Jordan University of Science and Technology

Faculty of Engineering

Nuclear Engineering Department

NE560 Radiochemistry - JNQF Level: 7
Second Semester 2024-2025

Course Catalog
3 Credit Hours. The chemistry of radioactive material, transuranic elements, the effect of radiation on the chemical properties of material.
Teaching Method: Blended

Text Book	
Title	Nuclear and Radiochemistry : Fundamentals and Applications
Author(s)	Karl Heinrich Liese
Edition	1st Edition
Short Name	Ref #1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #2	Nuclear and Radiochemistry	G. Friedlander, J. W. Kennedy, E. S. Macias, and J. M. Miller	3rd Edition	
Ref #3	Radiochemistry and Nuclear Methods of Analysis	W. D. Ehmann, D. E. Vance	1st Edition	

Instructor	
Name	**Dr. GHADEER AL-MALKAWI**
Office Location	E1L2
Office Hours	
Email	ghmalkawi@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Thu : 10:00 - 11:00 Room: E2113

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
2004130	NE413 Radiation Detection And Measurement Lab Ii	Prerequisite / Study
293630	IE363 Engineering Materials	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	Introduction and brief history of radioactivity	From **Ref #1**
Week 1	Atomic and Nuclear structures	From **Ref #1**
Week 2	Nuclear reactions, and radioactive decay processes	From **Ref #1**
Week 2	Interaction of radiation with matter	From **Ref #1**
Week 3	Radiation detection and measurements	From **Ref #1**
Weeks 3, 4	Production of radionuclides	From **Ref #1**, From **Ref #2**
Week 4	Nuclear activation analysis	From **Ref #1**, From **Ref #2**
Week 5	Radionuclides in geo- and Cosmo-chemistry	From **Ref #1**, From **Ref #3**
Week 6	Dating by nuclear methods	From **Ref #1**, From **Ref #3**
Week 8	General chemistry applied to radiochemistry	From **Ref #1**, From **Ref #2**
Weeks 9, 10	Radioanalysis and radiochemical separations	From **Ref #1**, From **Ref #3**
Weeks 11, 12	Radionuclides in the life science	From **Ref #1**
Weeks 13, 14	Students Projects Presentations	

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method

Students will be able to explain the fundamental principles of radiochemistry including radioactive decay of radioisotopes, half-life, and the different types of decay of radioisotopes [1SO1] [1L7K1]	28%	
Students will be able to describe the Interaction of radiation with matter and the radiation detection and measurements. [1SO1] [1L7K1]	19%	
Students will be able to describe the use of radioactive isotopes emitting different types of radiation (alpha, beta, gamma) in various industrial, medical, and environmental problems. [1SO1] [1L7K1]	19%	
Students will be able to discuss techniques in nuclear chemistry, radiochemical applications, nuclear processes in geology, radionuclides in life science, and Radioanalysis [1SO1, 1SO3] [1L7C3]	34%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
83		17				

Relationship to NQF Outcomes (Out of 100%)	
L7K1	L7C3
66	34

Evaluation	
Assessment Tool	**Weight**
First Exam	20%
Term Project	5%
Final Exam	40%
Second Exam	25%
Quizzes	10%

Policy	
Attendance	Since class discussion is a major course ingredient, regular attendance is mandatory. Attendance record will be taken into consideration in any borderline grade decisions.
Exam Policy	There will be no make-up exams except in extreme circumstances at the discretion of the instructor. The instructor has to be informed in advance (by email, phone, personal ...). You will be asked to provide proper documentation.
Disabled students	Students with any sort of limitation or disability should discuss its consequences with instructor prior to the start of the course

Emergency Provisions	In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor?s control. Here are ways to get information about changes in this course: ?E-learning announcements ?Instructor email (ghmalkawi@just.edu.jo)

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