Course Specification

(Bachelor)

Course Title:	Fundamentals of Petrochemical Industries
Course Code:	CHM 1320
Program:	Bachelor of Science in Chemical Laboratories
Department:	Chemistry
College:	Science
Institution:	Imam Mohammad ibn Saud Islamic University (IMSIU)
Version:	2024- 1
Last Revision Date:	15 September 2024

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A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3 Lectures, 0 Lab and 0 Tutorials)				
3 (3 Lectures, 0 Lab and 0 Tutorials)				
2. Course type				
A.	☐University	☐College	☐Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 6/ Year 3)				
4. Course General Description:				
The course is intended to provide an in-depth understanding of the most important petrochemical terms, raw materials for petrochemicals, synthesis, and applications of the derivatives from methane and ammonia. It introduces students to petrochemical processes such as methanol, ethylene, propylene, butene, butadiene, benzene, toluene, xylenes, and polyvinylchloride production, derivatives, and applications.				
5. Pre-requirements for this course (if any)**:**				
Organic Chemistry- CHM 1225				
6. Pre-requirements for this course (if any)**:**				
None				
7. Course Main Objective(s):				
A major objective of the course is to learn how different petrochemical products can be produced and define the most important petrochemical expressions. The course provides the learner with practical knowledge and competencies relevant to petroleum and petrochemical processing techniques.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**45**	**100%**
2	E-learning	**0**	**0**
3	Hybrid • Traditional classroom • E-learning	**0**	**0**
4	Distance learning	**0**	**0**

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	**45**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify)……**	**0**
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To Recognize basic concepts of petrochemicals, such as definitions, products, and some processes.**	**K1**	• **Lectures and Group Discussions** • **A Private study including home exam.**	**Direct:** ✓ **Quizzes** ✓ **Discussion** ✓ **Participation** ✓ **Exams**
1.2	**TO Memorize information about various petrochemical processes and products.**	**K1**	• **Lectures with group discussion.** • **Think, talk, and discuss Polymer types, Polymerization, and Reaction processes.**	**Direct:** ✓ **Oral Discussion** ✓ **Exams** ✓ **Participation**
1.3	**To List raw materials for petrochemicals.**	**K1; K2**	▪ **Lectures with group discussion.** ▪ **Think, talk, and discuss the Petrochemical Process in Petrochemicals and industry**	**Direct:** ✓ **Quizzes** ✓ **Home exam** ✓ **Oral discussions.**
2.0	**Skills.**			
2.1	**To Interpret some petrochemical processes.**	**S1**	✓ **Interactive lectures** ✓ **Brainstorming** ✓ **Group discussions**	**Direct:** ✓ **Short Quizzes and Exams.** ✓ **Participation** ✓ **Oral Discussion,**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	To Differentiate between petroleum and petrochemicals.	S2; S3	✓ Interactive lectures ✓ Group discussions	Direct: ✓ Questions in Lectures. ✓ Short Quizzes and Exams. ✓ Participation ✓ Oral Discussion,
2.3	To Compare different petrochemical products, i.e., properties and uses.	S2; S3; S4	✓ Interactive lectures ✓ Brainstorming ✓ Group discussions	Direct: ✓ Short Quizzes and Exams. ✓ Participation ✓ Oral Discussion,
2.4	To Demonstrate the ability to communicate effectively (both orally and in written English).	S3	✓ Interactive lectures ✓ Brainstormin ✓ Group discussions	Direct: ✓ Oral Discussion, ✓ Quizzes and Exams. ✓ Oral Discussion ✓ Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the ability to work both individually and in a work team to answer questions and solve problems in this course.	V1; V2	✓ Team-based learning ✓ Group discussions	Direct ✓ Homework ✓ Presentation (Poster, PowerPoint or Review)

C. Course Content

No	List of Topics	Contact Hours
1.	Primary Raw Materials for Petrochemicals	3
2.	Hydrocarbon Intermediates	3
3.	Crude Oil Processing and Production of Hydrocarbon Intermediates	3
4.	Nonhydrocarbon Intermediates	3
5.	Chemicals Based on Methane	3
6.	Ethane and Higher Paraffins-Based Chemicals	3
7.	Chemicals Based on Ethylene	3
8.	Chemicals Based on Propylene	6
9.	C4 Olefins and Diolefins-Based Chemicals.	3
10.	Chemicals Based on Benzene, Toluene, and Xylenes.	3
11.	Polymerization	6
12.	Synthetic Petroleum-Based Polymers.	6
	Total	45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	Week 6th -7th	20 %
2.	Midterm 2	Week 11th -12th	20 %
3.	Quizzes, homework, class participation	During semester	20 %
4.	Final examination	Week 16th	40 %
5.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities:

. References and Learning Resources

Essential References	Sami Matar, Lewis F. Hatch, **Chemistry of Petrochemical Processes**, Gulf Publishing; 2nd edition (26 July 2001), ISBN-10 : 0884153150, ISBN-13 : 978-0884153153
Supportive References	1. B.K. Bhaskararao**, A Text on Petro Chemicals**, Khanna Publisher (January 1, 2004), ISBN-10 : 8174090444, ISBN-13 : 978-8174090447 2. James G. Speight, **The Chemistry and Technology of Petroleum (Chemical Industries),** CRC Press; (February 26, 2014), ISBN-10 : 1439873895, ISBN-13 : 978-1439873892

Electronic Materials	**Blackboard**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• **Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.**
Technology equipment (projector, smart board, software)	**The rooms are equipped with data show, Smart Board, WI-FI access.**
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Direct:** Questionnaire.
	Course Responsible	**Direct:** Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Peer Reviewer	**Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of students assessment	**Program Leaders**	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	**Students**	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
The extent to which CLOs have been achieved	**Course Responsible**	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.

Assessment Areas/Issues	Assessor	Assessment Methods
	Program Leaders	**Indirect:** Exams.
Other	**Students** **Course Responsible**	**Indirect:** Exams.

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**COUNCIL OF DEPARTMENT OF CHEMISTRY**
REFERENCE NO.	**3 (NO. 1/3)**
DATE	**5/3/1446- 8/09/2024**