هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Applied Organic Chemistry**
Course Code:	**CHEM 438**
Program:	**Bachelor in Chemistry**
Department:	**Chemistry**
College:	**College of Science**
Institution:	**Jazan University (JU)**

Table of Contents

A. Course Identification

1. Credit hours: 3hrs. **Workload:** 176.15 **ECTS:** 6.3	
2. Course type	
a. University ☐ College ☐ Department ☑ Others ☐	
b. Required ☑ Elective ☐	
3. Level/year at which this course is offered: Level 8, Year 4	
4. Pre-requisites for this course (if any)**:**	
None	
5. Co-requisites for this course (if any)**:**	
None	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	27	90 %
2	**Blended**		
3	**E-learning**	3	10%
4	**Distance learning**		
5	**Other (Lab.)**	30	100%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

Course Title	Course Number	Contact Hours (CH)		Credit unit (CU)	Year	Level	Pre-requisite
		Lec.	Prac.				
Applied Organic Chemistry	CHEM 438	2	2	3	4	8	.....

Course objectives:

at the end of this course the student should be able to:

1. Discuss the occurrence, extraction, properties of petroleum and application of fractional distillation, catalytic cracking and catalytic reforming during petroleum processing.
2. Describe using equations and flow diagrams, the manufacture of some petrochemicals, namely, ethylene, propylene, synthetic gas, benzene and inorganic petrochemicals.
3. identify polymers, their physical properties and different kinds of addition polymerization
4. Identify the characteristics of some common polymers and the industrial importance of polymers and their uses in various fields.
5. Identify the types of pigments and paints.
6. Discuss the classification, synthesis and uses of dyes.

Syllabus: A-Theoretical contents

The course is designed to give the students an idea about the polymer science – definition, classification of polymers, and polymerization by addition (chain reaction) – ionic polymerization (anionic and cationic) – free radical polymerization –polymerization by condensation– (linear polymerization– cross section polymerization). Introduce an idea about petroleum, Petrochemicals and industrial applications of organic chemistry, such as organic polymers and their uses in various fields and the manufacture of dyes and paints.

Syllabus: B-Practical contents

Basic knowledge concerning general Safety Rules, Lab Equipment, Purification of Organic Compounds, synthesis of some polymers, soap, cream, some dyes and examine their properties and their applications.

*See attachment

2. Course Main Objective

The main purpose of Applied organic chemistry course is giving the students basic information about the petroleum, Petrochemicals, Polymers, and Dyes with their classifications, applications and their uses.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	

CLOs		Aligned PLOs
	Upon completion of this course student will be able to	
1.1	*Demonstrate a broad knowledge and understanding of industrial chemistry, petroleum, petrochemicals, polymer, and dyes. (M)*	K1
1.2	*Describe the uses and applications of petrochemicals, polymers, and dyes in our life. (M)*	K2
2	**Skills:** *Upon completion of this course student will be able to*	
2.1	Demonstrate ability in critical thinking, analyzing reaction mechanisms and classifying industrial compounds. *(M)*	S1
2.2	Apply their experimental basics and skills to use laboratory equipment, modern instructions, and classical techniques for carrying out experiments in polymers, dyes and petroleum and write a report representing the scientific data. *(M)*	S2
2.3	Examine and follow proper procedures and regulations for safe handling, use, and disposal of chemicals. (M)	S3
2.4	Make effective use of communication, and online technology about chemistry topics to improve their basic knowledge in writing (report and research) with a good verbal and clear scientific language. *(M)*	S4
3	**Values:** *Upon completion of this course student will be able to*	
3.1	*Work as a group leader in cooperation with other colleagues (M)*	V1

C. Course Content

No	List of Topics	Contact Hours
1	**Definitions, origin, and composition of crude oil**	**2**
2	**Characterization and classification of crude oil**	**2**
3	**Basic petroleum refining**	**4+Quiz**
4	**Petrochemicals, classifications, uses and applications**	**4**
5	**Definition, Properties, and classifications of Polymers**	**2**
6	**Addition Polymerization**	**3**
7	**Condensation Polymerization**	**3**
8	**Application of industrial polymers**	**2**
9	**Introduction and Classifications of Dyes**	**2+quiz**
10	**Preparation, uses, and applications of dyes**	**4**
11	**Paints, types, constitutions and applications**	**2**
12	***selected experiments covered the course topics, Polymer synthesis, synthesis of some dyes, Soap manufacture...etc.***	**30**
Total		**60**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding** *Upon completion of this course student will be able to*		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.1	Demonstrate a broad knowledge and understanding of industrial chemistry, petroleum, petrochemicals, polymer, and dyes. *(M)*	Lecture	MCQ and Embedded Q in Final exam
1.2	Describe the uses and applications of petrochemicals, polymers, and dyes in our life. *(M)*	Lecture	Embedded Q Final exam
2.0	**Skills** *Upon completion of this course student will be able to*		
2.1	Demonstrate ability in critical thinking, analyzing reaction mechanisms and classifying industrial compounds. *(M)*	Lecture Open discussion in class	Embedded Q Final exam
2.2	Apply their experimental basics and skills to use laboratory equipment, modern instructions, and classical techniques for carrying out experiments in polymers, dyes and petroleum and write a report representing the scientific data. *(M)*	Lab. Work	Lab. report
2.3	Examine and follow proper procedures and regulations for safe handling, use, and disposal of chemicals. *(M)*	Lab. Work	MCQ in safety
2.4	Make effective use of communication, and online technology about chemistry topics to improve their basic knowledge in writing (report and research) with a good verbal and clear scientific language. *(M)*	Group work Group discussion	Presentation/Report rubric Assessment research
3.0	**Values** *Upon completion of this course student will be able to*		
3.1	Work as a group leader in cooperation with other colleagues. *(M)*	Lab Group work	Presentation/Report rubric /Assessment

2. Assessment Tasks for Students

#	Assessment task*		Week Due	Percentage of Total Assessment Score
1	**Homework assignment**		3	1 (1 %)
2	**Lecture Quizzes**		4	1 (1 %)
3	**Mid-term exam**		6	15 (15 %)
4	**Homework assignment**		8	1 (1%)
5	**Lecture Quizzes**		10	1 (1%)
6	**Homework assignment**		12	1 (1%)
7	**Oral presentation**		13	0
8	**Group project**		14	0
9	**safety Quiz**		10	0
10	**Final practical exam**	**Sheet**	15	5 (5%)
		Lab report	15	10 (10%)
		Final Experiment	15	15 (15%)
11	**Final Exam**		16	50 (50%)
Final (total)			**100**	

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- The instructor will be available for academic counseling on daily basis for 4h/day during office hours.
- The office hours are listed in the instructor time table and delivered to the students in the first lecture each semester.
- The instructor is available in the WhatsApp group and BB with the students.
- E-mail and Telephone number are delivered to the students for any help throughout the semester.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	**Industrial Organic Chemicals by Harold A. Wittcoff, Bryan G. Reuben and Jeffery S. Plotkin, 2012 | ISBN: 0470537434**
Essential References Materials	**كتاب الصناعات البترولية والبتروكيماوية ... تأليف أ. د سالم بن سليم الذياب** **كيمياء و تقنية البوليمرات بواسطة أ. د. سالم سليم الذياب**
Electronic Materials	• https://en.wikipedia.org/wiki/Chemical_industry • http://www.rsc.org/learn-chemistry • https://www.khanacademy.org/science/organic-chemistry • https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/intro1.htm • https://chem.libretexts.org/
Other Learning Materials	none

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• ***1 Lecture room(s) for groups of 50 students.*** • ***1 Laboratory for a group of 25 student***
Technology Resources (AV, data show, Smart Board, software, etc.)	• ***1 Computer laboratories for groups of 25 students*** • ***Accelrys Material Studio Software.***
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• ***Glassware, chemicals, V/UV spectrophotometer, IR, Mass spectrometry and scientific videos***

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
The effectiveness of Teaching and Assessment	***Student***	***Likert-type Survey (CES)*** ***Indirect***

Evaluation Areas/Issues	Evaluators	Evaluation Methods
The extent of achievement of course learning outcomes	*Instructor & Course coordinator*	***Classroom evaluation (direct & indirect)***
Quality of learning resources	*Program coordinator*	***Indirect***
Exam Quality assessment	*Assessment committee*	***Indirect***

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Chemistry Department Council
Reference No.	42 / 35 /102 112
Date	17 /09 /1442 Corresponding to 28 / 04 /2021

Laboratory Experiments

While specific laboratory experiments vary depending on the instructor and the semester, the following list is representative of the experiments that are used:

No	*Title of Experiment*	*Tools, Chemicals, and equipment Needed in Experiments*	*No of Weeks*	*Contact Hours*	*Total Credit hours*
1	**Phenol formaldehyde resin**	Glacial acetic acid, 40% formaldehyde solution, Phenol, conc. HCl. Glass rod, beakers, funnel, heater and filter paper, analytical balance, FTIR.	2	4	
2	**Urea- Formaldehyde Resins**	Urea, Formaldehyde, 35-40 % neutral solution, Oxalic acid, saturated solution. Concentrated ammonia solution Conc. HCl. Flame, Beakers, Test Tubes, Filter papers, Funnels, filtration system, analytical balance	1	2	
3	**Determination of Saponification Value**	Fat, Oil, Fatty acids, Standard N/2 HCl, Alc. KOH and phenolphthalein. Round bottom flask, burette, pipette, water condenser, water bath, analytical balance.	1	2	
4	**DETERMINATION OF PURITY ANILINE SALTS**	Aniline hydrochloride, Aniline sulfate, Standard 0.1N HCl, and phenolphthalein. burette, pipette, conical flasks and dropper, analytical balance	1	2	15 h
5	**Determination of the Equivalent Weight of a Carboxylic Acid**	*Barium hydroxide solution 0.05N, phenolphthalein, carboxylic acids* Burette, pipette, conical flasks and dropper, analytical balance	1	2	
6	**Preparation of para-Red and Dyeing**	4-Nitroaniline,2-naphthol, HCl, Sodium Nitrite, Sodium Hydroxide Beakers, Dropper, Magnetic stirrer, Thermometer, Ice-Bath, Filtration system, Ethanol, Fibers sample, analytical balance, FTIR	2	4	
7	**Preparation of Soap**	Oil, Fat, Sodium hydroxide, Sodium Chloride, Ethanol. Water-bath, thermometer, magnetic stirrer, filtration system, Round-bottomed flask, analytical balance	1	2	
9	**Synthesis of Biodiesel and studying its properties**	Oil, Fat, Potassium hydroxide, Sodium Chloride, Calcium chloride anhydrous, Acetic acid. Water-bath, Separating funnel, Conical flask, analytical balance	2	4	

10	**Creams**	oils, fats, Borax, Mineral oil, water and waxes. Beakers, Water-bath, magnetic stirrer, Thermometer, Filter papers, analytical balance	1	2	
11	**Preparation of glyptal resin.**	phthalic anhydride anhydrous sodium acetate ethylene glycol glycerol analytical balance 2 large test tubes (20- x 150-mm) 1-mL graduated pipette Bunsen burner ring stand 2 utility clamps (not rubber coated clamps) FTIR (optional) melting point apparatus (optional) small test tubes or spot plate (optional) assorted solvents such as water, alcohol, acetone,	1	2	
12	**Presentation/Report rubric /Assessment**	Theoretical	2	4	