هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**PETROLEUM REFINING AND TESTING**
Course Code:	**232 CHET**
Program:	**Chemical Engineering Technology (CHET)**
Department:	**Chemical Engineering Technology**
College:	**College of Applied Industrial Technology (CAIT)**
Institution:	**Jazan University**
Version:	**V2022-Eng-revised**
Last Revision Date:	**04 Mar 2024**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3 hours **(Contact hours: 4 hours/ week)**				
2. Course type					
a.	University ☐	College ☐	Department ■	Track☐	Others☐
b.	Required ■	Elective☐			
3. Level/year at which this course is offered:	**Level 6/ Third Year**				

4. Course general Description

Petroleum provides the largest fraction of primary energy supply in the world. Transportation of people and goods in many parts of the world depend almost completely on petroleum fuels, such as gasoline, jet fuel, diesel fuel, and marine fuel. Apart from the fuels, materials that are necessary for operating the combustion engines of cars, trucks, planes, and trains also come from petroleum. These materials include lubricating oils (motor oils), greases, tires on the wheels of the vehicles, and asphalt to pave the roads for smooth rides in transportation vehicles. All petroleum fuels and many materials are produced by processing of crude oil in petroleum refineries. Petroleum refineries also supply feedstock to the petrochemicals and chemical industry for producing all consumer goods from rubber and plastics (polymers) to cosmetics and medicine. This course addresses the origin and occurrence, composition, physico-chemical properties of petroleum, petroleum refining to review how a variety of physical processes and chemical reactions in separate refinery units are integrated to process compliant fuels and materials, function of Saudi Aramco refineries.

The course is introduced through two classes weekly. They are 2 classes (1 hour each) for theoretical part and 3 hours class for laboratory for which students apply and implement the concepts of the lectures..

5. Pre-requirements for this course (if any): **221 CHET**

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)

To understand and know origin, occurrence, exploration, drilling and production of crude oil and be aware of the challenges involved in crude refining from viewpoint of product specifications, economic considerations and environmental regulations.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	48	100
2.	E-learning	--	--
3.	Hybrid • Traditional classroom • E-learning	--	--
4.	Distance learning	--	--

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	24
2.	Laboratory/Studio	24
3.	Field	--
4.	Tutorial	--
5.	Others (specify)	--
	Total	48

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	Identify the fundamentals and basics of crude oil such as its origins, resources, and properties.	K1	• Lectures/Presentations • Lectures	• Quizzes/ • Mid exam • Assignment • Class Activity • Final Exam
2.0	Skills			
2.1	Tell the history of refinery development and composition of petroleum	S1	• Lectures / • Presentations • Lectures	• Quizzes/ • Mid exam • Assignment • Class Activity • Final Exam
2.2	Explain well performance and deliverability at different flow conditions—steady state, pseudo-steady state, and transient flow-under Darcy and non-Darcy flow with and without hydraulic fractures.	S2	• Lectures / • Presentations • Lectures	• Quizzes/ • Mid exam • Assignment • Class Activity • Final Exam
2.3	Develop alternatives to natural gas in both utilization and	S3	• Lectures / • Presentations	• Quizzes/ • Mid exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	environmental concerns		• Lectures	• Assignment • Class Activity Final Exam
2.4	Describe the function of Saudi Aramco processing & distribution facilities	S4	• Lectures / • Presentations • Lectures	• Quizzes/ • Mid exam • Assignment • Class Activity Final Exam
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate the techniques used in the refining of crude oil	V2	• Group Discussion	• Lab Exercise
3.2	Show independent timeliness, work in classroom with effective contribution with classmates	V1	• Group Discussion	• Lab Exercise
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Petroleum: Origin and occurrence, composition, classification and physico-chemical properties of petroleum, use of oil and search for oil, energy & raw materials, properties of hydrocarbons past and future of petroleum processing in Saudi Aramco	8
2.	Separation Processes: Distillation of Crude Oil, Distillation in Light Ends Unit, Deasphalting, and Dewaxing Processes	8

3.	Thermal and Catalytic Conversion Processes used in Saudi Arabia and the world.	6
4.	Hydrotreating and Blending	4
5.	Discovering and drilling Processes and oil production, Oil and gas reserves in Saudi Arabia	4
6.	Natural Gas Processing.	4
7.	Function of Saudi Aramco processing & distribution facilities: key functions of GOSP's, UGP's, Refineries, OSPAS, SSSP, BP, AFO and terminals	6
8.	Inputs and outputs into the above facilities	4
9.	Review of theoretical content	4
10.	Self Study (few selected topics)	--
Total		48

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class activities (Quiz-1/Assignments/Labs)	Week 2 till Week 11	10%
2.	Oral discussion/Homework and participation in classroom/BB/Assignment/	All weeks	10%
3.	Midterm	Week 6	20%
.4	Quiz-2/ Self study	--	10%
5.	Final Term Exam	As scheduled	50%
6.	***Total***		**100%**

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

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Classroom policy • Soft and hard copies of lecture notes and some of sections from the following books: • Gary, J.H., and Handwerk, G.E, Kaiser, M. J. (2007) *Petroleum Refining*. 5th Ed. CRC Press N.Y., New York. • Fahim M.A., Sahhhaf T.A., Elkilani A.S. Fundamentals of Petroleum Refining: – First Edition. – Elsivier. – 2010. – 485 p. 2. Chaudhuri U.R. Fundamentals of Petroleum and Petrochemical Engineering. – CRC Press. – 2011. – 406 p.
Supportive References	• Meyers Robert A. (ed.) Handbook of petroleum refining processes. 3rd edition. McGraw-Hill Professional. – 2003. – 847 p. • An introduction to petroleum refining and the production of ultra low sulfur gasoline and diesel fuel. –ICCT. – 2001. – 89 p.
Electronic Materials	https://sites.google.com/site/santhirajupilli/lecture-notes_jazan-university/chet-232-petro-refining-testing?authuser=0 (url for most of my classroom lecture notes)
Other Learning Materials	• Popular Petroleum Videos/LAB demos

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom equipped with projector and whiteboard and enough seating arrangements. • Laboratory with required equipment setups and with a lab instructor. • Appropriate Seating arrangements
Technology equipment (projector, smart board, software)	• Smart Board • Internet connectivity • Speakers (for audio)
Other equipment (depending on the nature of the specialty)	• Whiteboard of good quality (to be used as a screen for playing videos as well) • Whiteboard markers • Paper for photocopying • Photocopying and printing facilities for the teachers and the students

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Quality Assurance and Accreditation Unit/Faculty	Quizzes, Assignments, exams **Direct**
Effectiveness of students assessment	CRC / QAU / HoD	Direct/ Indirect
Quality of learning resources	Track leaders / CRC	Indirect
The extent to which CLOs have been achieved	HoD / committee nominated by HoD	Random re-checking of evaluated answer sheets Surveys designed by the CHET dept. faculty/ University - distributed among the course instructors. **Direct/ Indirect**
Other	Course Instrcutor / QAU	CLO assessment template that is further verified at course coordinator and QAU level.

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	*Chemical Engineering Technology*
REFERENCE NO.	CAITCET24012
DATE	17/04/2024