هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Water Treatment and Analysis
Course Code:	ICHM465-2
Program:	Bachelor of Science in Industrial Chemistry
Department:	Department of Physical Sciences
College:	College of Science
Institution:	Jazan University
Version:	TP-153 (2024)
Last Revision Date:	14 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2hr)

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:

Course title	Course code	Contact Hours			Credit Hours	Year	Level	Pre-requisite	Co-requisite
		Lec	Tut	Lab					
Water Treatment and Analysis	ICHM465-2	1	-	2	2	4th	8th	CHEM311-4	-

This course aims to provide students with the basic principles, concepts, terminologies, and practical skills of the analytical methods used in water analysis. The course covers the theoretical and practical basics of chemical, physical, and biological processes used in water treatment.

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

CHEM311-4

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

None

7. Course Main Objective(s):

1. Recognizing the water chemistry, water pollution, and water sampling
2. Recognizing the fundamentals and concepts of the analytical methods used in water analysis.
3. Applying the analytical skills for using different analytical methods in water analysis.
4. Recognizing the fundamentals, concepts, and terminologies of water treatment techniques.
5. Applying some of the water treatment techniques for the treatment of contaminated water.
6. Providing the student with the basic skills to interpret the obtained results.

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**	$1 \times 15 = 15$
2.	**Laboratory/Studio**	$2 \times 15 = 30$
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

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, students are able to:*			
1.1	***Demonstrate a comprehensive understanding of principles, concepts, and terminology of*** **water chemistry, water pollution, and analytical methods used in water analysis and water treatment methods (M)**	***K1***	***lecture/discussion/Seminars/presentation***	***oral and written examinations/ laboratory reports***
1.2	***Describe and explain correctly the chemical phenomena of water chemistry, water pollution, and practical procedures of sampling and analysis.*** **(M)**	***K2***	***lecture/discussion/Seminars/presentation***	***oral and written examinations/ laboratory reports***

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills;** *Upon completion of the course, students are able to:*			
2.1	***Identify and solve problems using appropriate principles, methodologies, and tools, related to water chemistry, water pollution, and practical procedures of sampling and analysis* (M)**	***S1***	***lecture/discussion/Seminars/presentation***	***oral and written examinations/ laboratory reports***
2.2	***Carry out chemical experiments, analyze data and report results related to water analysis and water treatment methods correctly* (M)**	***S2***	***Lab work, group work***	***Lab report/ Lab notebook.***
2.3	***Use a variety of analytical techniques for water analysis* (M)**	***S3***	***Lab demonstrations / hands-on student learning activities***	***Safety exam***
2.4	***Apply the proper procedures and regulations for the safe handling, use, and disposal of chemicals during the analysis of water samples experiments (M)***	***S4***	***Presentation/reports***	***Oral presentation /reports***
2.5	***Clearly communicate the results of scientific work in the field of water analysis and treatment* (M)**	***S5***	***lecture/discussion/Seminars/presentation***	***oral and written examinations/ laboratory reports***
3.0	**Values, autonomy, and responsibility;** *Upon completion of the course, students are able to:*			
3.1	***Working as a group leader in cooperation with other colleagues. (M)***	***V1***	***lab demonstrations / whole***	***group project reports / Practical***

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			group and small group discussions	*assignments and laboratory reports*
3.2	*Recognize the chemist's professional and ethical responsibilities*	*V2*	*Research project/presentation*	*ethic rubric*

C. Course Content

1- Theoretical Part

No	List of Topics	Contact Hours
1.	Introduction to the water chemistry, Sources of water and parameters of water quality	1
2.	Water pollution - types of water pollutants	1
3.	Water sampling - traditional and instrumental analytical methods used in water analysis	6
4.	Natural water analysis (turbidity, pH, acidity, alkalinity, total solids, water hardness, dissolved oxygen, organic substances, oxygen demand, and trace pollutants)	2
5.	Water treatment and water treatment techniques (coagulation, flocculation, ultrafiltration, sedimentation)	2
6.	Water treatment and water treatment techniques (Softening methods, filtration, disinfection, adsorption, ion exchange,	2
7.	Water treatment and water treatment techniques (ultraviolet light water treatment, photocatalytic disinfection, and nanotechnology for water treatment)	1
Total		$1 \times 15 = 15$

2- Lab work

Practical experiments to determine and remove some pollutants from synthetic and real-contaminated water samples.

Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*Periodic Exams*	*6-8*	*15%*
2.	*Assignments & Classroom activities*	*During semester*	*5%*
3.	*Lab work*	*During semester*	*30%*
4.	*Final Exam*	*16-17*	*50%*
	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	**1. MWH's water treatment: principles and design, Crittenden, J. C. Trussell, R. R., Hand, D. W., Howe, K. J., & Tchobanoglous, G., 2(John Wiley & Sons.** **2. Handbook of environmental analysis: chemical pollutants in air, water, soil, and solid wastes, P. Patnaik, 1997, Lewis Publishers**
Supportive References	**1. Environmental sampling and analysis: lab manual, Maria Csuros, 1997, CRC Press.**
Electronic Materials	**https://www.cdc.gov/healthywater/drinking/public/water_treatment.html**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	*1. Lecture Hall for 30 students equipped with modern teaching technology (projector, smart board, computer and internet)* *2. Laboratory in accordance with the rules of safety and personal protection accessories should be available to all students*
Technology equipment (projector, smart board, software)	*- Laptop computer, smart board and internet access in the classroom and laboratory*
Other equipment (depending on the nature of the specialty)	*Chemicals and standards used in lab experiments - Related analytical equipment and*

Items	Resources
	instruments such as atomic absorption,uv-vis spectrophotometer, spectrofluorometer, GC, HPLC, UV lamp for TLC, separation columns and accessories, pH meter, analytical balance, …etc

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	Class room 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.	Meeting (3)
DATE	12/03/2024 -02/09/1445