



T-104  
2022

## Course Specification



Course Title: **Chemistry of main groups**

Course Code: **221CHEM-4**

Program: **Bachelor in Chemistry**

Department: **Chemistry**

College: **College of Science**

Institution: **Jazan University (J U)**

Version: **T104 2022**

Last Revision Date: **29 December 2022**



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## A. General information about the course:

### Course Identification

1. Credit hours:

2. Course type

a. University ☐ College ☐ Department ☒ Track ☐ Others ☐

b. Required ☒ Elective ☐

3. Level/year at which this course is offered: Level 5  
Year 2

### 1. Course Description

Course Title	Course Number	Contact Hours (CH)		Credit unit (CU)	Year	Level	Pre-requisite
		Lec.	Prac.				
Chemistry of main groups	221CHEM-4	3	2	3	2	5	101CHEM4

**Course Objectives ; They are to identify the following**

- 1- Recognizing the elements and their chemical and physical properties.
- 2- Recognizing the periodic table of the elements.
- 3- Recognizing the properties of elements by knowing the group that belongs to.

**Syllabus: A-Theoretical contents**

- 4- Study effective nuclear charge - formal charge - draw molecular orbital diagram for the molecule - Study of the properties of the elements in the groups and periods of the periodic table – Chemistry of hydrogen – Elements of the first group (Alkali Metals) – Elements of the second group (Alkaline Earth Metals) - Elements of the third group – Elements of the fourth group – Elements of the fifth group – Elements of the sixth group – Elements of the seventh group (Halogens) – Elements of the eighth group (Noble Gases).

**Syllabus: A-Practical contents**

**Selected experiments in qualitative and quantitative analysis.**

5. Pre-requirements for this course (if any): 101CHEM-4

6. Co- requirements for this course (if any): Non

7. Course Main Objective(s)

**The course of chemistry of main groups is designed to give the students basic information about the General properties of S and b-block elements in periodic table.**





## 1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul>		
4.	Distance learning		100

## 2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	33
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	55

## 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 in the properties of Hydrogen, periodic table groups (I, II, III,...etc) elements and their related properties, preparation and uses. (I)	K(1.1)	lecture / discussion Seminars /presentation	Objective question
1.2	Describe the types of hydrides, oxides and carbides. Describe the allotropy phenomena, and the difference in chemical and physical properties of the main groups. (I)	K(1.2)	lecture / discussion / Seminars /Individual presentation	Essay question
2.0	Skills ; (Upon completion of the course, student will be able to)			
2.1	Demonstrate the knowledge and skills required to calculate effective nuclear charge, formal charge, and draw molecular orbital diagram for	S(2.1)	lecture discussion Seminars /	Solving Problems & chart analysis





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	the molecule. (I)		<i>/Individual presentation</i>	
2.2	Carry out scientific experiments as well as accurately record and analyze the results of such experiments. (I)	S(2.2)	<i>Lab work, group work</i>	<i>Objective question, Essay question, lab report rubric</i>
2.3	Examine his material and lab safety background to Follow proper procedures and regulations for safe handling and use of chemicals. (I)	S(2.3)	<i>lab demonstrations / hands-on student learning activities</i>	<i>Safety exam</i>

## C. Course Content

No	List of Topics	Contact Hours
1.	General properties of the elements in periodic table.	4
2.	Types of bonds	5
3.	VSEPR theory and molecular orbital theory	5
4.	Hydrogen, properties, position, isotopes, preparation and uses	2
5.	Group (I): alkali metals, properties, oxides, stability and Extraction.	3
6.	Group (II): Electronic configuration, occurrence, properties and extraction.	2
7.	Group (III), Electronic configuration, occurrence, properties, extraction,	2
8.	Group (IV), Electronic configuration, occurrence, properties, extraction hydrides, halides, oxygen compounds and carbides.	2
9	Group (V), Electronic configuration, occurrence, properties, extraction hydrides, uses, (N,P,....)and oxides.	2
10	Group (VI), Electronic configuration, occurrence, extraction (S, O....) uses of ozone, H <sub>2</sub> O <sub>2</sub> , Halides, Oxides, and uses of Sulphur.	2
11	Group (VII), Halogens, Electronic configuration, occurrence, uses of HF and Halogen oxides.	2
12	Noble gases, electronic structure, properties, occurrence and preparation	2
13	Selected Experiments related to course contents	22
Total		55





## D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	<b>Homework assignment</b>	<b>3-8</b>	<b>1%</b>
2.	<b>Lecture Quizzes</b>	<b>5-7</b>	<b>4 %</b>
3.	<b>Mid-term exam</b>	<b>6-8</b>	<b>15 %</b>
4	<b>LAB Sheet</b>	<b>15</b>	<b>5 %</b>
5	<b>Safety Exam</b>	<b>11</b>	<b>3%</b>
6	<b>Final practical exam</b>	<b>11</b>	<b>12%</b>
7	<b>Lab report</b>	<b>2-10</b>	<b>10 %</b>
8	<b>Final Exam</b>	<b>12-14</b>	<b>50 %</b>
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	Inorganic Chemistry, 5th Edition by Gary L. Miessler, Paul J. Fischer, Donald A. Tarr, (2013)
Supportive References	Concise Inorganic Chemistry, 5th Edition, J.D. Lee, Blackwell Science Ltd (1996)
Electronic Materials	<b><i>Some course contents and materials are posted on Black board sites</i></b>
Other Learning Materials	<ul style="list-style-type: none"> <li>• <a href="https://courses.lumenlearning.com/chemistryfor majors/chapter/introduction-to-electrochemistry/">Molecular Orbital Diagram Maker (sydney.edu.au)</a>  <a href="https://courses.lumenlearning.com/chemistryfor majors/chapter/introduction-to-electrochemistry/">https://courses.lumenlearning.com/chemistryfor majors/chapter/introduction-to-electrochemistry/</a></li> </ul>

### 2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 50 students
Technology equipment (Projector, smart board, software)	Smart board, Data show, Black board, internet
Other equipment (Depending on the nature of the specialty)	none



## 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		

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

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval Data

COUNCIL /COMMITTEE	Chemistry Department Council <b>CHEMS2301</b>
REFERENCE NO.	<b>CHEMS230104</b>
DATE	<b>11/1/2023G – 18/06/1444H</b>



## H. Attachments

### 1- Practical Work

No.	Experiment Title	Required Chemicals	Required Glass Wear & equipment	week
1	Safety	-----	----	1
2	Separation and determination of potassium	1- Potassium chloride salt. 2- Tartaric acid (17% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	2
3	Separation and determination of calcium	1- Calcium Chloride salt. 2- Sodium carbonate $\text{Na}_2\text{CO}_3$ (10% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	3
4	Separation and determination of aluminum	1. Aluminum Chloride salt. 2. Sodium sulphide $\text{Na}_2\text{S}$ (23% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	4
5	Separation and determination of tin	1-Tin Chloride salt. 2- Sodium sulphide $\text{Na}_2\text{S}$ (15% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	5
6	Separation and determination of lead	1- Lead acetate salt. 2- Potassium dichromate $\text{K}_2\text{CrO}_4$ (10% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	6
7	Separation and determination of bismuth	1- Bismuth nitrate salt. 2- Potassium iodide KI (45% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	7
8	Separation and determination of barium	1- Diluted sulphuric acid. 2- Barium chloride $\text{BaCl}_2$ . 3- Hydrochloric acid HCl	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	8
9	Separation and determination of iodine	1- Sodium iodide salt. 2- Lead acetate $(\text{CH}_3\text{COO})_2\text{Pb}$ (33% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	9
10	determination of total hardness of tape water	1-EDTA 2-EBT 3- buffer solution	Conical flask , burette beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	10
13	Final practical exam	----	---	11





## 2- Blue Print

Course Name	Chemistry of main groups
Course Code	221CHEM-4

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	2.2	2.3			
Marks	29	25	16	27	3			

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (29M)	Quiz	Objective question	2	3	3
			Mid term	Objective question	1	5	5
			Final Exam	Objective question	2	21	21
	K2	1.2 (25M)	Quiz	Essay question	2	2	1
			Mid term	Essay question	1	5	6
			Final Exam	Essay question	2	18	18
Skills	S1	2.1 (16M)	H.W	Solving Problems & chart analysis	4	1	1
			Mid term	Solving Problems & chart analysis	2	4	4
			Final Exam	Solving Problems & chart analysis	6	11	11
	S2	2.2 (27M)	Practical Sheet	Objective question	5	5	5
			Lab Report	10 EXP.	10	10	10
			Final Lab Exam	Task	1	12	12
	S3	2.3 (3M)	<b>Safety EXAM</b>	Objective question	8	3	3
TOTAL		100					100

