مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

Course Syllabus

1	**Course title**	Isotope Geochemistry
2	**Course number**	0345752
3	**Credit hours**	3
	Contact hours (theory, practical)	3, theory
4	**Prerequisites/corequisites**	-
5	**Program title**	M.Sc. in Geology
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**School**	School of science
9	**Department**	Geology
10	**Course level**	
11	**Year of study and semester (s)**	Fall or Spring semesters
12	**Other department (s) involved in teaching the course**	Non
13	**Main teaching language**	English
14	**Delivery method**	☐✗Face to face learning ☐Blended ☐Fully online
15	**Online platforms(s)**	☐✗Moodle ☐Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	Spring 2024

17 Course Coordinator:

Name: Dr Najel Yaseen Contact hours:

Office number: 202 Phone number: 22275

Email: nyaseen@ju.edu.jo

18 Other instructors: Non

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
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19 Course Description:

Radiogenic isotopes in geochronology, absolute dating methods: Rb-Sr, K-Ar, U-Pb-Th and Sm-Nd, sample treatment, measurement techniques, interpretation and modelling, petrogenetic implications of radiogenic and stable isotopes, environmental radioactive isotopes, and stable isotopes: modelling of atmospheric surface and groundwater isotopic composition, chemical and isotopic geothermometry.

20 Course aims and outcomes:

A. Aims:

1. Achieve advanced proficiency in the analytical methods and instrumentation utilized in isotope geochemistry.
2. Demonstrate a deep understanding of the application of isotopic systems to unravel complex geological, environmental, and climatic processes.
3. Develop leadership capabilities in academia, research institutions, and industry by acquiring the knowledge, skills, and ethical grounding necessary to influence the future direction of isotope geochemistry and its global applications.

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B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

1. Understand the principles of atomic physics and nuclear systematics, including the various decay modes of radionuclides and the fundamentals of radioactive decay, with a focus on geochronometry, sample treatment, and methods of isotopic measurements.

2. Demonstrate proficiency in applying radiogenic isotope geochronometers, including the Rb-Sr, K-Ar, 40Ar*/39Ar, Sm-Nd, U-Th-Pb, and common lead methods, as well as understanding the isotopic composition of water, sediments, and oceans.

3. Acquire knowledge of short-lived radionuclides, particularly the U-Th disequilibrium series, as well as He and Tritium.

4. Apply radiation-damage methods, such as the Fission-Track method, to analyze geological samples.

5. Utilize cosmogenic radionuclides, with a particular emphasis on the Carbon-14 method, in geochronological and environmental studies.

6. Analyze the impact of thermonuclear radionuclides, including fission products and transuranium elements, on the environment.

7. Master the principles of stable isotope fractionation across various elements, including oxygen, hydrogen, carbon, nitrogen, sulfur, boron, and others, to interpret environmental and geological processes.

21. Topic Outline and Schedule:

22 Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
1st exam	15				
2nd exam	15				

Proplem sets	15				
. Project and presentation	15				
Final exam	40				

23 Course Requirements

Students should have a computer, internet connection, active account on Microsoft-teams.

24 Course Policies:

A- Attendance policies: **university regulation**

B- Absences from exams and submitting assignments on time: **university regulation**

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior: **university regulation**

E- Grading policy: **May subjected to changes (depends on the overall results)**

60 – 64 C

65 – 69 C+

70 - 74 B-

75 – 79 B

80 - 84 B+

85 - 89 A-

90- 100 A

F- Available university services that support achievement in the course:

25 References:

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

Faure, G. & and Mensing, T. 2005: Principles and Applications. John Wiley and Sons. 897 pages.

Allegre, C. L. 2008: Isotope Geology. university press. Cambridge **(soft copy available)**

B- Recommended books, materials, and media:

Faure, G. 2001. Origin of Igneous rocks, the isotopic evidence, Springer Verlag, Heidelberg.

Ludwig K. R. 2003. Isotplot 3.00 A geochronological toolkit for Microsoft Excel. Berkley Geochronology Center Publication no. 4

Hoefs, J. 2009. Stable isotopes geochemistry, Springer Verlag (soft copy available)

William White. Online lecture notes

http://www.geo.cornell.edu/geology/classes/GEO656.HTML

Geochemistry by W. White a textbook on the WWW

http://www.geo.cornell.edu/geology/classes/geo455/Geo455.html (Textbook online)

Geyh and Schleicher 1990 Absolute age determination.

Faure 1998 Principles and applications of geochemistry.

26 Additional information:

Name of Course Coordinator: --------Najel Yaseen----------Signature: -------- Date: - Spring-2023-2024
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------