Course Specification
(Bachelor)

Course Title:	Water treatment
Course Code:	CEM 405
Program:	Chemistry
Department:	Chemistry
College:	College of Sciences Al Zulfi
Institution:	Majmaah university
Version:	TP-153
Last Revision Date:	14 December 2024

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/4 year)					
4. Course General Description:					
This course presents an overview of the need for analysis of water, how analytical methods are developed and quality control is applied and how the results of analysis are used. It will describe the physical, chemical and other relevant properties of water components and will also cover sampling, cleanup, extraction and derivatization procedures. Older techniques that are still in use will be compared to recently developed techniques and participants will be directed to future trends. A similar strategy will be followed for discussion of detection methods. In addition, the applications of analysis of water types (potable water, tap water, wastewater, seawater)					
5. Pre-requirements for this course (if any)**:**					
CEM 353					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					

- **Know different water sources and its ability to renew**
- **Familiar with quality control and environmental pollutions and effect of the pollutants on human health**
- **Treatment of waste water using different methods and tests of significance**
- **Collection of different types of water samples**
- **Knowing different water parameters and constituents**

2. Teaching mode (mark all that apply)

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

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 different water sources and its ability to renew**	**K.1**	**-Lectures. –Discussions - Brainstorming**	**-Midterms exam - Quizzes - Homework - Final exam -Electronic exam -Class exercises**
1.3	**Identify quality control and environmental pollutions and effect of the pollutants on human health**	**K.3**		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.2	Describe analytical chemistry in manufactures and found way for purification and corrosion control	S.2	-Lectures -Active learning - E-learning -Self-learning -Cooperative Education -Examinations	- Final exam - Midterm exam - Short tests -Quizzes. - Homework - Class exercises - Evaluation of research
2.4	Select proper water samples from different sources and performing different methods of analysis	S.4		
3.0	**Values, autonomy, and responsibility**			
3.1	Apply standards of integrity, transparency and ethical behavior in various academic and professional fields	V.1	- Working in groups - Cooperative work	- Research papers

C. Course Content

No	List of Topics	Contact Hours
1.	Requirement of water and sources , Water quality standards	3
2.	Physico chemical parameters and significance-odor temperature turbidity, density, solids, hardness, acidity and alkalinity .Dissolved oxygen-organic chemicals, solid substances and secondary drinking water standards	6
3.	Determination of pH, CO2, alkalinity (carbonate, bicarbonate) ,Determination of hydroxide, chloride, fluoride, sulphate, and H_2S	6
4.	Determination of calcium, magnesium, sodium, potassium, iron (total ferrous and ferric), ammonia, nitrite and nitrate Determination of phosphorous (total inorganic and organic), phenols, surfactants and pesticides	3

5-	Analysis of biological parameter	3
6-	Aim of water treatment	3
7-	brief idea of sedimentation, coagulation and flocculation Water purification processes, corrosion and its control	3
8.	Removal of toxic compounds, refractory organics, dissolved inorganic substances and different methods for water treatment	3
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	1st Mid-term exam	7th	15%
2.	2nd Mid-term exam	12th	15%
3.	Homeworks and Quizzes	Continuous	10%
4.	Presentation	One/semester	10%
5.	Electronic exam	15th	10%
7.	Final Theoretical exam	End of term	40%
	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	Handbook of Water Analysis, F. Rouessac and A. Rouessac, 2013
Supportive References	Industrial water pollution control, W. Wesley Eckenfelder, Jr, 2000
Electronic Materials	http://www.chemistry.ohio-state.edu
Other Learning Materials	Bb, power point

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Class rooms are available with smart boards and internet
Technology equipment (projector, smart board, software)	Computers and internet are available for online study and video tutorials.

Items	Resources
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Course Evaluation Survey Quality of Exam Survey
Effectiveness of Students assessment	Faculty	CLO Mapping with teaching & assessment. Course Blueprinting Grade Analysis Psychometric Analysis
Quality of learning resources	Peers	Grade Verification
The extent to which CLOs have been achieved	Faculty member / Quality assurance committee	Direct assessment outcome analysis Course report preparation
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**CHEMISTRY**
REFERENCE NO.	**17**
DATE	**15/12/2024**