Course Specification

(Postgraduate Programs)

Course Title:	**Chemistry and Technology of Inorganic Materials**
Course Code:	**CHM 6216**
Program:	**Master of science in chemistry**
Department:	**Chemistry**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	*Course Specification Version Number*
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3 (3 Lectures, 0 Lab, 0 Tutorials))					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (Level 1/Year 2)					

4. Course General Description:

The course includes basics of different ores bearing minerals and the chemical composition of such minerals. The course also, includes the several industries purifications and synthesis of the important metals for strategic industries. The applications of these metal industries, are classified in terms of, the raw materials, and advanced process in the steel and ceramic industries. The course will extend the Aluminum, Lead, cement, glasses, copper industries and the chemical reaction for their manufacturing procedure. Metallurgical Processes and Metals is one of the topics that will cover in this course. It provides information on chemical changes associated with transformation of powder cement into a solid. The course includes the introduction to advanced composite materials and its important applications in different branches of live. The practical part of this course consists of a set of experiments that reinforce the quality control principles for the analysis of raw materials such as limestone, calcium oxide and silica.

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

Inorganic Molecular Spectroscopy – CHM 6111

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

None

7. Course Main Objective(s):

- **Recognize various ores and minerals**
- **Be Fimiliar with different extraction methods for different applications.**

- **Enrich the knowledge for the most famous strategic industries such as ceramics, steel glass and building materials in KSA.**
- **Develop awareness advanced inorganic compounds and their applications.**

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)……**	0
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To recall knowledge of Different Ores bearing minerals and their Industrial Applications.**	**K1. *Inorg*.; K2. . *Inorg*.; K4. *Inorg***	• **Five hours/week lectures.** • **Self-study**	• **Regular Exams** • **Assignments**

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			• Home-exam.	• Short Quizzes • Oral Discussion Participation.
1.2	To state The Chemical Compositions of Minerals.	K1. *Inorg.*; K4. *Inorg.*	• Five hours/week lectures. • Think and justify The Chemical Compositions of Minerals, using available references (SDL) online. • Open discussion.	• Oral Discussion marks • Literatures Survey • Mini-seminar. Participation.
1.3	To describe the processes for minerals extraction for inorganic applications.	K1. *Inorg.*; K3. *Inorg.*; K4. *Inorg.*	• Five hours/week lectures. • Group Discussion using available references (SDL) online.	• Midterm. • Assignments. • Group Discussions. • Literatures Survey • Mini-seminar. • Participation.
1.4	To recognize the applications of the advanced composite materials.	K3. *Inorg.*; K4. *Inorg*	• Five hours/week lectures. • Group Discussion on Applications of the Advanced Composite Materials	• Assignments • Open Discussions. • Literatures Survey • Mini-seminar.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			using available references (SDL) online.	Participation.
2.0	**Skills**			
2.1	To explain the processes for minerals extraction for inorganic Applications.	S1. *Inorg.*; S2. *Inorg*.	• Lectures activity. • Self-study. • Think, differentiate and discuss on metals and ligands inside biological system.	• Questions in Lectures. • Short Quizzes and Exams. • Open Discussions. • Participation • Mini-seminar.
2.2	To summarize strategic industries of the minerals.	S1. *Inorg.*; S2. *Inorg.*; S4. *Inorg*.	• Practice some examples of Minerals Extraction for Inorganic Applications achieving. • Brainstorming. • Self-study	• Questions in Lectures. • Participation • Oral Discussion • Short Quizzes.
2.3	To show the advanced composite materials applications.	S1. *Inorg.*; S2. *Inorg.*; S3. *Inorg*.	• Lectures • Oral Discussions. • Brainstorming. • Self-study	• Questions in Lectures. • Short Quizzes and Exams. • Oral Discussion. • Participation

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.4	To operate communication of the importance and applications of Advanced Inorganic Composites in KSA, accompanying writing of mini-Reports, operating electronic mail, and Network in communicating with others.	S1. *Inorg.*; S3. *Inorg.*; S4. *Inorg*.	• Group Discussion and Assignments • Introduce several examples of advanced Inorganic Composites and applications of KSA which will require reading, writing, and oral presentation in groups. • Encourage students to use electronic mail to submit Home Exams and Assignments	• Oral Discussion. • Quizzes, and Exams. • Giving marks for Oral Discussion in Lectures. • Marks given for Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	To perform a scientific presentation, research, and work independently and integrate with a collaborated group, Using IT to acquire, analyze, and communicate information.	V1. *Inorg*.	• Brainstorming. • Exercises • Group Discussion. • Team work.	• Oral Discussion. • Group Discussion • Assignments.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.2	To demonstrate his ability to the effectively collaboration and inter-professionalism in class discussions or team works, as well as independently.	V1. *Inorg.*; V2. *Inorg.*	• Small Group tasks • Open discussion at classroom. • Office hour guiding. • Group Presentation of mini-projects	• Participation • Homework's • Mini-project(s).
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C. Course Content:

No	List of Topics	Contact Hours
1.	*he Different Ores bearing minerals and their Industerial Applications*: Iron Ores for steel production- Copper Ores - lead Oress- Glasses Ores- Aluminum Ores – Chromium Ores.	8
2.	*The Chemical Compositions of Minerals:* Chemical Compositions of Iron and Its Compounds-Chemical Composition of Copper- Chemical Composition of Lead-Chemical Composition of Aluminum and its Oxides- Chemical Composition of Different Glasses – Chemical Composition of Chromium and its compounds	7
3.	*Proceses for Minerals Extraction for Inorganic Applications:* Blast furnace for Iron and different Alloys production- Melting and Bessmerization for copper production – Electrolysis, Baeyer's process, Serpeck's process for Alumium production – Reduction Processes for Chrom production- Air Reduction and Carbon Reduction process for Lead Production.	8
4.	*Stratigic Industries of the Minerals:* Ceramics Industries- Building Materials – Steel Industries- Glas Industries.	8
5.	*Manufacture of the Advanced Inorganic Composites*: Introduction to the Composite Materials – Examples of the Composites like Carbon nanotubes and Aluminium Oxide.	8
6.	*Applications of the Advanced Composite Materials:* Midicen-Water treatment – Environments- Aircraft- Automobiles- Nuclear sector.	6
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class Activities (Open Discussion, Mini-reports, Oral Presentation, solving questions)	weekly	30 %
2.	Midterm Exam	9th week	30 %
3.	Final Exam	Around 17th week	40 %
4.	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	*Iindustrial Inorganic Chemistry*, K. H. Buchel, Moretto, Hans-Heinrich; Werner, D., 2nd Ed., Completely Revised Edition, (2008). ISBN: 978-3-527-61333-5. *COMPOSITES ANDTHEIR APPLICATIONS,* Ning Hu., First published August, 2012-Printed in Croatia ISBN 978-953-51-0706-4
Supportive References	None
Electronic Materials	• *Special Inorganic Cements,* Odler, I. March 23, 2000 by CRC Press,American Chemical Society (Relevant Journals) • Saudi Digital Library
Other Learning Materials	• Blackboard • Multimedia associated with the textbook and the relevant websites.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.**
Technology equipment (Projector, smart board, software)	**The rooms are equipped with data show, Smart Board, Wi-Fi access.**
Other equipment (Depending on the nature of the specialty)	**None**

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct: Questionnaire.
	Course Responsible	Direct: Course e-Portfolio. Indirect: Second examiner checklist- Course report.
	Peer Reviewer	Direct: Questionnaire. Indirect: External assessor report.
Effectiveness of students' assessment	Program Leaders	Direct: Course e-Portfolio. Indirect: Course report.
Quality of learning resources	Students	Direct: course Entrance/Exit. Indirect: Observations - Accreditation review.
	Faculty (Academic Advisory- GCC)	Direct: Course e-Portfolio.
	Program Leaders	Indirect: Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Course Responsible	Course Responsible Direct: Exams - Course e-Portfolio. Indirect: Second examiner checklist- Course report.Program Leaders
	Program Leaders	Indirect: Exams
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	COUNCIL OF CHEMISTRY DEPARTMENT
REFERENCE NO.	10 (NO. 2/10)
DATE	21/04/1444- 15/11/2022