Course Specification
(Bachelor)

Course Title:	Chemistry of main groups
Course Code:	221CHEM-4
Program:	Bachelor of Science in Chemistry
Department:	Physical Sciences
College:	College of Science
Institution:	Jazan University (J U)
Version:	TP-153 2024
Last Revision Date:	5/5/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4h)

2. Course type

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

3. Level/year at which this course is offered: (Level 4 Year 2)

4. Course general 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*	*4*	*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

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-requisites 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.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	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**	45
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

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

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 the knowledge and skills required to calculate effective nuclear charge, formal charge, and draw molecular orbital diagram for the molecule. (I)	S(2.1)	***lecture / discussion / Seminars /Individual presentation***	Solving Problems & chart analysis
2.2	Carry out scientific experiments as well as accurately record and analyze the results of such experiments. (I)	S(2.2)	***Lab work, group work***	***Objective question, Essay question,*** ***lab report rubric***
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)	***lab demonstrations / hands-on student learning activities***	***Safety exam***

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	5
5.	Group (I): alkali metals, properties, oxides, stability and Extraction.	5
6.	Group (II): Electronic configuration, occurrence, properties and extraction.	3
7.	Group (III), Electronic configuration, occurrence, properties, extraction,	3
8.	Group (IV), Electronic configuration, occurrence, properties, extraction hydrides, halides, oxygen compounds and carbides.	3
9.	Group (V), Electronic configuration, occurrence, properties, extraction hydrides, uses, (N,P,….)and oxides.	3
10.	Group (VI), Electronic configuration, occurrence, extraction (S, O….) uses of ozone, H_2O_2, Halides, Oxides, and uses of Sulphur.	3
11.	Group (VII), Halogens, Electronic configuration, occurrence, uses of HF and Halogen oxides.	3
12.	Noble gases, electronic structure, properties, occurrence and preparation	3
13.	Selected Experiments related to course contents	30
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*Homework assignment*	*3-11*	*1%*
2.	*Lecture Quizzes*	*5-11*	*4 %*
3.	*Mid-term exam*	*9-11*	*15 %*
4.	*LAB Sheet*	*15*	*5 %*
5.	*Safety Exam*	*15*	*3%*
6.	*Final practical exam*	*15*	*12%*
7.	*Lab report*	*15*	*10 %*
8.	*Final Exam*	*16-17*	*50 %*
...			**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	***Some course contents and materials are posted on Black board sites***
Other Learning Materials	• Molecular Orbital Diagram Maker (sydney.edu.au)https://courses.lumenlearning.com/chemistryformajors/chapter/introduction-to-electrochemistry/

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		

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

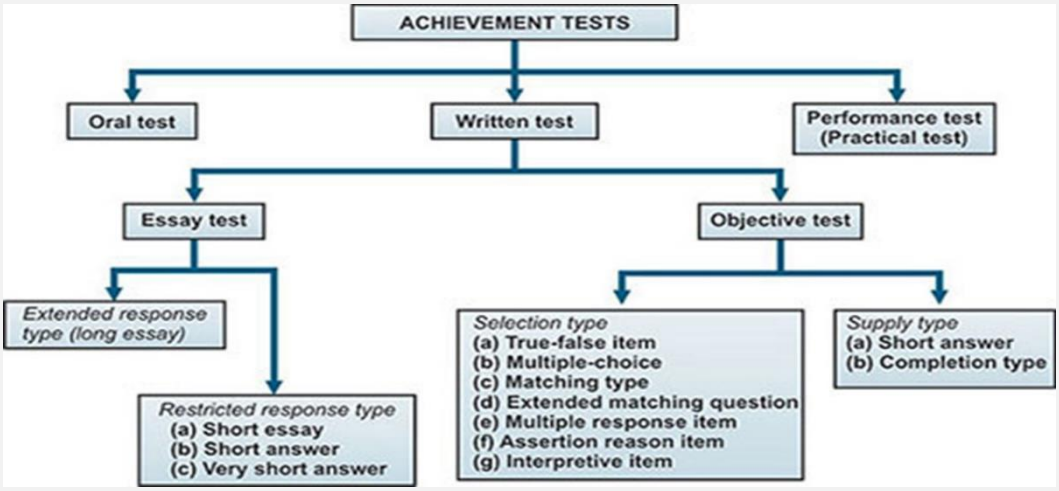
o.	Experiment Title	Required Chemicals	Required Glass Wear& equipment	week
1	Safety	------	----	1
2	Separation and determination of potassium	1- Potassium chloride salt. 2- Tartaric acid (17% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	2
3	Separation and determination of calcium	1- Calcium Chloride salt. 2- Sodium carbonate Na_2CO_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 sulpide Na_2S (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 Na_2S (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 K_2CrO_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 sulphoric acid. 2- Barium chloride $BaCl_2$. 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 $(CH_3COO)_2Pb$ (33% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	9
10	Separation and determination of iodine	1- potassium iodide salt. 2- Lead acetate $(CH_3COO)_2Pb$ (33% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	10
11	Separation and determination of chloride	1- Sodium chloride salt. 2- Lead acetate $(CH_3COO)_2Pb$ (33% solution).	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	11
12	Separation and determination of chloride	1- Sodium chloride salt. 2- Silver nitrate	Conical flask , beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	12
13	determination of total hardness of sea water	1-EDTA 2-EBT 3- buffer solution	Conical flask , burette beakers , tubes , filter papers, holders, heater ,vacuum gas chamber	13
14	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	14
15	Final practical exam	----	---	15

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)	***Safety EXAM***	Objective question	8	3	3
TOTAL		100					100


ACHIEVEMENT TESTS
Oral test
Written test
Performance test (Practical test)
Essay test
Objective test
Extended response type (long essay)
Restricted response type
(a) Short essay
(b) Short answer
(c) Very short answer
Selection type
(a) True-false item
(b) Multiple-choice
(c) Matching type
(d) Extended matching question
(e) Multiple response item
(f) Assertion reason item
(g) Interpretive item
Supply type
(a) Short answer
(b) Completion type