

# CHEM3083: COSMETIC CHEMISTRY

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## Effective Term

Semester A 2024/25

## Part I Course Overview

### Course Title

Cosmetic Chemistry

### Subject Code

CHEM - Chemistry

### Course Number

3083

### Academic Unit

Chemistry (CHEM)

### College/School

College of Science (SI)

### Course Duration

One Semester

### Credit Units

3

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

CHEM2006 Principles of Inorganic Chemistry

CHEM2007 Principles of Organic Chemistry

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course offers an exciting opportunity to explore the chemistry and manufacturing of cosmetics. Students will delve into the scientific aspects of cosmetics, including the chemistry, physics, and biological functions of various ingredients. Interactive lectures, tutorials, and group projects will keep students engaged throughout the course. In the laboratory sessions, students will learn hands-on skills to create cosmetic formulations like brightening serum, gentle shampoo, moisturizing day cream, and gloss lipstick. The course is developed in collaboration with the Hong Kong Society of Cosmetic Chemists (HKSCC), and guest lecturers from HKSCC will contribute their expertise. Upon successful completion, students will receive a certificate of attendance from HKSCC. Students will be able to unlock the world of cosmetic chemistry and manufacturing in this dynamic learning experience.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Recognize the significance of cosmetics in modern society by identifying their essential role and impact on individuals and communities.	5	x	x	
2	Explain the necessity and operational principles of various cosmetic ingredients, showcasing a deep understanding of how they contribute to the effectiveness and desired outcomes of cosmetic products.	40		x	x
3	Engage in exploration and articulate a clear understanding of the underlying rationale behind diverse cosmetic formulations. Present well-supported explanations that highlight the considerations and goals in formulating cosmetics for specific purposes.	40		x	x
4	Conduct a thorough analysis of safety concerns associated with the use of cosmetics. Demonstrate the ability to evaluate and critically assess potential risks, hazards, and implications concerning the use of cosmetic products, and propose informed recommendations to mitigate these issues.	15		x	x

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will engage in interactive lectures that explore the basic concepts of cosmetic ingredients and formulations, fostering a comprehensive understanding of the subject matter.	1, 2, 3, 4	2 hrs/week for 8 weeks
2	Tutorials	Students will participate in interactive discussions focused on designing cosmetic formulations, facilitating critical thinking and collaborative exploration to deepen knowledge and encourage innovative approaches.	2, 3, 4	1 hrs/week for 8 weeks
3	Group Project	Students will collaborate on interactive poster and video projects aimed at enhancing the discovery of cosmetic-related products' use, production, and safety. These projects encourage independent research, creativity, and effective communication of key findings.	1, 2, 3, 4	3 hrs/week for 1 week
4	Laboratory Session	Students will take part in laboratory experiments and demonstrations that illustrate the production processes involved in creating cosmetic products, providing firsthand experience and reinforcing theoretical understanding of cosmetic production complexities.	2, 3, 4	3 hrs/week for 4 weeks

#### Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes and Assignments	1, 2, 3, 4	20
2	Laboratory Report Write-up	2, 3, 4	10

3	Group Project and Presentation	1, 2, 3, 4	30	
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**Continuous Assessment (%)**

60

**Examination (%)**

40

**Examination Duration (Hours)**

2

**Additional Information for ATs**

Starting from Semester A, 2015-16, students must satisfy the following minimum passing requirement for courses offered by CHEM: "A minimum of 40% in both coursework and examination components."

**Assessment Rubrics (AR)****Assessment Task**

1. Quizzes and Assignment

**Excellent (A+, A, A-)**

Demonstrates excellent grasp of the important concepts to various aspects of the topic covered in this course, and can apply these concepts to solve problems with clear and logical explanations.

**Good (B+, B, B-)**

Able to describe and explain the important concepts to several aspects of the topic covered in this course.

**Fair (C+, C, C-)**

Student completes most of the assessment tasks and can describe some key elements on the topics covered in the course. Shows limited ability to apply concepts.

**Marginal (D)**

Student has little participation and interest, and demonstrates limited ability in analysis.

**Failure (F)**

Student has no participation, interest or original thought.

**Assessment Task**

2. Laboratory Report Write-up

**Excellent (A+, A, A-)**

Demonstrates excellent grasp of the important concepts to various aspects of the topic covered in the laboratory sessions. Reports are well-written with clear and logical explanations.

**Good (B+, B, B-)**

Able to describe and explain the important concepts to several aspects of the topic covered in the laboratory sessions.

**Fair (C+, C, C-)**

Student completes most of the assessment tasks and can describe some key elements on the topics covered in the course. Shows limited ability to apply concepts.

**Marginal (D)**

Student has little participation and interest, and demonstrates limited ability in analysis.

**Failure (F)**

Student has no participation, interest or original thought.

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**Assessment Task**

3. Group Project and Presentation

**Excellent (A+, A, A-)**

Excellent logical structure with coverage and relevance. The work is presented in an accurate and concise fashion. Fluent language with a formal tone. Good timing. Provides detailed answers to all questions.

**Good (B+, B, B-)**

Good logical structure with coverage and relevance. The work is presented in an accurate fashion. Appropriate use of language. Good timing. Can answer all questions in detail.

**Fair (C+, C, C-)**

Acceptable logical structure with coverage and relevance. The work is presented in an acceptable fashion. Reading from single-page notes or cue cards. Either too short or overruns by only one to two minutes. Can answer most questions.

**Marginal (D)**

No structure with no/little coverage and relevance. Very easy to find mistakes in the presented work. Very poor timing. Fails to answer most questions and has difficulty understanding many of them.

**Failure (F)**

Zero contribution in the whole presentation, including information research, data processing, preparation works and presentation.

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**Assessment Task**

4. Examination

**Excellent (A+, A, A-)**

Demonstrates a deep understanding of selected topic and able to critically analyse the issues of the question.

**Good (B+, B, B-)**

Demonstrates a good understanding of selected topic and able to reasonably analyse the issues of the question.

**Fair (C+, C, C-)**

Demonstrates a limited understanding of selected topic and does not go beyond a standard description of the issues of the question.

**Marginal (D)**

Demonstrates a weak understanding of selected topic and presents limited perspective of the topic.

**Failure (F)**

Does not present evidence of a reasonable understanding of the question and omits key issues of the question.

## Part III Other Information

### Keyword Syllabus

Week 1 The science of beauty and introduction to cosmetic chemistry

(Class description: introduction to the world of cosmetic chemistry, the balance between aesthetics and sciences, types of cosmetics) (Prof. C.-Y. Wong)

Week 2 Skin & hair biology for cosmetics

(Class description: brief discussion of skin and hair biology and how cosmetics work to improve appearance) (Guest lecturer from HKSCC)

Week 3 Fine chemicals for cosmetic: solvent, emulsifiers, surfactants, emollients, oils, waxes, humectants, fragrances, additives and beyond

(Class description: brief review of commonly used chemicals in cosmetic sciences) (Guest lecturer from HKSCC)

Week 4 Formulating cosmetics: aqueous and surfactant systems in theories

(Class description: introduction and studies of aqueous and surfactant type formulations, their use and preparation) (Guest lecturer from HKSCC)

Week 5 Formulating cosmetics: aqueous systems in practice (Experiment I: making of brightening serum)

(Class description: laboratory session to study a basic serum formulation and make the formulation in small group)(Prof. C.-Y. Wong)

Week 6 Formulating cosmetics: aqueous systems in practice (Experiment II: making of gentle shampoo)

(Class description: laboratory session to study a basic surfactant cleansing preparation and make the formulation in small groups) (Prof. C.-Y. Wong)

Week 7 Formulating cosmetics: emulsion systems in theories

(Class description: introduction and studies of emulsions for cosmetic. A brief discussion of basic emulsion types, including W/O, O/W and W/Si.) (Guest lecturer from HKSCC)

Week 8 Formulating cosmetics: emulsion systems in practice, (Experiment III: making of moisturizing day cream)

(Class description: laboratory session to study an emulsion in practice and make a moisturizing day cream) (Prof. C.-Y. Wong)

Week 9 Formulating colour cosmetics: solid systems and other specialty products

(Class description: general discussion of colour cosmetics and its fundamentals. Review of dispersion, material structure and pigments. Brief touch on other types of cosmetics and their chemistry) (Guest lecturer from HKSCC)

Week 10 Formulating colour cosmetics: solid systems in practice, (Experiment IV: making of a gloss lipstick)

(Class description: laboratory session to study a solid cosmetic and make a gloss lipstick) (Prof. C.-Y. Wong)

Week 11 Importance of cosmetic safety and assessment

(Class description: the study of safety and assessment on cosmetic chemistry) (Guest lecturer from HKSCC)

Week 12 Group presentation (Prof. C.-Y. Wong)

Week 13 Summary and revision (Prof. C.-Y. Wong)

### Reading List

#### Compulsory Readings

Title	
1	Beginning Cosmetic Chemistry 3rd Edition (ISBN-13: 978-1932633535)

#### Additional Readings

Title	
1	Chemistry and Manufacture of Cosmetics: Science 4th edition (ISBN-13: 978-1932633474)