

Course E-Syllabus

1	Course title	Environmental Geochemistry
2	Course number	0365481
3	Credit hours	3 hrs. (Theory)
	Contact hours (theory, practical)	3 hrs. (Theory / week)
4	Prerequisites/corequisites	
5	Program title	B. Sc. In Geology
6	Program code	0305 4
7	Awarding institution	The University of Jordan
8	School	Science
9	Department	Geology
10	Level of course	4 th year B.Sc.
11	Year of study and semester (s)	
12	Final Qualification	B. Sc. In Geology
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Teaching methodology	☐ Blended ☐ Online
16	Electronic platform(s)	☐ Moodle ☐ Microsoft Teams ☐ Skype ☐ Zoom ☐ Others.....
17	Date of production/revision	08-10-2023

18 Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Office number: **Geo 307**

Phone number (Office): 009626 5355000 ext. 22254

Cell: :00962796906169

Office Hrs.: Every day 12.15-1:30 PM

Email: mkuisi@ju.edu.jo

19 Other instructors:

Name:

Office number:

Phone number:

Email:

Name:

Office number:

Phone number:

Email:

20 Course Description:

As stated in the approved study plan.

Welcome to Introduction to Environmental Geochemistry!

Environmental geochemistry is the application of chemical and hydrochemical principles to predicting the fate of organic and inorganic pollutants at the earth's surface and in the atmosphere. The purpose of this course is to provide a practical background in basic geochemical principles that can be applied to environmental problems. The course will make use of computer programs to solve geochemical problems. Some simple chemical analyses will be done to illustrate important environmental chemical reactions, e.g., pH, Eh, dissolved O₂, alkalinity, hardness, nutrient concentrations

Software packages includes: **PhreeqC, Aquachem, Minteq and Rockworks**

The understanding of pollutants' behavior in various environmental compartments, remediation of contaminated sites and evolution of ecosystems in the Earth's history are just a few examples of the topics

21 Course aims and outcomes:

A- Aims:

By the end of the course you will be able to:

- Interpret water chemistry in terms of water quality
- Recognize all water parameters include field and laboratory parameters
- Plot and interpret chemical parameters on different hydrogeochemical software packages to visualize them
- Describe the basic processes occurring along the groundwater flowing in the different aquifer types
- Having a knowledge of Water quality standards (Jordanian, WHO standards) for different uses
- Properties of potential contaminants: Organic anthropogenic compounds; Inorganic pollutants
- Selected geochemical processes: Thermodynamics and equilibrium; Weathering Adsorption
- Partitioning: Sorption, retention and release of contaminants Partitioning in the aqueous phase Volatile compounds
- Chemical transformations: hydrolysis and other reactions involving other nucleophilic species
- Redox reactions
- Groundwater contamination: case study
- Remediation technologies for contaminated groundwater
- Solid waste disposal and its environmental problems
- Climate change and global warming

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

1. Understanding the water quality parameters and how to interpretate any laboratory results by using the proper software package
2. Understanding of the natural geochemical cycles of elements at the surface of the Earth, as well as the effects of human activities upon these cycles.
3. Understanding of the processes involved in the distribution and transport of chemical substances between the atmospheric, continental and marine environments.
4. Ability to reflect on the interactions among chemical, geological, physical and biological environmental processes.
5. Ability to interpret environmental geochemical data sets

SLOs SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)	SLO (9)
1	X	X							
2	X	X							
3	X	X					X	X	X
4	X	X					X	X	X
5	X	X					X	X	X

22. Topic Outline and Schedule:

Week	Lecture	Topic	Evaluation Methods**	References	
1, 2	1.1	Introduction to Environmental Geochemistry	Assignment 1	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	1.2	Chemistry of Groundwater Water Quality: Physical, Chemical, Microbiological and Radiological			
	1.3				
	1.4				
	1.5				
3	2.1	Sampling Methods for Site Characterization	Assignment 2	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	2.2				
	2.3				Characteristics of water
	2.4				
	2.5				
4	3.1	Water Classification and Treatment Systems	Assignment 3	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	3.2				
	3.3				Software packages includes: PhreeqC, Aquachem, Minteq and Rockworks
	3.4				
	3.5				
5,6	4.1	First Exam	30 Grades		
	4.2	Urban Geochemical Mapping GIS aided techniques for urban geochemical data presentation	Assignment 4	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	4.3				
	4.4				
	4.5				
7,8	5.1	Atmospheric Chemistry and Pollution Climate Change and Global Warming		Assignment 4	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery
	5.2				
	5.3				
	5.4				
	5.5				
9,10	6.1	Solid waste disposal and waste managements Hazard waste and Hazardous Material	Assignment 4	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	6.2				
	6.3				
	6.4				
	6.5	Second Exam	10 Grades		
11, 12	7.1	Carbon Chemistry	Quiz 1	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	7.2				
	7.3				
	7.4	The Marine Environment			
	7.5				
13,14	8.1	Environmental Mineralogy	Quiz 2	Environmental Geochemistry Text book 2 nd Edition Video Ch1 and 2 PDF file Summery	
	8.2				
	8.3				
	8.4				
	8.5	Final Exam	50 Grades		

- Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
- Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz...etc

23 Evaluation Methods:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Quizzes and Assignment	10	Different Chapters	Every Week	In Person /Campus
First Exam	30	Different Chapters	After 6 weeks	In Person /Campus
Second Exam	10	Different Chapters	After 10 weeks	In Person /Campus
Final Exam	50	All Chapters	After 16 Weeks	In Person /Campus

24 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc):

Internet connection, PC or Laptop, Account on Microsoft

25 Course Policies:

- Attendance Policy: attendance is mandatory. Class non-attendance usually results in poor grades.
- All students are expected to follow the policies of the Student Code of Ethics as outlined in the Student Handbook.
- During class lectures, please make sure that all cell phones and pagers are silenced or are in vibrate mode. If you need to answer an urgent call (except during an exam), please leave the class to speak on the phone.
- Please make sure to arrive at class on time, as entering late is a distraction to the students and instructor. Students arriving after an exam has already been passed out (without legitimate excuse) will lose 10 points on that exam, and will have less amount of time to finish the exam compared with the rest of the class.
- Cheating may, at my discretion, result in an **F** for the course.

Grading will not necessarily be “on a curve.” There is no expectation of what the average grade should be, nor what the grade distribution should look like. If everyone were to demonstrate outstanding understanding of all the material, then everyone deserves a grade of A (and I would be very happy to give each one of them)! I therefore encourage you to discuss the course material with each other to get the most out of the class.

Note: the points and percentages given are approximations and may vary slightly

Letter	Percentage
A	90-100
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	65-69
C	60-64
C-	55-59
D+	50-54
D	45-49
D-	40-44
F	0-39

26 References:

A- Required book(s), assigned reading and audio-visuals:

DeVivo, B, Belkin H. and Lima A. (2019) Environmental Geochemistry, 2nd Edition. Site Characterization, Data Analysis and Case Histories

Eby, G. N. (2004) Principles of Environmental Geochemistry. Brooks/Cole, 514 p.

B- Recommended books, materials and media:

Manahan S (2018) Environmental Chemistry", 10th Ed

27 Additional information:

Name of Course Coordinator: Prof. Dr. Mustafa Al Kuisi Signature:  Date: 10-11-2023

Head of Curriculum Committee/Department: Prof. Dr. Mustafa Al Kuisi Signature: -----

Head of Department: Prof. Dr. Mustafa Al Kuisi Signature: -----

Head of Curriculum Committee/Faculty: ----- Signature: -----

Dean: ----- Signature: -----