

CHEM 0970
General Chemistry for Engineers 2
Spring 2023

Lecturer: Dr. Wenwen Xu, Dr. Jiabei Zhou

Office hour: 9:30 am - 12:00 pm Monday, Wednesday, Thursday

Office: 226, Zone 4, SCUPI

****Special thanks to Dr. Kevin Quan for his work in this document.****

Catalog Description

Chem 0970 covers physical properties of solutions, entropy and free energy, chemical equilibrium, acid-base equilibria and solubility equilibria, electrochemistry, chemical kinetics, nuclear chemistry, and coordination chemistry, organic chemistry, environmental chemistry and modern materials.

Chem 0960 is required for Chem 0970.

Credit hours: 3.0

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, this two-semester course (including Chem 0960) covers 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 “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 e.g., 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, 4th edition* by Julia Burdge and Jason Overby.
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Course Format

We will adopt a study format combining both lecture and group study. Intensive individual practice and student - instructor interaction are highly expected. We also use flipped class to maximize your learning effectiveness.

In this semester, we will solve the studio problems during lectures. You are still encouraged to solve those problems in a group setting. So you may want to sit next to your group members before the class starts.

While you are working on in-lecture problems, you are more than welcome to reach to me as well. Related questions are still welcome **any time** during the class. Feel free to interrupt me. I won't feel annoyed but pleased.

Usually 2 - 3 days ahead of the class, you will be assigned to watch several short videos which cover important topics that I **will NOT lecture** in class **BUT test** in exams. Yes, you have to study those parts on your own. However, I will check answers of the questions in the videos at the beginning of the class or in some other ways. **DO WATCH those videos** to avoid confusion in lectures.

For the after-class homework, you can still discuss with others but should complete it **INDEPENDENTLY**. It means that you can't copy others' work or let others copy yours.

Homework

- Homework is due the beginning of each lecture in the week after. Late homework will not be accepted. BB submission is required.

• If BB is down, please bring your hand-writing homework to class. Please put your name, last four digits of your student ID, and section number on the upper **right corner** and staple on the upper left corner. Use A4 size sheets. If your hand writing is illegible, print your homework on A4 sheets.

Grades

Mid Exam	100 pts
Final Exam	150 pts
Homework	30 pts
Presentation	10 pts
<u>Group discussion</u>	<u>10 pts</u>
Total	300 pts

Please expect a midterm exam after lecture 5 (week 7). Midterm exam will last two hours covering all content after the previous exam. The final exam is 2.5 hours long and will cover content throughout the course, with emphasis on the content after the midterm. Exam guide will be offered at least one week before each exam.

Homeworks will be given weekly to help you practice and check your mastery of class content. Remember that altogether they take 10% of the total grade. Failure in those can cost you more than a letter grade (A to B, B to C, etc.)!

If you have any questions for any of your homework grades, you should contact your TA first **within 5 days** after the homework score has been posted. If there is still disagreement, you can contact me.

For exam grades, contact Prof. Xu and Prof. Zhou within four days after the grade is released. Any requests will be denied after this four-day period.

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

Absence and Makeup

In principle, any absence in 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 (assigned an F), 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” or an “F” should be expected as the final grade.

Copyrights

If not specifically pointed out, all materials used in this course are copyrighted, meaning that without my explicit permission you do not have the right to copy any of the materials for any purpose other than your own personal academic use. The copyrighted materials used in this course include but do not limit to syllabi, 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. See a staff in the administrative office if you are not aware of it. 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 it 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 and it will get easier. Even if you have learned some of the topics in high school, you may find minor to huge differences.
- Attend tutorial sessions with questions.
- Consult a text book in Chinese if 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 is a must. Chemistry is a subject based on workings of this objective world

Course schedule

Week	Topics
2	Physical properties of solutions
3	Chemical kinetics
4	Entropy and gibbs free energy
5	Chemical equilibrium
6	Nuclear Chemistry
7	Exam 1
8	Acids bases and salts
9	Acid base equilibria and solubility equilibria
10	Electrochemistry
11	Environmental chemistry
12	Coordination Chemistry
13	Organic chemistry I
14	Organic Chemistry II
15	Modern Materials
16	Nonmetallic Elements / Metallurgy and the Chemistry of Metals
17	Final exam

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