

# CHEM4033: INDUSTRIAL CHEMISTRY

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## Effective Term

Semester A 2022/23

## Part I Course Overview

### Course Title

Industrial Chemistry

### Subject Code

CHEM - Chemistry

### Course Number

4033

### Academic Unit

Chemistry (CHEM)

### College/School

College of Science (SI)

### Course Duration

One Semester

### Credit Units

4

### Level

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

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

CHEM2006/BCH2006 Principles of Inorganic Chemistry

CHEM2007/BCH2007 Principles of Organic Chemistry

CHEM2008/BCH2008 Principles of Physical Chemistry

### Precursors

Nil

### Equivalent Courses

BCH4033 Industrial Chemistry

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

In this course, students will be introduced to the fundamentals of industrial chemistry and its role in current technologies in the chemical, petrochemical, and pharmaceutical industries. Following completion of the course students will be able to describe the role of chemical, petrochemical, and pharmaceutical industries in the world; identify the key concepts and laws of physical chemistry used in technology; comprehend the fundamentals of chemical engineering; review the production of energy and raw materials. Describe the chemical processes related to water; identify the most important inorganic and organic products and the technologies for their production; and discuss the most important challenges for sustainable development.

### Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the role of chemical, petrochemical, and pharmaceutical industries in the world.	5	x		
2	Describe the use of the key concepts and laws of physical chemistry and chemical engineering in technology.	15	x		x
3	Analyse the role and the production of energy and raw materials including drinking water and waste water.	30	x	x	
4	Describe a technology using processes at the molecular level for the production of key inorganic and organic products.	40		x	x
5	Design a list of criteria to evaluate the feasibility of a project / plan related to sustainable developments.	10	x	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.

### Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures and tutorials	The contribution of the chemical, petrochemical, and pharmaceutical industries to the economy will be demonstrated by using global data.	1	

2	Lectures and tutorials	The key concepts industrial chemistry and the fundamentals of chemical engineering will be described.	2	
3	Videos	Use of process schemes and videos to review and demonstrate the production of energy and raw materials, including the treatment waste water and the production of drinking water.	3	
4	Animations	Use of animations to illustrate key inorganic and organic products and some of the production process.	4	
5	Group discussion	Group work to compose a list of criteria to be assessed by peers through online discussion.	5	

**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Recollection Tests & Tutorial Assignments	1, 2, 3, 4, 5	20
2	Group Presentations	4	15
3	Reports & Debates	5	5

**Continuous Assessment (%)**

40

**Examination (%)**

60

**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**

Recollection Tests & Tutorial Assignments

**Criterion**

Ability to explain the concepts of industrial chemistry and their use in chemical processes and technologies

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

High

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

Significant

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

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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**Assessment Task**

Group Presentations

**Criterion**

Ability to explain an industrial chemical processes and the role of their products in society.

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

High

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

Significant

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

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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**Assessment Task**

Reports

**Criterion**

- 1 Capacity for self-directed learning to understand the basics of industrial chemistry
- 2 Ability to explain industrial processes

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

High

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

Significant

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

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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**Assessment Task**

Examination

**Criterion**

Ability to answer questions in details concerning the role of physical chemistry in industrial processes, the basics of chemical engineering, the production of energy, raw materials, inorganic and organic products and some of their production process, and discuss sustainable development.

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

High

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

Significant

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

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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## Part III Other Information

### Keyword Syllabus

- The role of chemical technology in the world.
- The role of physical chemistry in chemical technology.
- The fundamentals of chemical engineering.
- Energy production.
- The raw materials of the chemical and petrochemical industry.
- Chemical processes related to water.
- The products and processes of the inorganic chemical industry.
- Synthetic fuels.
- Cl chemical processes.
- The products and processes of the organic chemical industry.
- Polymers
- Agricultural chemicals.
- The fundamentals and products of biotechnology.
- Challenges for sustainable developments.

### Reading List

**Compulsory Readings**

Title	
1	Slides of the lectures

**Additional Readings**

Title	
1	Benvenuto, M. A. Industrial Chemistry, Walter de Gruyter; Berlin/Boston, 2014.