



Course Specifications

Course Title:	Environmental Analysis
Course Code:	341CHEM-2
Program:	Bachelor of Science in Chemistry
Department:	Chemistry
College:	Science
Institution:	King Khalid University

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A. Course Identification

1. Credit hours: 2 (1+1)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 5/Year 3
4. Pre-requisites for this course (if any): 242CHEM
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	1	50%
2	Blended	0	0
3	E-learning	0	0
4	Correspondence	0	0
5	Other	1	50%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	15
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	30
	Total	45
Other Learning Hours*		
1	Study	15
2	Assignments	15
3	Library	0
4	Projects/Research Essays/Theses	0
5	Others(specify)	0
	Total	30

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>1- This course focuses on various environmental problems; these are used to develop better understanding about the pollution problems.</p> <p>2- Air, water, and soil contamination are broad topics to be investigated in depth.</p>
<p>2. Course Main Objectives</p> <p>1- Environmental studies for atmosphere, water and soil. Moreover, to know more about</p>

environmental pollutants and how to overcome them.

- 2- To know some instrumental analysis used for pollutants.
- 3- To develop fundamental understanding about environmental problems such as climate change, waste treatment, noise pollution and radioactive pollutants.
- 4- To apply scientific approaches on how to solve the above mentioned environmental problems.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Student shall be able to define pollution problems	K1, K3
1.2	Students will be able to describe some analysis for environmental samples	K1
1.3	Students will be able to name and recall various pollution problems	K1
1.4	Students will have deep understanding of environmental problems and potential answers for them	K1, K3
1.5	Students should have basic knowledge in applying the scientific method to solve pollution problems	K1
2	Skills :	
2.1	Ability to demonstrate knowledge and understanding of essential concepts of environmental analysis	S1, S3
2.2	Ability to apply the gained knowledge to solve environmental problem	S1, S3
2.3	Ability to recognize various environmental problems	S1
2.4	Skills in the evaluation and interpretation laboratory results from environmental point view	S1
3	Competence:	
3.1	To present an oral explanation for a subject in the area.	C1, C3
3.2	To interact positively with colleagues in a group work.	C1, C2
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	C4, C5
3.4	To summarize the literature and sources for an area in the course.	C2, C3

C. Course Content

No	List of Topics	Contact Hours
	Theoretical lectures:	
1	Introduction to the components of the atmosphere and chemical reactions in the different layers of the atmosphere	1
2	Basic air pollutants and acid rain	1
3	The problem of ozone, climate change and how to manage air pollutants	1
4	Chemistry of water and the water cycle - water pollutants - drinking water treatment - how to protect the rivers and lakes	2
5	Water Treatment	2
6	Sewage Water Treatment	1
7	Protection of water resources from pollution	1

8	Solid and liquid wastes	2
9	The effects of liquid and solid wastes on the environment	1
10	Radioactive Pollutants	1
11	Noise Pollution & Pesticides Pollution	1
12	Simulated field trip to a nearby farm for collecting soil, plant, and water samples	1
Total		15
Practical sessions:		
1	Introduction to laboratory health and safety procedures and tools names <i>(laboratory book should be used in this course)</i>	2
2	The collection and preparation of soil samples	2
3	Determination of soil physico-chemical parameters such as pH, conductivity and organic contents.	4
4	Determination of silica content in soil	2
5	Collection of plant's leaves samples & determination of aluminium and iron in previous soil samples	4
6	Preparation of the plants' leaves samples (dry, grind, acid digestion)	2
7	Determination of sodium and potassium in previous plants samples by using Flame photometry	2
8	pH determination for water and total alkalinity of the water	2
9	Determination of total dissolved solids in water (TDS)	2
10	Determination of dissolved oxygen in water	2
11	Determination of total water hardness	2
12	Determination of chloride in water	2
13	Determination of particulate matter in ambient air	2
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.1	Student shall be able to define pollution problems	- Lectures - Interactive teaching sessions	- Periodic exams - Oral questions - Assignments - Final exam
1.2	Students will be able to describe some analysis for environmental samples	- Lectures - Interactive teaching sessions	- Periodic exams - Oral questions - Assignments - Final exam
1.3	Students will be able to name and recall	- Lectures	- Periodic exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	various pollution problems	- Interactive teaching sessions	- Oral questions - Assignments - Final exam
1.4	Students will have deep understanding of environmental problems and potential answers for them	- Lectures - Interactive teaching sessions	- Periodic exams - Oral questions - Assignments - Final exam
1.5	Students should have basic knowledge in applying the scientific method to solve pollution problems	- Lectures - Interactive teaching sessions	- Periodic exams - Oral questions - Assignments - Final exam
2.0	Skills		
2.1	Ability to demonstrate knowledge and understanding of essential concepts of environmental analysis	- Lectures - Interactive teaching sessions - Practical sessions	- Periodic and practical periodic exams - Oral questions - Assignments
2.2	Ability to apply the gained knowledge to solve environmental problem	- Lectures - Interactive teaching sessions - Practical sessions	- Final and final practical exam - Periodic and practical periodic exams
2.3	Ability to recognize various environmental problems	- Lectures - Interactive teaching sessions - Practical sessions	- Oral questions - Assignments - Final and final practical exam
2.4	Skills in the evaluation and interpretation laboratory results from environmental point view	- Lectures - Interactive teaching sessions - Practical sessions	- Periodic and practical periodic exams - Oral questions - Assignments - Final and final practical exam - Periodic and practical periodic exams - Oral questions - Assignments - Final and final practical exam
3.0	Competence		
3.1	To present an oral explanation for a subject in the area.	opened essays on selected topics	Class activities
3.2	To interact positively with colleagues in a group work.	Interactive teaching sessions	Oral presentation on a group report
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	Interactive teaching sessions	Discussion within a group
3.4	To summarize the literature and sources for an area in the course.	Guided reading of books and articles	Written Reports and summaries

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First periodic exam	3	10%
2	Second periodic exam	5	10%
3	Assignments/Homeworks	5	5%
4	Practical exam 1	4	12.5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
5	Practical exam 2	7	12.5%
6	Final exam	17	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Total 10 hrs. of office hours for individual student consultations and academic advice per week.

Electronic Learning (Blackboard).

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1- R. Roger; Introduction to Environmental Analysis: Analytical Techniques in the Sciences; 2010 2- Practical Environmental Analysis, M. Radojević and V.N. Bashkin, 2006, RSC Publishing
Essential References Materials	1- D. A. Skoog; D.m. West; S.R. Crouch; F.J. Holler; Fundamentals of Analytical chemistry; 9 th , 2014 Quantitative Chemical Analysis by Harris, D.C. 5th Edition W.H. Freeman and Company: New York.. Introduction to Environmental Analysis” Roger N. Reeve (2002) “Environmental Chemistry” S.E. Manahan 5th Ed. (1991) “Chemistry and our Changing World” A. Sherman and S.J. Sherman (1992) 6- “Experiments in Environmental Chemistry” L.T. Pryde (1973) Modern Analytical Chemistry by David Harvey 1st ed, 2000; ISBN 0-07-237547-7; McGraw-Hill.
Electronic Materials	1- Sciencedirect.com 2- Saudi Digital Library (SDL): http://www.sdl.edu.sa
Other Learning Materials	1- Journal of Environmental Quality 2- Environmental Science & Technology 3- The International Journal of Environmental Analytical Chemistry

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room and LAB
Technology Resources (AV, data show, Smart Board, software, etc.)	One computer, one data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course delivery (teaching methods and assessment methods)	Student	Questionnaire
	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
	Program Leader	Meeting
Course contents (update)	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
Quality of learning resources	External reviewers	Reports

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

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

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department counsel
Reference No.	1/22/142
Date	15-9-1442