Course Specification
(Bachelor)

Course Title:	Cement and refractory chemistry
Course Code:	
Program:	Industrial Chemistry
Department:	Department of Chemistry
College:	College of Science
Institution:	Majmaah 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: (2)					
2. Course type					
A.	☒ University	☐ College	☒ Department	☐Track	☐Others
B.	☐ Required		☐Elective		
3. Level/year at which this course is offered: (8th Level/4th year)					
4. Course General Description:					
Introduction to the cement industry and its importance, Portland cement: manufacturing methods - the raw materials used, Chemical transformations and energy requirements - wet and dry manufacturing methods, Compounds entering in the cement industry, Precipitation and purification of cement – special types of cement and their uses, Lime: raw materials - energy changes and chemical transformations - manufacturing outputs, Gypsum and other calcium compounds, Cement Oxy magnesium chloride – other magnesium compounds used in construction and chemical processing, Effort and tensile curves for cement and gypsum, Refractories industry and their different types, refractories have resistance to heat and acids, Modern building materials					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The goal of this course is to familiarize students with: a. Cement industry and its importance. b. Cement manufacturing methods, raw materials used, purification of cement, special types of cement and their uses. c. Modern building materials					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	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**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

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	**Know manufacturing methods of Portland cement and the raw materials used in these processes.**		**• Lectures** **• Scientific discussion** **• Use the library to work duties and a small research on cement industry and**	**- Midterms** **- Quizzes** **- Homework** **- Class participation** **- Encourage students to search the Internet for everything related to**
1.2	**Write on the cement industry and its importance.**			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			modern building materials. • Use of the Internet to carry out some reports on course subjects.	- Homework on the blackboard - Final exam - E-exam. Final Practical exam
1.3	Recall the chemical transformations and energy requirements.			
1.4	Describe the special types of cement and their uses.			
1.5	List the compounds entering in the cement industry			
2.0	**Skills**			
2.1	Compare between wet and dry manufacturing methods.		• Lectures • Scientific discussion • Library visits • Web-based study	• Periodic tests and assignments. • Measuring the response to the assignments.
2.2	Estimate the refractories have resistance to heat and acids.			
2.3	Summarize the modern building materials			
2.4	Analyze effort and tensile curves for cement and gypsum.			
3.0	**Values, autonomy, and responsibility**			
3.1	Develop the student's ability in self reliance and responsibility.		• Dividing students into groups to carry out collective	• Evaluate the results of collective works

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.2	Choose the compounds used in construction and their chemical treatment.		scientific reports. • Periodic individual duties to develop the skill of taking responsibility and self-reliance	and duties as well as knowing the contribution of each individual through dialogue and discussion. • Assessment of individual tasks and duties to determine the student's ability to self-reliance.
3.3	Operate in team work and accept his college's opinions.			

C. Course Content

No	List of Topics	Contact Hours
1.	• Introduction to the cement industry and its importance. • Portland cement: manufacturing methods - the raw materials used.	2
2.	Chemical transformations and energy requirements - wet and dry manufacturing methods.	2
3.	Compounds entering in the cement industry.	2
4.	Precipitation and purification of cement – special types of cement and their uses.	4
5.	Lime: raw materials - energy changes and chemical transformations - manufacturing outputs.	4
6.	Gypsum and other calcium compounds.	2
7.	Cement Oxy magnesium chloride – other magnesium compounds used in construction and chemical processing.	2
8.	Effort and tensile curves for cement and gypsum.	2
9.	Refractories industry and their different types, refractories have resistance to heat and acids.	4
10.	Modern building materials.	4
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	Continues	5%
2.	Quizzes	End of topic	5%
3.	Presentation	One/semester	10%
4.	First midterm exam	6th	15%
5.	Second midterm exam	9th	15%
6.	E. exam	12th	10%
7.	Final written Exam	End of the semester	40%

*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	- Cement Chemistry, I. Richardson, H. F. W. Taylor, ICE Publishing, 3rd edition, 2015. - Lea's Chemistry of Cement and Concrete, P. Hewlett, Butterworth-Heinemann, 4th edition, 2004.
Supportive References	Chemistry For The Engineering and Applied Sciences, W. Steedmann, R. B. Snadden, I. H. Anderson, Pergamon Press, Oxford, 2nd edition, 1986.
Electronic Materials	http://www.sciencedirect.com/
Other Learning Materials	PowerPoint presentation. Interactive and multimedia soft-books

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, E- learning, blackboard
Technology equipment (projector, smart board, software)	Data show, Smart Board

Items	Resources
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Faculty**	**Direct**
Effectiveness of Students assessment	**Faculty**	**Program/Department Instructor**
Quality of learning resources	**Faculty**	**Program/Department Instructor**
The extent to which CLOs have been achieved	**Peer review**	**Peer review**
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	