

CHEM352: PHYSICAL CHEMISTRY I
SYLLABUS FALL 2018

Instructor: Dr. Mateusz Marianski

Room#: HN-1321B

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Lecture: Tue, 2.10-3.25 pm & Fri 2.10-3.25 pm, **C111**

Office hours: Wed, 4-6 pm, **Library - Science Center, 7th floor**

Text:

Physical Chemistry
Thomas Engel, Phillip Reid
3rd edition, Pearson

Supplemental reading:

Physical Chemistry: Molecular Approach
John McQuarrie, John Simons
3rd edition,

Slides and notes:

Some lectures will be accompanied with slides posted later on Bb

Course Objectives and Learning Goals

Students in this course will learn basic principles governing the realm of Physical Chemistry. In details, the course is aimed to equip students with understanding of:

- Principles of chemical thermodynamics which describes behavior of substances in a macroscopic scale
- Phase equilibrium properties of liquids and electrochemistry.
- Elements of statistical mechanics, and molecular kinetics which provides a link between macroscopic observables and molecular structure

Upon completion of this course, students should have a solid understanding of the basic principles of classical thermodynamics, physical transformations and elements of statistical thermodynamics and kinetics. Students should be able to apply the knowledge in future studies and in career in science or related fields. Moreover, students should have enhanced ability to use mathematics to address complex chemical and physical problems, as well as enhanced analytical reasoning and problem-solving skills.

Prerequisites

Participation in the course requires understanding of variety of mathematical tools, namely logarithms, differential calculus and linear algebra.

Grading and Exams

The lecture is divided into 3 sections. Two problem sets accompany each section. Each problem set is worth 25 pts, the due dates are listed in the table. Each section will be concluded with an 75-minutes exam (100 pts).

The exams are notes-open. Please bring calculators. Mobile phones substitutes are not allowed.

Students are expected to take exams at the scheduled time with the entire class. There are no makeups for exams (Department policy)

In-class project worth 50 pts will be assigned in the third part of the semester individually.

The grade will be calculated on the basis of a percentage of total points (500 pts). The projected grade lines are:

A : 100.0% - 90.0%

B : 89.8% - 80.0%

C : 79.8% - 70.0%

D : 69.8% - 60.0%

F : 59.8% - 0.0%

HC statements:

Academic Integrity Statement: “Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.”

Cheating will be punished as severely as allowed under University guidelines.

ADA Statement: “In compliance with the ADA and with Section 504 of the Rehabilitation Act, Hunter College is committed to ensuring educational access and accommodations for all its registered students. Hunter College’s students with disabilities and medical conditions are encouraged to register with the Office of AccessABILITY for assistance and accommodation. For information and appointment contact the Office of AccessABILITY located in Room E1214 or call (212) 772-4857 /or VRS (646) 755-3129.”

Hunter College Policy on Sexual Misconduct: “In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College’s Public Safety Office (212-772-4444).

b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College’s Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123. CUNY Policy on Sexual Misconduct Link: <http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

Tentative Schedule

Table 1: The list of lectures titles, and respective chapters in the book. The due dates for homework are shown in bold.

| # | Class/HW due | Day | Lecture | Chapters |
|-----|-----------------|-----|--|----------|
| L01 | 08-28-18 | T | Fundamental Concepts of Thermodynamics | CH 1 |
| L02 | 08-31-18 | F | q, w, U, H and the First Law of Thermodynamics – I | CH 2 |
| L03 | 09-04-18 | T | q, w, U, H and the First Law of Thermodynamics - II | CH 2 |
| L04 | 09-07-18 | F | The Importance of State Functions: U and H | CH 3 |
| B | 09-11-18 | T | No class | |
| L05 | 09-14-18 | F | Thermochemistry – I | CH 4 |
| L06 | 09-18-18 | T | Thermochemistry – II | CH 4 |
| L07 | 09-21-18 | F | S and the Second and Third laws of thermodynamcis – I | CH 5 |
| L08 | 09-25-18 | T | S and the Second and Third laws of thermodynamcis – II | CH 5 |
| L09 | 09-28-18 | F | Chemical Equilibrium – I | CH 6 |
| L10 | 10-02-18 | T | Chemical Equilibrium – II | CH 6 |
| L11 | 10-05-18 | F | The properties of real gases | CH 7 |
| E01 | 10-09-18 | T | Exam I – Thermo | CH 1-7 |
| L12 | 10-12-18 | F | Phase Diagrams and the Relative Stability of Phases | CH 8 |
| L13 | 10-16-18 | T | Ideal and Real Solutions – I | CH 9 |
| L14 | 10-19-18 | F | Ideal and Real Solutions – II | CH 9 |
| L15 | 10-23-18 | T | Electrolyte Solutions | CH 10 |
| L16 | 10-26-18 | F | Electrochemical Cells, Batteries and Fuel Cells - I | CH 11 |
| L17 | 10-03-18 | T | Electrochemical Cells, Batteries and Fuel Cells - II | CH 11 |
| E02 | 11-02-18 | F | Exam II – Phase transitions etc | CH 8-11 |
| L18 | 11-06-18 | T | Probability Theory | CH 29 |
| L19 | 11-09-18 | F | The Boltzman Distribution | CH 30 |
| L20 | 11-13-18 | T | Ensemble and Molecular Partition Functions – I | CH 31 |
| L21 | 11-16-18 | F | Ensemble and Molecular Partition Functions – II | CH 31 |
| L22 | 11-20-18 | T | Statistical Thermodynamics – I | CH 32 |
| B | 11-23-18 | F | No class | |
| L23 | 11-27-18 | T | Statistical Thermodynamics – II | CH 32 |
| L24 | 11-30-18 | F | Kinetic Theory of Gases | CH 33 |
| L25 | 12-04-18 | T | Transport Phenomena | CH 34 |
| L26 | 12-07-18 | F | Elementary Chemical Kinetics – I | CH 35 |
| L27 | 12-11-18 | T | Elementary Chemical Kinetics – II | CH 35 |
| L28 | 12-14-18 | F | Elementary Chemical Kinetics – III | CH 35 |
| E03 | 12-18-18 | T | Exam III – Elements of StatMech and kinetics | CH 29-35 |