

CHEM 0970
General Chemistry for Engineers 2
SCUPI, Sichuan University

Spring 2018

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Course Objectives

Fundamental concepts and principles of chemistry are important to engineers. Knowledge on chemistry will help engineers to communicate with chemists, and more importantly, to understand the properties of working objects. To gain such knowledge, we will have two semesters of Chemistry covering a relatively broad yet important range of topics. Learning objectives related to specific topics will be listed in the lecture slides as each chapter goes. Upon successful completion of this course, you should gain some “global” skills as follows:

- ❖ Be able to communicate chemistry using basic chemistry vocabulary.
- ❖ Predict material properties using basic concepts and principles of chemistry.
- ❖ Explain scientific methods and how theory is constructed and tested via experimental efforts, particularly in chemistry.
- ❖ Demonstrate both qualitative and quantitative problem solving skills using knowledge on structural chemistry, stoichiometry, thermochemistry, chemical equilibrium, and reaction kinetics.

Required Textbook

- ❖ *Chemistry: Atoms First, 3rd edition* by Julia Burdge and Jason Overby. The books should have been ordered for you by the Admin office.

Course Format

We will adopt a study format combining both lecture and group study feature in intensive individual practice and student - instructor interaction. We also use flipped class to maximize your learning effectiveness.

For a typical class, you will be assigned to watch several short videos before you come to the lecture. Those videos address basic concepts and principles as part of the materials discussed in lecture. In lectures, after a possible brief review of the video content, the majority of the class time is for new concepts and principles. DO WATCH those videos to avoid confusions in lectures.

Following the lecture is a group study on a studio assignment, which is to solve a problem set before class ends. You will work in groups where in-group discussion is encouraged. Try to solve the problems together instead of breaking it into parts and everyone works on one part alone. At the end of the class, you should check with an instructor (professor or teaching assistant) before you leave the classroom. The Studio assignment is a pass / not-pass work which contributes to your overall grade.

For the after class homework, you can still discuss with other students, but you should complete it INDEPENDENTLY, meaning that you can't copy others' work or let others copy yours.

Recitation

There will be a one hour recitation each week where you can discuss with an instructor of problems and/or concerns you encounter during your study. Although this session is not required to attend, I highly encourage you to come provided the fact that students who attend recitations in a regular basis have a better grade.

Grades

Exams 1 & 2	200 pts
Final Exam	200 pts
Homework	35 pts
Studio Homework	30 pts
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Total	465 pts

There will be two exams spread evenly before the beginning of the semester and the final exam. Each exam will last one and a half hour and cover all the content after the previous exam. You should expect your first exam at mid-October.

The final exam is three hours long and will cover all the content thought out the course, with slight emphasis on the content after the second 1.5 hour exam.

Studio assignment and homework will be given weekly to help you practice and check your mastery of class content. Remember that altogether they take 13% of the total grade. Failure on doing those can cost you a letter grade (A to B, B to C, etc.)!

If you have any questions for any of your grades, you should contact me within three days after that grade is released. Any requests for regrading will be denied after this three-day period.

Letter Grade

Final letter grade will be given according to the following scheme:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
≥ 88%	≥ 85%	≥ 81%	≥ 78%	≥ 75%	≥ 71%	≥ 68%	≥ 65%	≥ 61%	≥ 55%	≥ 50%	< 50%

Grades might be curved at the end of the semester if the class average is low. However, this is not guaranteed. You should only rely on your performance in all the assignments and exams.

Absence and Makeups

In principle, any absence in class or exams is not allowed except for irresistible reasons (diseases, accidents, deaths, etc.). For other reasons, you should contact me in advance. Make-up exams will not be guaranteed.

Failure of the Course

If you unfortunately failed the course, you can either retake the course or pass a make-up exam at the beginning of the next semester. Based on your performance in the make-up exam, a "D" should be expected as the final grade. Poor performance results in retaking the course.

Copyrights

If not specifically pointed out, all materials used in this course are copyrighted, meaning that you do not have the right to copy any of the materials for any purpose other than your own personal academic use without my explicit permission. The copyrighted materials used in this course include but do not limit to syllabus, exams, class slides, problem sets, and other handouts.

Academic Integrity

Upon accepting admission to SCUPI, you immediately assume to follow the SCUPI academic integrity guidelines, which can be obtained from the administrative office. The guidelines should be followed in homework, examinations, and other academic work. Violations of these guidelines may result in zero points for an exam or failure for the course.

Study Tips

- ❖ Do your homework ON YOUR OWN!!! You can discuss with a friend, but do the homework independently. Make sure you can solve similar problems after completion.
- ❖ Come to classes and take notes. You may find it's hard to understand your instructor. Keep on trying. Even if you have learned some of the topics in high school, don't assume they are identical to what we will discuss in class. To forget is also human nature.
- ❖ Attend recitation sessions with questions.
- ❖ Consult a text book in Chinese if you find you have trouble understanding the required text book. However, make sure you learn all the terminology in English. The exam is in English!
- ❖ Study your notes every day. Memorizing basic facts, terms, and principles helps!
- ❖ Come to my office hour and let me know any trouble you might have.

Tentative Course Schedule

Week	Chapter	Topics
1	13	Molecular view of solution process, factors that affect solubility, colligative properties
2	14	Spontaneous processes, entropy, entropy change in a system and in the universe
3	14, 15	Predicting spontaneity using Gibbs Free-Energy, concept of equilibrium, equilibrium constant and expression
4	15	Chemical equilibrium and free energy, calculating equilibrium concentrations, Le Chatelier's principle
5	Holiday No class	

6	16, Exam 1	Molecular structure and acid strength, strong and weak acids/bases, pH and pOH scales, weak acids/bases and ionization constants
7	16	Conjugate acid-base pairs, diprotic and polyprotic acids, acid-base properties of salt solutions, oxides and hydroxides, Lewis acids and bases, common ion effect
8	17	Buffer solution, acid-base titrations, solubility equilibria, factors affecting solubility
9	18	Galvanic cells, standard reduction potentials, spontaneity of redox reactions, batteries
10	18, 19	Electrolysis, corrosion, reaction rates, collision theory of chemical reactions, measuring reaction progress and expressing reaction rate
11	19	Dependence of reaction rate on concentration, dependence of reaction concentration on time, dependence of reaction rate on temperature, reaction mechanism, catalysis
12	20, Exam2	Nuclei and nuclear reactions, natural radioactivity, nuclear transmutation, fission, and fusion, uses of isotopes
13	21	Metallurgical processes, band theory of conductivity, periodic trends in metallic properties, the alkali metals, the alkaline earth metals
14	21, 22	Aluminum, coordination compounds, application of coordinate compounds, structure of coordination compounds
15	22	Bonding in coordination compounds, crystal field theory, reactions of coordination compounds
16	23	Classes of organic compounds, representing organic molecules, isomerism, organic reactions, organic polymers
17	24	Polymers, ceramics and composite materials, liquid crystals, biomedical materials, nanotechnology, semiconductors, super conductors
18	Prep week	
19	Final	

* Schedule might be slightly changed based on class performance and other unforeseeable schedule changes.