

# Physical Chemistry I (Chem 4110/6110)

## Course Syllabus – Fall 2018

**Instructor:** Samer Gozem

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**Office Hours:** Wednesdays 10:30 A.M. – 12:30 P.M., or e-mail in advance.

**Lecture time and place:** MWF 9:30 – 10:20 A.M. in Langdale Hall 218.

**Course Prerequisites:** This course relies on chemistry, physics and math concepts from Chem 1212K; Math 2212; Phys 2211K, and Phys 2212K. Appendix B in the textbook is a good resource for reviewing important mathematical relationships and concepts that will be used in this class.

**Textbook:** "**Physical Chemistry**" by Peter Atkins, Julio de Paula, and James Keeler, 11<sup>th</sup> Edition, Oxford University Press, 2017, ISBN 9780198769866.

**Course Description:** Physical Chemistry I is a 3 credit semester course that covers the principles of thermodynamics, transport and kinetics, and how they serve as the basis for interpreting and interrelating the properties of matter. Chapters 1-11 and 16-19 of the text will be covered.

**Course Objectives:** Understand the behavior of matter and transformation between different forms of energy as they relate to expansion and compression of gases, phase transitions, and chemical reactions.

**Help Sessions:** Special Course: CHEM 4111; Fridays from 12:30 - 2:10 p.m. at Classroom South 327. All undergraduate students are **strongly** encouraged to register for this course. Graduate students cannot register for this course but are also strongly encouraged to sit in and solve homework problems.

**Practice Problems:** Practice problems will be assigned to help you learn and test your knowledge of each of the topics covered in the course. The CHEM 4111 session on Fridays can be used as an opportunity to ask questions about these problems if you have difficulties with them. You should therefore try to solve problems independently sometime **before** the Chem 4111 session on Friday. Several quiz and exam questions will be based directly on homework problems or will be very similar, so solving the homework problems will be highly beneficial in this class.

**Quizzes & Exams:** There will be seven quizzes, one midterm exam, and one ACS final exam. The lowest two quiz scores will be dropped. **The Midterm and final ACS Exam must be completed and cannot be dropped.** Quizzes will not be given at any time other than the scheduled lecture period. Should you miss a quiz, you may use it as your drop grade. Therefore, you are allowed to miss two quizzes, but you then lose the opportunity to drop another quiz with a low grade.

### Grading:

**CHEM 4110:** The quizzes will count for **50%** of your overall grade. The midterm counts for **25%** of the grade. The ACS Exam will count for **25%** of the grade.

**HONORS CHEM 4110:** Quizzes will count for **50%** of the overall grade. The midterm counts for **20%** of the grade. The ACS Exam will count for **20%** of the grade. A list of 10 problems will count for **10%** of the overall grade. The list will be emailed at the end of the fourth week and the solutions are due on or before November 30<sup>th</sup>, 2018.

**CHEM 6110:** The quizzes will count for **50%** of the overall grade. The midterm counts for **20%** of the grade. The ACS Exam will count for **20%** of the grade. A list of 10 problems will count for **10%** of the overall grade. The list will be emailed at the end of the fourth week and the solutions are due on or before November 30<sup>th</sup>, 2018.

The following plus/minus grading system will be used for everyone:

<u>Grade</u>	<u>%</u>
A+	100
A	90-100
A-	85-90
B+	80-85
B	75-80
B-	70-75
C+	65-70
C	60-65
C-	55-60
D	40-55
F	< 40

#### **Last day to withdraw: Tuesday, October 9th, 2018**

The University requires faculty, on a date set by the Provost after the mid-point of the course,

1. to give a WF to all those students who are on their rolls but no longer taking the class, and
2. to report the last day the student attended or turned in an assignment.

**Problem Set Policy:** The Chem 6110 / Chem 4110 honors problem set must be handed in either as a physical copy or emailed to me as a clear and legible pdf file before midnight on November 30<sup>th</sup>, 2018. The problem set must represent your individual, unaided effort. Receiving unauthorized outside information or offering unauthorized information to another student is considered cheating. Any suspected offenses may be referred to the Department of Chemistry and the College of Arts and Sciences for appropriate action.

**Quiz and Exam policies:** The seven quizzes will be open-book, so you may use the book or your notes during these quizzes. You may also use calculators during the quizzes. However, consider that you will not have a lot of time to browse through your book/notes, so use your time wisely.

The mid-term and ACS final are both closed-book, and you **cannot** use calculators during these two exams.

Cell phones must be turned OFF (not just silent) during all exams and quizzes. Cell phones must not be in any place that is visible to you or me during the exam. In case of an emergency where you anticipate you might need your phone turned on during your exam, you must clear that with me first. You cell phones may not be used in place of a calculator for the quizzes.

I reserve the right to move anyone during quizzes and exams without explanation. I typically use this simply as a way to spread people out. If you are asked to relocate, please gather your test and move to the newly assigned seat as quietly as possible.

#### **Tentative Course Schedule:**

**Holidays:** Labor Day: September 3<sup>rd</sup>, 2018 and Thanksgiving break: November 19-24<sup>th</sup>, 2018

<u>Dates</u>	<u>Chapter</u>	<u>Subject</u>
8/20	1	Introduction, what is this course about?
8/22, 8/24	1	Ideal and van der Waals gases
8/24, 8/27, 8/29	2	Work, Heat, First Law of Thermodynamics
8/31		Quiz 1 (Chapter 1)
8/31, 9/5	3	Math review, State functions and Exact Differentials
9/7, 9/10	4	Thermochemistry
9/12	5	Entropy
9/14		Quiz 2 (Chapters 2, 3)
9/14, 9/17, 9/19	5	2nd and 3rd laws

9/21, 9/24, 9/26	6	Free energies
9/28		Quiz 3 (Chapters 4,5)
9/28, 10/1, 10/3	6	Chemical Equilibrium
10/5	1-6	Midterm exam
10/8	7	Real gases
10/10	8	Phase diagrams
10/12		Quiz 4 (Chapter 6)
10/12, 10/15	8	Phase transitions
10/17, 10/19, 10/22, 10/24	9,10	Solutions, Electrolytes
10/26		Quiz 5 (Chapters 7, 8)
10/26, 10/29, 10/31	11	Electrochemical Reactions
11/2, 11/5, 11/7	16	Kinetic Theory
11/9		Quiz 6 (Chapter 9,10)
11/12	18	Intro to kinetics
11/14 – 11/28	18,19	Kinetic Mechanisms, Enzyme Catalysis
11/30	16-19	Quiz 7 (Chapters 11, 16)
11/30, 12/3	1-11,16-19	Review
12/7, 8:00 A.M.	1-11,16-19	Final ACS Exam