Course Specification
(Bachelor)

Course Title:	Organic Applied Chemistry
Course Code:	438 CHEM-3
Program:	Bachelor of Science in Chemistry
Department:	Physical Sciences
College:	College of Science
Institution:	Jazan University (JU)
Version:	TP153 2024
Last Revision Date:	06/05/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3h)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (Level 8/ Year 4)

4. Course general 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**	**232 CHEM3**

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.

Course objectives: They are to identify the following.

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

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

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6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

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.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

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

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**; (Upon completion of the course, student will be able to)			
1.1	*Demonstrate a broad knowledge and understanding of industrial chemistry, petroleum, petrochemicals, polymer, and dyes.* (P)	K (1.1)	***lecture/ discussion Seminars/ presentation***	***Objective question***
1.2	*Describe the uses and applications of petrochemicals, polymers, and dyes in our life.* (P)	K (1.2)	***lecture / discussion /Seminars/Individual presentation***	***Essay question***

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**; (Upon completion of the course, student will be able to)			
2.1	*Demonstrate ability in critical thinking, analyzing reaction mechanisms and classifying industrial compounds*. (P)	S (2.1)	***lecture / discussion / Seminars /Individual presentation***	***Solving Problems & Essay question***
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*. (P)	S (2.2)	***Lab work, group work***	***Objective question, Essay question,*** ***lab report rubric***
2.3	*Examine and follow proper procedures and regulations for safe handling, use, and disposal of chemicals*. (P)	S (2.3)	***lab demonstrations / hands-on student learning activities***	***Safety exam***
3.0	**Values, autonomy, and responsibility**; (Upon completion of the course, student will be able to)			
3.1	*Working as a group leader in cooperation with other colleagues*. (P)	V (3.1)	***lab demonstrations / whole group and small group discussion***	***Practical group work Rubric***

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**
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**
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. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*Homework assignment*	*3-10*	*4%*
2.	*Lecture Quizzes*	*4*	*1%*
3.	*Mid-term exam*	*9-11*	*15%*
4.	*LAB Sheet*	*15*	*5%*
5.	*Quiz in Safety*	*15*	*4%*
6.	*Final practical exam*	*15*	*6%*
7.	*Lab report*	*2-14*	*10%*
8.	*Group work evaluation*	*2-14*	*5%*
9.	*Final Exam*	*16-17*	*50%*
	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	**Industrial Organic Chemicals by Harold A. Wittcoff, Bryan G. Reuben and Jeffery S. Plotkin, 2012 | ISBN: 0470537434**
Supportive References	كتاب الصناعات البترولية والبتروكيماوية ... تأليف أ. د سالم بن سليم الذياب كتاب الصناعات البترولية والبتروكيماوية ... تأليف أ. د سالم بن 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. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• 1 Lecture room(s) for groups of 50 student • 1 Laboratory for a group of 25 student
Technology equipment (projector, smart board, software)	Smart board, Data show, Black board, internet

Items	Resources
Other equipment (depending on the nature of the specialty)	Bunsen burner, reagent bottles, beakers, Buchner funnel, Test tube and many more. Scientific videos

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect
Effectiveness of Students assessment	Instructor & Course coordinator	Classroom evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physical Sciences Department Council
REFERENCE NO.	Psci2415
DATE	28/03/1446 Corresponding to 1 / 10 /2024

H. Attachments

1- Practical Work

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

Week	EXP, titles	Chemicals and tools	Remarks
1	General Safety Rules, Lab Equipment, and Basic Laboratory techniques.	Theoretical	
2	Phenol formaldehyde resin	Glacial acetic acid, 40% formaldehyde solution, Phenol, conc. HCl. Glass rod, beakers, funnel, heater and filter paper, analytical balance, FTIR.	None
3	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	None
4	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.	None
5	Soap	Fat, Oil, Fatty acids, NaOH, $CaCL_2$ and dis. water. Tools: - Round bottom flask, Water bath, electric balance, filtration system	
6	Biodiesel	Oil, Alcohol, NaOH, and NaCl. Tools: Round bottom flask, Water bath, electric balance, filtration system, separating funnel.	
7	DETERMINATION OF PURITY ANILINE SALTS	Aniline hydrochloride, Aniline sulfate, Standard 0.1N HCl, and phenolphthalein. burette, pipette, conical flasks and dropper, analytical balance	None
8	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	None
9	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	None
10	Preparation of Soap	Oil, Fat, Sodium hydroxide, Sodium Chloride, Ethanol. Water-bath, thermometer, magnetic stirrer, filtration system, Round-bottomed flask, analytical balance	None

11	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	None
12	Creams	oils, fats, Borax, Mineral oil, water and waxes. Beakers, Water-bath, magnetic stirrer, Thermometer, Filter papers, analytical balance	None
13 -14	Preparation of glyptal.	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,	None
15	Presentation/Report rubric /Assessment	Theoretical	

- Blue Print

2Course Name		Organic Applied Chemistry
Course Code		438 Chem -3

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2
Marks	10	18	42	20	4	--	6	-----

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (10 M)	Quiz	Objective question	5 5	10	1
			Mid term	Objective question	4 2	2 1	2
			Final Exam	Objective question	7	7	7
	K2	1.2 (18 M)	HW	Essay question	10	10	2
			Mid term	Essay question	3	3	3
			Final Exam	Essay question	4	13	13
Skills	S1	2.1 (42 M)	HW	Essay question	4	2	2
			Mid term	Essay question	4	10	10
			Final Exam	Essay question	6	30	30

	S2	2.2 (20 M)	Practical Sheet	Objective question	10	5	5
			Lab Report	10 experiments	10	10	10
			Final Lab Exam	1 task experiment	1	5	5
	S3	2.3 (4 M)	Safety EXAM	Objective question	8	4	4
Value	V1	3.1 (6 M)	Continuous assessment	Group evaluation rubric	--	6	6
Total		100				100	100 %