PHYSICAL CHEMISTRY I : Thermodynamics (CHEM 234/2 Section 51)

Fall 2014

Instructor: Dr. Guy Paquette

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Office hours: Thursday: 10h00-11:30 and 16h00-17h00; please make an appointment

**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, on Thursdays from 18:00 to 20:15

Location: CC-314

**Textbook: Atkins & De Paula, *Physical Chemistry*, 10th Ed., 2014**

(available at the Concordia Bookstore)

(The textbook is sold as a package that includes access to the bookʼs website.

It is highly recommended.)

**Lecture Topics**

(1) Introduction; properties of gases

(2) internal energy, enthalpy & the FirstLaw

(3) entropy, free energy & the Second and Third Laws

(4) phase equilibrium

(5) simple mixtures

(6) chemical equilibrium

**Exam Schedule and Grading**

→ 2 assignments : 5% each 10%

→ 2 Midterm Exams: 20 % each (Oct. 2nd and Oct. 30th ) 40%

→ Final Exam December (TBA) 50%

(unannounced in-class quizzes: possibility of 4 % bonus points)

*The minimum passing grade for the course is 50%.*

If a student is absent from a midterm exam, 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**. The Department determines the validity of the

absence. If the absence is not valid, the student will receive a mark of zero for the exam. If it is valid,

the other exams (other midterm exam, and final exam) will be worth 100% of the final grade.

**Grades :**

A+ : 86,7% and higher

A: 83,4 to 86,6%

A-: 80,0 to 83,3%

B+: 76,7 to 79,9%

B: 73,4 to 76,6%

B- : 70,0 to 73,3%

C+: 66,7 to 69,9%

C: 63,4 to 66,6%

C-: 60,0 to 63,3%

D+: 56,7% to 59,9%

D: 53,4 to 56,6%

D-: 50,0 to 53,3%

F: 40,0 to 49,9 %

R: below 40%

**PLAGIARISM AND OTHER FORMS OF ACADEMIC DISHONESTY**

The academic code of conduct can be found in section 17.10 of the academic calendar

(http://registrar.concordia.ca/calendar/pdf/sec17.pdf). Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. Ignorance of these regulations is no excuse and will not reduce the sanction.

**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 this course, but a list of suggested practice problems from the book will be provided with each section. It is the studentʼs 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**

Sept. 04 Lecture 1: Introduction, Ideal gases, Real gases 1A–1C

Sept. 11 Lecture 2 : The First Law (internal energy & enthalpy) 2A–2B

Assignment #1 : due Sept. 18th

Sept. 18 Lecture 3 : Thermochemistry, State functions, Adiabatic changes 2C-2E

Sept. 25 Lecture 4 : The Second and Third Laws 3A–3B

**Oct. 02 Midterm Exam #1 : 75 minutes (covers Chapters 1 and 2)**

Oct. 02 Lecture 5 : Helmholtz and Gibbs energies 3C

Oct. 09 Lecture 6 : /Combining the First and Second Laws 3D

Assignment #2 : due Oct. 16th

Oct. 16 Physical transformation of pure substances 4A-4B

Oct. 23 Exercises in class

**Oct. 30 Midterm Exam #2 : 75 minutes (covers Chapter 3)**

Oct. 30 Lecture 8 : Simple mixtures, The properties of solutions 5A–5B

Nov.06 Lecture 9 : Phase diagrams of binary systems 5C

Nov. 13 Lecture 10 : Activities 5E–5F

Nov. 20 Lecture 11: Chemical equilibrium 6A–6B

Nov. 27 Lecture 12 : Exercises in class

**TBA Final Exam (covers Chapters 3 (again), 4, 5, and 6)**