

**City University of Hong Kong
Course Syllabus**

**offered by Department of Chemistry
with effect from Semester A 2024/25**

Part I Course Overview

Course Title: Polymer Chemistry

Course Code: CHEM8013

Course Duration: 1 semester

Credit Units: 3 credits

Level: R8

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) Nil

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) BCH8013 Polymer Chemistry

Exclusive Courses:
(Course Code and Title) Nil

Part II Course Details

1. Abstract

Polymer chemistry is a multidisciplinary science that deals with the chemical synthesis and chemical/physical properties of polymers. This course of polymer chemistry is a postgraduate taught course tailored for postgraduate students only. The aim of this course is to:

- Introduce students to core concepts of polymer synthesis and characterization;
- Prepare students to undertake a PhD in the research of polymer science and functional materials;
- Prepare students to take on consulting and/or R&D professionals in industry related to the application of polymers in nanotechnology, renewable energy, information technology and healthcare.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs [#]	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes		
			A1	A2	A3
1.	Demonstrate the attitude and ability to discover and describe the fundamental characteristics of synthetic polymers.	20%	✓	✓	
2.	Explain the fundamental principles, polymerization and characterization of polymers.	20%	✓	✓	
3.	Evaluate the properties of polymeric materials that are related to atomic, molecular, and crystalline structures, molecular weight, phase transition and morphologies.	20%		✓	
4.	Analyze the critical role of polymer application in nanotechnology, renewable energy, information technology and healthcare.	20%	✓	✓	
5.	Manipulate the polymer structure, processing and properties in materials engineering designs; discover examples encountered in our daily lives that involve the applications of polymers	20%	✓	✓	✓
		100%			

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 self-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.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

Seminar : 39 hours

LTA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Group activities	Students will learn through large group activities exploring problems and applications of polymer chemistry.	✓					
Lectures, videos and web-based teaching methods	Students will develop experience in recognizing and explaining polymer synthesis, processing, characterization and application through lectures, videos and web-based teaching methods.		✓				
Group activities	Teaching and learning will be in the form of large and small group activities; students will develop an understanding on the structural and functional properties of polymers.			✓			
Group critical evaluation tasks	In large and small group critical evaluation tasks students will discuss and rationalise the various factors affecting application landscape of polymers.				✓		
Group activities	In large and small group activities, students will discuss and examine the critical role of polymer application in nanotechnology, renewable energy, information technology and healthcare.					✓	
Literature search and presentation	Students, in small groups, will take part in the literature search on identification of their daily life encounters related polymer chemistry. They will then present, evaluate and discuss their findings in the light of modern day living in the form of written reports and oral presentations.					✓	

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.					Weighting	Remarks
	1	2	3	4	5		
Continuous Assessment: 40%							
Short Quizzes and Tutorial Questions	✓	✓	✓	✓	✓	10%	
Assignments	✓	✓	✓	✓	✓	10%	
Tests	✓	✓	✓	✓	✓	10%	
Written Reports and Group Presentations					✓	10%	
Examination: 60% (duration: one 3-hour exam)							
AT3. Final Examination	✓	✓	✓	✓	✓	60%	
The purpose of the examination is to assess students' overall competence level in the domain areas.							
						100%	

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."

5. Assessment Rubrics

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Short Quizzes and Tutorial Questions	ABILITY to develop a fundamental understanding on the concepts of polymer chemistry, and good comprehension of polymer processing, polymer engineering, and polymer physics	High	Significant	Moderate	Basic	Not even reaching marginal levels
Assignments	ABILITY to analyse and solve problems relevant to polymer chemistry	High	Significant	Moderate	Basic	Not even reaching marginal levels
Tests	ABILITY to describe and explain the aforementioned concepts to solve problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
Written Reports and Group Presentations	ABILITY to conduct literature search and give written and oral presentations on different topics on polymer chemistry at the advanced level	High	Significant	Moderate	Basic	Not even reaching marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
Short Quizzes and Tutorial Questions	ABILITY to develop a fundamental understanding on the concepts of polymer chemistry, and good comprehension of polymer processing, polymer engineering, and polymer physics	High	Significant	Basic	Not even reaching marginal levels
Assignments	ABILITY to analyse and solve problems relevant to polymer chemistry	High	Significant	Basic	Not even reaching marginal levels
Tests	ABILITY to describe and explain the aforementioned concepts to solve problems	High	Significant	Basic	Not even reaching marginal levels
Written Reports and Group Presentations	ABILITY to conduct literature search and give written and oral presentations on different topics on polymer chemistry at the advanced level	High	Significant	Basic	Not even reaching marginal levels

Part III Other Information

1. Keyword Syllabus

Polymer Chemistry, Polymer Synthesis, Polymer Reactions, Solid-State Structures and Properties of Polymers, Functional Polymers, Polymer Processing, Polymers for Advanced Technologies

2. Reading List

2.1 Compulsory Readings

1.	Nil
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2.2 Additional Readings

1.	Koltzenburg, Sebastian, Maskos, Michael, Nuyken, Oskar, <u>Polymer Chemistry</u> , Springer, 2017.
2.	Joel R. Fried, <u>Polymer Science and Technology</u> , Third Edition, Prentice Hall, 2014.
3.	Abe Ravve, <u>Principles of Polymer Chemistry</u> , Springer-Verlag New York, 2012.
4.	Paul C. Hiemenz, and Timothy P. Lodge, <u>Polymer Chemistry</u> , 2nd edition, Taylor & Francis Inc, 2007.
5.	J.M.G. Cowie, Valeria Arrighi, <u>Polymers: Chemistry and Physics of Modern Materials</u> , Third Edition, CRC Press, 2007.