Syllabus: General Chemistry (I) - EMI

Academic Semester: 2026 Fall

Lectures: Monday 10:10-12:00 pm; Wednesday 9:00-9:50 am/week at R326

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Teaching Assistant (TA)	張瑜倖 (Chang, Yu-Hsing)
TA Office Hours	Monday, 1:20-2:20 pm; Tuesday, 1:20-2:20 pm (Chemistry Building, R503) *Email TA in advance about your questions

A. Course Description

General Chemistry (I) is the first half of a two-semester, accelerated, first-year college chemistry sequence designed for science and engineering majors. The course builds a strong foundation in problem-solving, mathematical reasoning, and analytical thinking, while deepening students' understanding of the fundamental chemical principles that govern matter and energy. The topics covered include chemical reactions and stoichiometry, thermochemistry, electronic structures of atoms, chemical bonding theories, molecular geometry, states of matter, properties of solutions, chemical kinetics, and thermodynamics. These principles will be applied to explore reaction mechanisms, including condensation–hydrolysis, acid–base reactions, and organic and biological chemistry, in General Chemistry (II).

Lecture. Lectures organize the material, outline goals, and cover the basic principles of each topic. The lecture is not intended to describe or explain everything you will learn in the course; rather, it will indicate important topics to study and allow you to think about these topics and see if you understand them. You should take notes during the lecture that reflect your understanding. Students are expected to read the textbook and work on the problems as appropriate to augment the material presented in class. The lecture material can be downloaded from NTHU eLearn: https://elearn.nthu.edu.tw/

Exams. There will be three 60-minute midterm exams and one 100-minute final exam, as scheduled in this syllabus, and the exams will consist of multiple-choice questions (22 for the midterm exam and 30/60 for the final exam). The final exam is cumulative and comprehensive, covering all the material from the general chemistry course. The location for each exam will be announced one week prior to the exam date. In the event of natural disasters or other force majeure that prevent the examination from being conducted, make-up examinations will generally not be offered. The final semester grade will be calculated based on the existing examination scores proportionally. **No make-up exams will be given, and an unexcused absence from an exam will result in a grade of zero. Students who miss the final exam will have another 25% deducted from their final grade.**

Exercise. Students are expected to read the textbook and work on the exercises as appropriate to augment the material presented in class. For example, sample exercises from each textbook chapter should be practiced, although they are not required to be turned in for grading. You should begin working on these exercises as soon as we have covered the relevant material in class, so you have the earliest possible indication of any questions or difficulties to be addressed. You are encouraged to collaborate with your classmates on exercises and seek help with any topics you find difficult. Please start early and ask questions! An in-depth understanding of these exercises is by far the best predictor of success in this course.

B. Goals, Objectives, and Core Learning Outcomes

This course is designed to help you learn fundamental chemistry. Your professor and graduate TA will do their best to guide you in mastering the material, but no course or instructor can learn for you. You will need to devote considerable time outside of class to studying chemistry. When encountering problems you cannot solve, refer to the textbook, your notes, a tutorial, or your fellow students. Forming a study group to work through problems is an excellent way to study chemistry. Throughout this course, emphasis will be placed on understanding chemistry and learning to think effectively in solving problems. Successful problem-solving requires a basic knowledge of principles, facts, and terms: a vocabulary of chemistry. Some of this background and vocabulary should have been obtained from your high school chemistry course. From time to time, you may need to review the material you studied in high school to understand the new material presented in this course. This course is designed to help you learn as much chemistry as possible and perform at the highest possible level. The pace is fast; you should be prepared to work considerably harder than in high school.

Students are expected to sharpen their quantitative skills in a scientific context:

- CH3. Chemical Reactions and Reaction Stoichiometry
- CH5. Thermochemistry
- CH6. Electronic Structures of Atoms
- CH8. Basic Concepts of Chemical Bonding
- CH9. Molecular Geometry and Bonding Theories
- CH11. Liquid and Intermolecular Forces
- CH12. Solids and Modern Materials
- CH13. Properties of Solutions
- CH14. Chemical Kinetics
- CH19. Chemical Thermodynamics

Keywords: Chemical Reactions (化學反應), Electronic Structures of Atoms (原子的電子結構), Molecular Geometry and Bonding Theories (分子幾何與鍵結理論), Chemical Kinetics (化學動力學), Chemical Thermodynamics (化學熱力學)

C. Required Knowledge

Basic knowledge of chemistry at the high school level and English at the undergraduate level

D. Required Materials

Textbook: Brown, et al., *Chemistry: The Central Science in SI Units (14th edition),* Pearson Education: New York, 2017, or S. S. Zumdahl, D. J. DeCoste, Chemical Principles, 8th edition, 2017.

Class Handouts: You should obtain an electronic copy of each handout before the lecture.

Calculator: An inexpensive calculator with logarithmic/exponential/scientific notation capabilities is required. The calculator can be used on the exams.

E. The Honor Pledge

To enhance the learning environment at National Tsing Hua University and develop student academic integrity, each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the utmost level of academic integrity." A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize.

A student who lives by the Honor Pledge:

- Espouses academic integrity as an underlying and essential principle of the National Tsing Hua University community;
- Understands that each act of academic dishonesty devalues every degree that this institution awards.
- He/She is a welcomed and valued member of National Tsing Hua University.

F. Academic Misconduct

Academic dishonesty is incompatible with the practice of science or any profession. If evidence of dishonesty is found, the National Tsing Hua University policy will be followed. This includes any form of plagiarism, copying, collusion, or cheating during any examination. All such cases are reported to the NTHU. Violations may result in failure in a particular assignment, failure in a course, suspension or expulsion from the University, or other penalties. Each student in this course is expected to work entirely on their own during the exams. Academic misconduct during lectures may result in a penalty in accordance with university policy.

G. AI Permissive Policies

This course encourages students to explore the use of generative artificial intelligence (GAI) tools such as ChatGPT for all assignments and assessments. Any such use must be appropriately acknowledged and cited. It is each student's responsibility to assess the validity and applicability of any submitted GAI output; you bear the final responsibility. Violations of this policy will be considered academic misconduct.

H. Method of Evaluation

Your grade will be based on a **maximum of 111 points,** divided as follows:

Examinations (#)		*Percentage*	*Total Points*
Midterm Exam	× 3	22%	66
Final Exam	× 1	45%	45

Total Available Points = 111 Points

Letter grades will be assigned at the end of the semester based on the following scale:

Total Points	*Letter Grade (GPA)*
90–111	A+
85–89	A
80–84	A–
77–79	B+
73–76	B
70–72	B–
67–69	C+
63–66	C
55–62	C–
50–54	D
< 50	E

*Final grades will be based on an absolute scale. You are competing against this scale, not against other students, and it is to your benefit to help each other. For example, if you earn a total of 90 points, you are guaranteed an A+, no matter how many other students earn that number of points.

*The final grade will be rounded to the nearest whole number.

Tentative Course Schedule

Week	*Date*	*Topic*	*Note*
1	9/6–9/12	CH3. Chemical Reactions and Reaction Stoichiometry	No Lecture on 9/9
2	9/13–9/19	CH5. Thermochemistry	No Lecture on 9/16
3	9/20–9/26	CH6. Electronic Structures of Atoms	9/23: 8:00-9:50 am
4	9/27–10/3	**Midterm Exam I** **9/30 (Wed), 08:00-09:00**	No Lecture on 9/28 (Teacher's Day)
5	10/4–10/10	Weeks 5-7, Wed: 8:30-9:50 am CH8. Basic Concepts of Chemical Bonding	
6	10/11–10/17	CH9. Molecular Geometry and Bonding Theories	
7	10/18–10/24	CH11. Liquid and Intermolecular Forces	
8	10/25–10/31	**Midterm Exam II** **10/28 (Wed), 08:00-09:00**	No Lecture on 10/26 (Taiwan Restoration Day)
9	11/1–11/7		
10	11/8–11/14	CH12. Solids and Modern Materials CH13. Properties of Solutions	No Lecture on 11/11 (Sports Day)
11	11/15–11/21		
12	11/22–11/28	**Midterm Exam III** **11/25 (Wed), 08:00-09:00**	
13	11/29–12/5	CH14. Chemical Kinetics	
14	12/6–12/12	No Lecture on 12/7 & 12/9	
15	12/13–12/19	CH19. Chemical Thermodynamics	
16	12/20–12/26	**Final Exam** **12/21 (Mon), 10:10-11:50**	Return of Final Exam and Score Check 12/23 (Wed), 9:40-10:00