DEPARTMENT OF

CHEMISTRY

CHEM UG Courses

UG Courses offered in Summer Term 2024-2025 but the courses outlines are not time-specific

Course Code	Course Title
CHEM 1002	Introduction to Chemistry of Cosmetics
CHEM 1008	Introductory Chemistry
CHEM 3610B	Chemistry Internship
CHEM 4691	Capstone Research I
CHEM 4692	Capstone Research II

The Hong Kong University of Science and Technology

CHEM 1002 Introduction to Chemistry of Cosmetics

2025 Summer Semester

Course Outline

1. **Course Instructor**:
Prof. CHAN, Ho-Wai Dennis *E-mail: chanhw@ust.hk*
Room 4528 (Lift 25/26), Academic Building. *Tel. 3469 2099*

2. **Teaching assistant(s):**
(i) *Miss MAK, Pui Yu Angela* *E-mail: makpy@ust.hk*
(ii) *Mr. MAN, Tak-Pui Tim* *E-mail: takpm@ust.hk*
Room UG001, CYT Building. *Tel. 3469 2583*

3. **Meeting Time and Venue:**
Date/Time: every Mon, Wed & Fri, 2:00 pm – 5:20 pm
Venue: Room 2503 (Lift 25 or 26), Academic Building

4. **Course Description:**
Credit points: 3.0 *Pre-requisite:* LANG 1401/1402/1403/1404 *Exclusion:* NIL
Common Core Area: Broadening – Science
Previous course code: CHEM 002 / CORE 1121
Brief information:

This course concentrates on the basic scientific principles in cosmetic science. Various topics with emphasis on molecular approach related to cosmetic products' formulation and proper uses of cosmetic products will be covered. Major topics include definition of cosmetics, make-up cosmetics, skin-care cosmetics, hair-care cosmetics, vehicles of cosmetic products, surfactants, colorants, alpha hydroxyl acids & beta hydroxyl acids, antioxidants and sunscreens, skin-whitening agents, hydrating substances / moisturizers, antiperspirants & deodorants and botanical ingredients.

5. **Intended Learning Outcomes (ILOs):**

This is an introductory chemistry course designed for students either with or without background knowledge in chemistry. Students are expected to achieve the following outcomes after taking the course:

(i) To identify the contributions of chemists to the technological innovations of modern personal care products.
(ii) To develop basic understanding of fundamental chemistry concepts and the scientific basis for cosmetic formulations.
(iii) To employ concepts in chemistry to explain some cosmetic technology and cosmetic inventions.
(iv) To appreciate the efforts of chemists in cosmetic product design and developments.

6. **Assessment scheme:**
Letter grades (i.e., a grade ranging from A+ to F).

Assessment	Weighting
1. Homework, HW1 (before mid-term test) & HW2 (before final exam)	15%
2. Quiz (Based on topics covered in topics 1 to 2)	15%
3. Mid-term Test (Based on topics covered in topics 1 to 5)	35%
4. Final Examination (Focus will be put on topics covered in topics 6 to 11)	35%

- *About Academic Integrity:* Dishonesty or cheating will not be tolerated. Any student violating the HKUST Academic Honor Code (https://registry.hkust.edu.hk/resource-library/academic-honor-code-and-academic-integrity) will be subject to disciplinary procedure.
- In HW1 and HW2, you are allowed to use *generative artificial intelligence (genAI)* to aid you in any manner. Quiz, Mid-term Test and Final Examination are closed-book assessments. No *genAI* is allowed in these assessments.

7. **Student Learning Resources:**

(a) Course Handouts:

Course handouts can be accessed from the Canvas site (https://canvas.ust.hk), by using your own ITSO username and password.

(b) General Reference Books:

(i) Hilda Butler (editor), *Poucher's Perfumes, Cosmetics, and Soaps, 10th edition*, Dordrecht: Kluwer Academic Publishers © **2010**. [call nr.: TP983.P723 2010] or Hilda Butler (editor), *Poucher's Perfumes, Cosmetics, and Soaps, 10th edition*, Dordrecht: Springer-Science+Business Media, B.V. © **2000**. §§

(ii) Zoe D. Draelos; Lauren A. Thaman (editors), *Cosmetic Formulation of Skin Care Products,* New York: Taylor & Francis © **2006**. [call nr.: TP983.3.C67 2006] §§

(iii) Nava Dayan (editor), *Skin Aging Handbook*: *An Integrated Approach to Biochemistry and Product Development*, New York: William Andrew Inc. © **2008**. [call nr.: QP88.5.S553 2008]§§

(iv) Linda D. Williams, *Chemistry Demystified*, New York: McGraw-Hill © **2003**. [call nr.: QD33.2.W54 2003] §§ or the same title published in **2011** [call nr.: QD37.W48 2011]

(v) Anthony J. O'Lenick Jr.; Thomas G. O'Lenick, *Organic Chemistry for Cosmetic Chemists*, Carol Stream, IL: Allured Publishing, © **2008** [call nr.: TP983.O445 2008]

(§§: *denotes an electronic version (e-book) is available in HKUST library and can be accessed using campus Wi-Fi network. For the remaining, you can borrow them from library's Course Reserves Collection.*)

8. **Teaching and Learning Activities:**

	Type of Activities	**ILOs**
1.	Lectures – participation and attention in lectures on fundamentals of chemistry and the scientific basis	(i), (ii) (iii) & (iv)
2.	Video clips – demonstration of basic concepts in chemistry.	(ii) & (iii)
3.	Live demonstration – demonstration of some basic scientific principles related to cosmetic functions/properties.	(ii) & (iii)

9. **Keyword syllabus / topics:**

1. Cosmetics & Chemists' Perspective; Classification & Production of Cosmetics
2. Vehicles in Cosmetics; Extractions of Botanical Ingredients
3. Surfactants in Cosmetics
4. Hair-Care Cosmetics: Shampoos, Hair-Conditioners and Treatment
5. Hair Waving & Hair Colors
6. Color Cosmetics: Essence of Makeup
7. Skincare: Cleansing, AHAs and BHAs
8. Photoaging and Antioxidants
9. Skin-whitening Agents
10. Sunscreens
11. Antiperspirants & Deodorants

The Hong Kong University of Science and Technology
Department of Chemistry

CHEM 1008 – Introductory Chemistry (3-credits) **Summer 2024 -2025**

Instructors:

Prof. Emily M.W. Tsang	**Prof. Frederick F.K. Sheong**
Office: Rm 4536 (lift 25/26)	Office: Rm 4543 (lift 25/26)
E-mail: chetsang@ust.hk	E-mail: chemfksheong@ust.hk

Course Description:
This course targets science or engineering students with very little to no chemistry background. It provides a general introduction to basic principles of chemistry. Key topics include state of matters, atoms and elements, molecules and compounds, atomic structures and periodicity, molecular structures, quantities in chemical reactions, bonding theories, acids and bases, and solution chemistry.

Exclusions: Level 3 or above in HKDSE 1/2x Chemistry OR HKDSE 1x Chemistry, a passing grade in AL/AS Chemistry, any CHEM courses at or above 1004-level

Lecture: Mon, Wed, Fri 14:00 – 17:20

Venue: Rm 2302 (lift 17/18)

Instructor Office Hours: By email appointment

Course Content/Topics:

Chapter 1: Matter and Energy	Chapter 7: Electrons in Atom and the Periodic Table
Chapter 2: Atoms and Elements	Chapter 8: Chemical Bonding
Chapter 3: Molecules and Compounds	Chapter 9: Solids, Liquids, and Intermolecular Forces
Chapter 4: Chemical Composition	Chapter 10: Properties of Solutions
Chapter 5: Chemical Reactions	Chapter 11: Acids and Bases
Chapter 6: Reaction Stoichiometry	Chapter 12: Chemical Equilibrium

Intended Learning Outcomes:
Upon successful completion of this course, students are expected to be able to:

1. Develop a microscopic view of the worlds in terms of atoms and molecules
2. Recognize physical/chemical properties, physical/chemical changes
3. Apply knowledge of states of matter, chemical reactions, stoichiometry, atomic structure, chemical bonding, molecular structure, and intermolecular interactions.
4. Obtain a basic knowledge of solution chemistry, acid-base chemistry, chemical equilibrium.
5. Recognize and appreciate the impact and significance of chemistry to our society.

Course Grading Scheme

Online Quizzes (2 x 10% each)	20%
In-class Midterm Exam	40 %
In-class Final Exam	40 %

The Hong Kong University of Science and Technology
Department of Chemistry

CHEM 3610B Chemistry Internship

Course Outline

2025 Summer

1. **Instructor/Coordinator**:
   Name: Prof. CHAN, Ho-Wai Dennis (e-mail: chanhw@ust.hk)
   Office: Room 4528 (Lift 25 or 26) *Phone: 3469-2099*

2. **Meeting Time and Venue:**

	Internship work	**Presentation/sharing**
Date/Time:	*[to be arranged by partner]*	19th August 2025
Venue:	*[to be arranged by partner]*	Room 4504 (Lift 25/26), HKUST campus

3. **Course Description:**
   Credit points: 3 units
   Pre-requisite: CHEM 3550 Synthetic Chemistry Laboratory II; or
   CHEM 3555 Molecular Characterization Chemistry Laboratory II
   Brief information: This course provides students with the opportunity to gain work experience in chemistry field. Students will undertake training and supervised internships in our collaborating companies/organizations/units.

4. **Intended Learning Outcomes (ILOs):**
   Students are expected to achieve the following outcomes after taking the course:
   (i) Apply academic knowledge to real-life situations.
   (ii) Communicate with professionals.
   (iii) Work independently and collaborate in teamwork.
   (iv) Reflect on their learning progress and develop motivation in lifelong learning.

5. **Assessment scheme:**

Type of Assessment	**Weighting**	**Assessing ILOs**
1. Written Assignments: (i) initial report and (ii) final report	40%	(ii) & (iv)
2. Presentation (~12 to 15 min, plus 5 min Q and A)	20%	(i) & (ii)
3. Performance (to be assessed by the internship supervisor)	40%	(i), (ii) & (iii)

6. **Student Learning Resources:**
   To be arranged by internship supervisor.

7. **Teaching and Learning Activities:**

Type of Activities	**ILOs**
1. Training provided by internship supervisor.	(i)
2. Guidance on writing reports at the initial and final stages of the internship. Students are required to regularly communicate orally with internship supervisor(s), the course coordinator and co-workers during internship.	(ii)
3. Duties assigned by internship supervisor(s) to be done either individually and in a team.	(iii)
4. Guidance on reflection on their learning progress.	(iv)

8. **Class Schedule:**
   On-site internship: (To be arranged by internship supervisor).
   Oral presentation/sharing: 19th August 2025.

CHEM 4691 Capstone Research I

Course Outline (Summer 2024/25)

1. Course Description

Pre-requisite: CHEM 3550 and CHEM 3555

Exclusion: CHEM 4689

Instructor(s)/Project Supervisor(s): Research Faculties of Chemistry Department

Course Coordinator: Prof. Emily M.W. Tsang

Reference Librarians:

Mr. Samson CHOI (lbsamson@ust.hk)

Mr. Ernest LAM (lbernest@ust.hk)

Brief Information/synopsis:

This is a project-based course that provides students an opportunity to integrate and apply their chemical knowledge learnt in regular lecture and lab courses. Students will carry out a research project under the supervision of a faculty member/teaching staff. At the end of the course, students are required to submit a written report and deliver an oral presentation to document their learning experiences. Students should seek instructor's approval prior to enrollment in the course.

2. Intended Learning Outcomes

Upon successful completion of this course, students are expected to be able to:

1	Demonstrate awareness of chemical topics relevant to social and daily life.
2	Analyze and interpret experimental data, critically assess data in literature and extract useful data from it.
3	Carry out directed research by selecting appropriate topics and procedures, and presenting the results.
4	Communicate effectively both orally and in writing with professionals and/or lay audience.
5	Demonstrate information technology skills, especially in the areas of information retrieval, literature searching and use of library database.
6	Show self-awareness, work independently and collaborate effectively with other people in a team.

3. Grading

Weight	Assessment	Course ILOs
50%	Lab Performance and Participation	1,2,3,4,5,6
30%	Written Research Thesis	1,2,3,4,5
20%	Oral Presentation	4,5,6

4. **<u>Mandatory</u> Library Trainings Schedule:**

The following library training workshops are ***mandatory***. Attendances will be taken and counted towards your course participation scores.

Date	Activity	Venue
Jun 17 (Tues), 11:00 – 11:50	**Library Workshop I: Literature Search Training**	Computer Room B (Library LG1) (Mr. Samson Choi/Mr. Ernest Lam)
Jun 19 (Thurs), 11:00 – 11:50	**SciFinder-n Workshop**	Zoom Meeting (meeting link to be provided)
Jun 24 (Tues), 11:00 – 11:50	**Chemical Structure Drawing Training**	Computer Room B (Library LG1) (Prof. Emily Tsang)
Jun 26 (Thurs), 11:00 – 11:50	**Library Workshop II - Referencing Training**	Computer Room B (Library LG1) (Mr. Samson Choi/Mr. Ernest Lam)

CHEM 4692 Capstone Research II
Course Outline

1. Course Description

Credit Points: 3
Pre-requisite: CHEM 4691
Instructor(s): Research Faculties of Chemistry Department

Brief Information/synopsis:

Continuation of research project started in CHEM 4691 and to be conducted under the supervision of a faculty member/teaching staff. A written report and oral presentation are required to document their learning experiences. Students should seek instructor's approval prior to enrollment in the course.

2. Intended Learning Outcomes

Upon successful completion of this course, students are expected to be able to:

1	Demonstrate awareness of chemical topics relevant to social and daily life
2	Analyze and interpret experimental data, critically assess data in literature and extract useful data from it.
3	Carry out directed research by selecting appropriate topics and procedures, and presenting the results
4	Communicate effectively both orally and in writing with professionals and/or lay audience
5	Demonstrate information technology skills, especially in the areas of information retrieval, literature searching and use of library database.
6	Show self awareness, work independently and collaborate effectively with other people in a team

3. Grading

Weight	Assessment	Course ILOs
50%	Lab Performance and Participation	1,2,3,4,5,6
20%	Oral Presentation	4,5,6
30%	Written Research Thesis	1,2,3,4,5