The Hong Kong University of Science and Technology (Guangzhou)

UG Course Syllabus

[Course Title] Chemistry in Everyday Life
[Course Code] UCUG 1900
[No. of Credits] 3
[Any pre-/co-requisites] N/A
Meeting time & venue: L01: Tuesday 13:30 – 16: 20, W4-102

Instructors & **Email**
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Course Description

This common core course takes students on a chemical journey, through which they will learn what is chemistry and how chemistry connects with every part of our daily life. Students will engage in an experiential learning study project and a mini-research task; they will also learn chemical concepts through many real-life case studies. The basic ideas and principles of chemistry, as well as many chemical topics of everyday relevance will be discussed in this course: such as air, water, metals, minerals, air pollution, global warming, ozone depletion, batteries, fire and fuels, food and drinks, household chemical products and plastics. Students taking this course are not required to have studied chemistry before.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Explain basic fundamental concepts of chemistry, recognize basic chemical terminology and be able to perform simple chemical calculations.

2. Demonstrate an understanding of how chemistry connects with our everyday experience and with modern technology on selected issues.

3. Explain the basic chemistry behind major environmental issues, common household items, and important industrial processes.

4. Obtain scientific information on chemistry topics of everyday relevance and to think critically from a chemistry perspective.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date	Explanation	Mapped ILOs
Online quizzes×2	10%	Week 7 & Week 12	Evaluates students' learning after 6 weeks and 12 weeks	ILOs 1, 3
Written assignment (report submission)	40%	penultimate week	Helps enhance students' active learning and literature research abilities	ILOs 2, 3, 4
Group project (video submission)	20%	Last class	Build students' teamwork and presentation skills	ILOs 2, 3, 4
Final examination	30%	/	Final exam comprehensively evaluates students' learning of the entire course	ILOs 1, 3

Two offline quizzes (each 5%) will help you review the lecture materials. The final exam (30%) is used to probe the understanding of the chemical knowledge taught in the lectures. The students need to think and critically apply this knowledge to new situations (CILOs-1,2,3). Some questions will also require them to digest information and analyze them to make a logical deduction (CILO-4). Instructions for written assignment (40%) and group project (20%) are detailed below.

Instructions for Research Challenge Task and Experiential Learning Study Project

The topics for written assignment and project report can be different. If plagiarism leads to a low score, the consequences will be borne by the individual.

1. Research Challenge Task –writing assignment (40%) (Submitted to Canvas)

Students will investigate a course-relevant topic, and summarize the work by individualized written report. They need to showcase some knowledge on chemical concepts taught in the lectures, also to research the internet for information on their chosen topic and think critically on how to apply this information to their projects. Each student will choose one topic to study based on their interest and is required to finish the written report individually. **The report should be within 3 pages of A4 size**, excluding reference (≤5 pages in total).

Assessment for the written report includes:

- Asking the right question
- Logical structure
- Accuracy & comprehensive
- Demonstrate critical thinking and propose new ideas
- Formatting, e.g. figures, tables, text, and proper reference

Detailed written report format:

1. 3 pages of A4 size (excluding references), Arial 10 pt for all words (including titles), 2.5cm margins, single line spacing, with page numbers, justified alignment
2. **Suggested structure:**
   Title and Abstract, with 5 keywords (0.5 page);
   Introduction, main content, discussion and conclusions (2.5 page);
   References (>10 references, up to 2 pages)
   Figure and table should have captions and in proper size.
3. The report should be novel, the content is detailed, the argument is clear, and the references are reliable.
4. Plagiarism is strictly prohibited and will be detected by iThenticate.
   Examples:
   《化学教育》化学·生活·社会 http://www.hxjy.chemsoc.org.cn/CN/volumn/current.shtml
   《ChemMatters》https://www.acs.org/education/chemmatters.html
   《Chemistry World》https://www.chemistryworld.com/

2. Experiential Learning Study Project –group video presentation (20%) (video in last class)

The research challenge task will invite students to select a daily life item to research on its chemical composition, manufacturing processes, and how it works. The research outcome will be illustrated as interesting short videos to demonstrate students' scientific literacy. Students apply some understanding from fundamental concepts of chemistry, chemical terminology, chemistry theories; and to be able to obtain scientific information on chemistry topics they have chosen and to think critically about the information they obtained from internet searches. **2-3 Students will engage in a group work and discuss their desired item and prepare the video.**

Assessment scheme for video making includes:

- Well balanced image & audio
- Well-informed narrative / subtitles / texts for viewers
- Accuracy for chemistry information
- Logic & reasoning
- Overall quality of storytelling (all team members should contribute to class presentation)

Detailed video requirements:

One video in MP4 format, total length 2-3 mins, size < 100M. The content should focus on popularizing chemical knowledge, spreading scientific ideas, advocating scientific methods, and promoting the scientific spirit. It should be short and concise, and be scientific, informative, easy to understand, artistic and interesting. The text language, subtitles and the dubbing and commentary in the video should be in English. Video vividly presents the selected topic.

(1) **Video files' name:** Group number_video topic title
(2) **List all the referenced materials,** e.g. scientific work (published or in-prep), articles, etc.
(3) **A statement** describing the tools, software or AI-assistants used during production.
(4) **List the individual contribution** at the end of the video.

Grading Rubrics

Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

Students are allowed to use artificial intelligence (AI) tools (e.g.,ChatGPT) to enhance their learning experience and course performance. However, if AI tools are adopted for any assignment, students must provide a statement briefly describing how the AI tools were used, including the exact prompts used and the rationale for the choices made. Screenshots of the prompts and outputs should also be attached. An example of the statement can be found on Canvas: Statement_of_GenAI_use_example.pdf.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include strengths and weaknesses, areas for improvement. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

Submission of assignments and lab reports is done electronically via Canvas. Resubmission is allowed on Canvas before the deadline, and grading is based on the **last submission before the deadline**. The total points of the late submission will be deducted by 10% per day. For example, if a student submits an assignment 2 days late, the score will reflect a 2*10%=20% late submission deduction.

Required Texts and Materials

No specific textbook for the course, the teaching materials were developed from a wide range of source including Chemistry books, the internet, and public information. References will be provided during the class.

Supporting Texts and Materials

Use LibreTexts : https://chem.libretexts.org/Ancillary_Materials/Exemplars_and_Case_Studies/Exemplars

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Course Schedule

Lecture	Date	Topic	Instructor
1	Jan 27	**Chemistry connects with our everyday life** *Introduction to the atom, elements and compounds, moles and chemical calculations.*	Ji
2	Feb 3	**Chemistry in the air** *Air and its composition* *States of matter: solid, liquid and gases.* **Introduction to Experiential Learning Study Project (group); Research Challenge Task (individual)**	Ji
3	Feb 24	**Chemistry in the air** *Covalent bonding* *Molecules and intermolecular forces*	Ji
4	Mar 3	**Chemistry in the environment** *Global warming* *Carbon cycle* *Air pollution*	Ji
5	Mar 10	**Chemistry in the environment** *Ozone depletion*	Ji
6	Mar 17	**Food & Nutrition** *Material and mass transfer in living organisms* *Food production and fermentation* *Food additives and allergies*	Ji
7	Mar 24	**Chemistry of acids and bases** *Acids and bases, pH scale* *Salt formation*	Zhou
8	Mar31	**Chemistry of metals & production** *Metallic bonding* *Properties and reactions of metals* *Redox chemistry* *Metal extraction methods*	Zhou
9	Apr 7	**Chemistry of metal compounds** *Ionic bonding* *Properties and reactions of ionic compounds* *Coordination bonding* *Metal-organic framework compounds*	Zhou
10	Apr 14	**Electrochemical processes in the industry** *Electrolysis for metal extraction* *Electrolysis of aqueous solutions (chloralkali industry)* *Electroplating, Anodization*	Zhou
11	Apr 21	**Chemistry of batteries** *Electrochemical cells* *Batteries – dry cells and rechargeable cells* *Fuel cells*	Zhou
12	Apr 28	**Chemistry of fuels** *Combustion* *Fire extinguishers* *Common fuels – simple organic chemistry* *Fireworks and explosives*	Zhou
13	May 9	**Plastics and Plastic Electronics** *Addition polymers; Condensation polymers; Biodegradable polymers; Biopolymers; Organic semiconducting polymers* **group project video in class**	Ji / Zhou
	TBD	Final exam	Ji / Zhou