PHYSICAL CHEMISTRY 1 (CHEM 330): SPRING 2010
DEPARTMENT OF CHEMISTRY

Professor Marco Ceruso, mceruso@sci.ccny.cuny.edu

Office: MR1233, Office Hours (Tuesday and Thursday 2-4 or by appointment)

Course Description (from Bulletin): Ideal and real gases, kinetic molecular theory, thermodynamics and phase equilibria, solutions.

Prerequisites: Chem 10401, Math 20300, and Physics 20700

Corequisites: Physics 20800 (recommended as a prereq.)

Class Schedule: 3 lecture hours per week, 3 credits: Tu and Th 9:30–10:45 am


Course learning objectives

To define and to explain the physical concepts as well as to solve problems involving the 4 fundamental laws of classical thermodynamics for single components systems in a single gaseous or condensed phase.

To define and to explain how these laws are applied and incorporated to further our understanding of chemical equilibria, phase equilibria, electrochemical equilibria and biochemical reactions equilibria. And to solve problems involving these classes of equilibria.

Assessment/grading/policies

The assessment of the learning objective will be done on the 4 Outcome Categories* below

<table>
<thead>
<tr>
<th>Outcome Categories</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Knowledge: (defining concepts and specific facts)</td>
<td>D/C</td>
</tr>
<tr>
<td>Comprehension: (understanding/explaining concepts and specific facts)</td>
<td>C</td>
</tr>
<tr>
<td>Application: (use of acquired knowledge and comprehension to solve basic/intermediate problems)</td>
<td>C/B</td>
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<tr>
<td>Synthesis: (use of acquired knowledge and comprehension to analyze and to solve new/advanced problems or to produce a new whole)</td>
<td>B/A</td>
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</table>
The assessment will be implemented in the form of 4 Exams (including the final exam) each worth 20 points, and Quizzes (at the beginning of each lecture) also worth 20 points in total. Quizzes will assess Knowledge and Comprehension while exams will assess Comprehension, Application and Synthesis.

**Weekly schedule**

Chapter 1: **Zeroth Law of Thermodynamics and Equations of State** (2 Lectures)

Problem set 1: 1.1, 1.3, 1.6, 1.11, 1.21, 1.23, 1.28, {1.17, 1.33, 1.34}, 1.E

Chapter 2: **First Law of Thermodynamics** (3 Lectures)

Problem set 2: 2.1, 2.4, 2.9, 2.11, 2.15, 2.26, 2.35, 2.40, 2.47


Chapter 3: **Second and Third Law of Thermodynamics** (3 Lectures)

Problem set 3: 3.4, 3.8, 3.9, 3.16, 3.21, 3.22, 3.24, 3.35, 3.41

Chapter 4: **Fundamental Equations of Thermodynamics** (3 Lectures)

Problem set 4: 4.2, 4.3, 4.8, 4.16, 4.19, 4.29, 4.33, 4.44, 4.48

**Exam-2**, date: 3/18/2010; chapters: 3-4.

Chapter 5: **Chemical Equilibrium** (4 Lectures)

Problem set 5: 5.1, 5.3, 5.6, 5.17, 5.24, 5.34, 5.44, 5.53, 5.63

Chapter 6: **Phase equilibrium** (3 Lectures)


**Exam 3**, date: 4/22/2010; chapters: 5-6.

Chapter 7: **Electrochemical Equilibrium** (3 Lectures)

Problem set 7: 7.1, 7.5, 7.12, 7.19, 7.26, 7.41, 7.51, 7.53, 7.B

Chapter 8: **Thermodynamics of Biochemical Reactions** (3 Lectures)

Problem set 8: 8.1, 8.9, 8.19, 8.24, 8.33, 8.45, 8.39, 8.A, 8.I

**Exam 4**, date of final exam, chapters 7-8
Attendance Policy

Attendance is mandatory to all lectures and exams. There are no make-up quizzes or exams. Special situations should be brought to my attention immediately (before quiz/lecture or exam).

Academic integrity

The CCNY policy on academic integrity will be followed see:

http://www1.ccny.cuny.edu/upload/academicintegrity.pdf

Make sure you have read these rules.

Suggested Reading

“Physical Chemistry: Thermodynamics” by Hora Metiu
“Mere Thermodynamics” by Don S. Lemons
“Molecular Thermodynamics” by Donald A. McQuarrie ad John D. Simon
“Chemical Thermodynamics” by Perter A. Rock
“Chemical Thermodynamics: Basic Theory and Mehtods” by Klotz and Rosenberg
“Thermodynamics” by Enrico Fermi
“Treatise on Thermodynamics” by Max Planck
“Modern Thermodynamics” by Kondepudi and Prigogine
“The Principles of Chemical Equilibrium” by Kenneth Denbigh
“Thermodynamics” by Lewis and Randall (2nd revised by Pitzer and Brewer)

Books on Mathematics for Physical Chemistry

“Mathematics for Physical Chemistry: Opening Doors” by Donald A. McQuarrie
“Applied Mathematics for Physical Chemistry” by James Barrante

Bibliographic Footnote: