

# Chem 351

## Physical Chemistry I

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Office Hours: M: 11–12:30, W: 3–4:30, F: 11–12 and 2–3

## Course Information

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**Prerequisites:** General Chemistry, General Physics, Differential and Integral Calculus

**Text:** Thermodynamics, Statistical Thermodynamics, and Kinetics – Engel and Reid, 2<sup>nd</sup> Edition.

**Recommended References:** Various other physical chemistry texts (Barrow, Laidler, Alberty, Moore, etc.), NIST WebBook, <http://webbook.nist.gov>, International Critical Tables, CRC Handbook of Chemistry and Physics, CRC Math Tables.

**Course Content:** Chemical thermodynamics - an introduction to the (1) language, (2) fundamental principles, and (3) application of chemical thermodynamics.

**Course Advice:** Thermodynamics is a challenging and course that requires you to draw extensively upon your general chemistry, math, physics, and problem solving skills. It is VERY IMPORTANT that you work problems and keep up with the reading assignments. I will stress both the technical nature of the material (i.e., solving problems and using the equations we will develop) and the concepts behind the material. There will be material on exams that is only covered in the text and material that is only covered in lecture so it is essential you BOTH READ YOUR TEXT AND ATTEND LECTURE! It is also VERY IMPORTANT to see me early if you are having problems with the material.

## Grading Policies

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	Points	% of Grade
Quizzes (5)	150 (30 pts each)	25%
80 minute exams (2)	300 (150 each)	50%
Final Exam (comprehensive)	150	25%
<b>Total</b>	<b>600</b>	<b>100%</b>

Exams or quizzes may be rescheduled **IF** the instructor is notified **WELL** in advance of the exam date. Working the suggested homework problems (listed on my web page and below) in will be necessary for success in this course on both exams and quizzes. **I will regularly draw quiz questions directly from the homework!**

# Course Schedule

Week	Tues	Reading Assignment	Thurs	Reading Assignment
1	9/22	Ch 1, Ch 2 (2.1 – 2.7)	9/24	Ch 2 (2.8 – 2.10) – <b>QUIZ 1</b>
2	9/29	Ch 3 (3.1 – 3.4)	10/1	Ch 3 (3.4 – 3.7)
3	10/6	Ch 3 (3.8), Ch 4 (4.1 – 4.2) - <b>QUIZ 2</b>	10/8	Ch 4 (4.3 – 4.6)
4	10/13	<b>EXAM 1 (Ch 1 – 4)</b>	10/15	Ch 5 (5.1 – 5.6)
5	10/20	Ch 5 (5.7 – 5.12)	10/22	Ch 5 (5.13 – 5.14), Ch 6 (6.1 – 6.2)
6	10/27	Ch 6 (6.3 – 6.6) – <b>QUIZ 3</b>	10/29	Ch 6 (6.7 – 6.15)
7	11/3	Ch 7 (7.1 – 7.5)	11/5	<b>EXAM 2 (Ch 5 – 7)</b>
8	11/10	Ch 8 (8.1 – 8.5)	11/12	Ch 8 (8.6 – 8.8)
9	11/17	Ch 8 (8.9), Ch 9 (9.1 – 9.2) – <b>QUIZ 4</b>	11/19	Ch 9 (9.3 – 9.7)
10	11/24	<b>Class Cancelled</b>	11/26	<b>Thanksgiving Holiday</b>
11	12/1	Ch 9 (9.7 – 9.9)	12/3	Ch 9 (9.9 – 9.13) – <b>QUIZ 5</b>

**Final Exam: 1:10 pm – 4:00 pm, Tuesday December 8<sup>th</sup> – Chapters 1-9 in our text**

The reading assignment should be completed ***BEFORE*** the lecture in which it is listed above. Much of your success in this class will be derived from how well you understand our discussions during class. I will try my best to be clear in my presentation of the material and answer all questions but you will get more from class discussions if you are prepared for the material.

## Suggested Problems

### Engle and Reid 1<sup>st</sup> Ed

Chapter 1	Q 1.2, 1.2, 1.4; P 1.1, 1.2, 1.4, 1.7, 1.9, 1.15, 1.18
Chapter 2	Work all the chapter 2 simulations and answer all questions; Q 2.1, 2.6, 2.8; P 2.1, 2.2, 2.3, 2.4, 2.8, 2.11, 2.16, 2.21, 2.24, 2.30
Chapter 3	Q 3.1, 3.3, 3.4, 3.5, 3.6; P 3.1, 3.2, 3.3, 3.6, 3.8, 3.9, 3.13, 3.15, 3.18, 3.24, 3.30
Chapter 4	Q 4.1, 4.2, 4.3, 4.6, 4.8, 4.10; P 4.1, 4.4, 4.6, 4.8, 4.11, 4.13, 4.16, 4.20, 4.21, 4.22
Chapter 5	Q: 5.1, 5.2, 5.5, 5.6, 5.8, P: 5.1, 5.2, 5.3, 5.5, 5.6, 5.7, 5.10, 5.17, 5.21, 5.24, 5.25; You should also take a look at the on-line applications for chapter 5
Chapter 6	Q 6.1, 6.2, 6.3, 6.5, 6.6, 6.7, 6.11; P 6.1, 6.3, 6.6, 6.7, 6.8, 6.9, 6.10, 6.12, 6.17, 6.18, 6.21, 6.24, 6.26
Chapter 7	Q 7.1, 7.6; P 7.1, 7.5, 7.21; W 7.1
Chapter 8	Q 8.5, 8.6, 8.8; P 8.1, 8.2, 8.3, 8.6, 8.7, 8.9, 8.13, 8.14, 8.17, 8.18, 8.23, 8.26, 8.30
Chapter 9	Q 9.1, 9.3, 9.4, 9.5, 9.8, 9.9, 9.10; P 9.1, 9.3, 9.5, 9.6, 9.10, 9.13, 9.14, 9.18, 9.19, 9.20, 9.23, 9.30

### Engle and Reid 2<sup>nd</sup> Ed

Chapter 1	Q 1.1, 1.2, 1.3, 1.6, 1.8; P 1.1, 1.3, 1.7, 1.8, 1.11, 1.19, 1.24, 1.26, 1.29
Chapter 2	Q 2.2, 2.4, 2.5, 2.6, 2.12, 2.14; P 2.2, 2.3, 2.6, 2.7, 2.9, 2.12, 2.14, 2.16, 2.26
Chapter 3	Q 3.2, 3.3, 3.5, 3.6, 3.8, 3.10, 3.11, 3.13, 3.14; P 3.1, 3.3, 3.4, 3.5, 3.7, 3.11, 3.12, 3.19, 3.20, 3.26, 3.34
Chapter 4	Q 4.1, 4.2, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11; P 4.2, 4.3, 4.5, 4.8, 4.9, 4.11, 4.17, 4.18, 4.19, 4.22, 4.30
Chapter 5	Q 5.2, 5.4, 5.6, 5.7, 5.8, 5.9, 5.10, 5.13; P 5.1, 5.4, 5.6 – 5.9, 5.11, 5.13, 5.19 – 5.22, 5.34, 5.37, 5.42
Chapter 6	Q 6.1, 6.3, 6.4, 6.5, 6.7, 6.12 – 6.18; P 6.1, 6.3, 6.4, 6.5, 6.8, 6.13, 6.15, 6.18, 6.20, 6.24, 6.30, 6.34, 6.36
Chapter 7	Q 7.5, 7.6, 7.8, 7.11, 7.14; P 7.3, 7.8, 7.10, 7.11, 7.17, 7.21, 7.22
Chapter 8	Q 8.1, 8.2, 8.6, 8.7, 8.10 – 8.13; P 8.1, 8.4, 8.5, 8.6, 8.8, 8.9, 8.10, 8.12, 8.13, 8.15, 8.16, 8.20, 8.22, 8.25, 8.43
Chapter 9	Q 9.1, 9.2, 9.4 – 9.7, 9.12 – 9.13; P 9.1, 9.2, 9.4, 9.7, 9.10, 9.14, 9.16, 9.17, 9.19, 9.22, 9.23, 9.25, 9.36, 9.37