
Oct. 13	Helmholtz and Gibbs energies (cont'd)	
Oct. 18	Combining the First and Second Laws	3D
Oct. 20	Combining the First and Second Laws (cont'd)	
Oct. 25	Problems in class	
Oct. 27	Midterm Exam #2 (covers Chapter 3)	
Nov. 1	Phase diagrams, Phase transitions	4A & 4B
Nov. 3	Phase diagrams, Phase transitions (cont'd)	
Nov. 8	Simple mixtures, The properties of solutions	5A & 5B
Nov. 10	Simple mixtures, The properties of solutions (cont'd)	
Nov. 15	Phase diagrams of binary systems	5C
Nov. 17	Phase diagrams of binary systems (cont'd)	
Nov. 22	Activities	5E & 5F
Nov. 24	Activities (cont'd)	
Nov. 29	Chemical equilibrium	6A & 6B
Dec. 1	Chemical equilibrium (cont'd)	
TBA	Final Exam (covers Chapters 3 (again), 4, 5, and 6)	