Course Specification
(Bachelor)

Course Title:	Nuclear and Radiation Chemistry
Course Code:	CHEM429-2
Program:	Bachelor of Science in Chemistry
Department:	Department of Physical Sciences
College:	College of Science
Institution:	Jazan University
Version:	TP-153 (2024)
Last Revision Date:	30/1/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2hrs)

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	Prerequisite	Corequisite
		Lec	Tut	Lab					
Nuclear and radiation chemistry	CHEM429-2	2	0	0	2	4th	8th	CHEM326-2	-

This course aims to give provide students with basic knowledge of nuclear and radiation chemistry.

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

CHEM326-3

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

None

7. Course Main Objective(s):

1. **Recognizing the structure of the atom, the types of isotopes and the types of radiation decay.**
2. **Identifying the types of nuclear reactions and how to write nuclear equations.**
3. **Describing the interaction of radiation with the material and the types of radiation measuring devices and how to prevent radiation.**
4. **Identifying the useful uses of radioisotopes.**
5. **Identifying the doses, units of measurement and the effect of radiation on gases and organic compounds.**
6. **Discussing the various applications of radiation chemistry.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	$(2 \times 15) = 30$	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

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 broad, knowledge in Useful uses of isotopes - Production of radionuclides, principles of nuclear power- Radiation sources - Radiation protection. (M)***	***K(1)***	***Lecture group work discussion***	***MCQ***
1.2	***Describe the essential facts, principles and theories in radiation doses, effect of radiation on organic compounds and gases (M)***	***K(2)***	***Lecture group work discussion***	***Q & A***
2.0	**Skills;** *Upon completion of the course, students are able to:*			
2.1	***Demonstrate the knowledge and skills in Radiation decay - Nuclear reactions and nuclear equations - Nuclear Fission and Nuclear Fusion, Production of radionuclides, radiation***	***S(1)***	***lecture group work discussion***	***oral Solving Problems & chart analysis***

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	detectors and measurement. (M)			
2.2	***Make effective use of communication, and online technology about chemistry topics in order to improve their basic knowledge in writing (report and paper/ poster) with a good verbal and clear scientific language. (M)***	***S(5)***	***project-based learning***	***Research presentation rubric***
3.0	**Values, autonomy, and responsibility;** *Upon completion of the course, students are able to:*			
3.1	***Recognize the chemist's professional and ethical responsibilities. (M)***	***V(2)***	***Research activities***	***Ethic Rubric check***

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to nuclear chemistry	3
2.	Radiation decay	3
3.	Nuclear reactions and nuclear equations - Nuclear Fission and Nuclear Fusion	5
4.	Interaction of radiation with matter	3
5.	radiation detectors and measurement - Useful uses of isotopes	3
6.	Production of radionuclides- Principles of nuclear power- Radiation sources	3
7.	Radiation protection, Radiation doses	3
8.	Introduction to radiochemical chemistry	3
9.	Effect of radiation on organic compounds. - Effect of radiation on gases - Applications of radiation chemistry.	4
	Total	$2 \times 15w = 30$

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*Periodic Exams*	*During Semester*	*30%*
2.	*Assignments & Classroom Activities*	*During Semester*	*20%*
6.	*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. Handbook of Radiation Chemistry, by Yoneho Tabata; Yasuo Ito ; Seiichi Tagawa , 1991 by CRC press, Inc. USA. 2. مقدمة في الكيمياء النووية و الإشعاعية , تأليف ا . د . عبد العليم سليمان أبو المجد د . أميرة سالم العطاس الطبعة الأولى 1426 – 2005 م .
Supportive References	1. أسس الكيمياء النووية و ظاهرة النشاط الإشعاعي ,تأليف ا.د. علي عبد الحسين سعيد ؛ سهاه عبد الجبار الجسام , الطبعة الأولى 2001 – 1422 2. مبادئ الكيمياء النووية ,تأليف ا . د . عبد الحكيم طه قنديل , الطبعة الأولى , 1422 -2001 م
Electronic Materials	Some course contents and materials are posted on Black board sites
Other Learning Materials	Annual Radiation Dose (sydney.edu.au)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	*1 Lecture room(s) for groups of 50 students*
Technology equipment (projector, smart board, software)	*Smart board, Data show, Black board, internet*
Other equipment (depending on the nature of the specialty)	*none*

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
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 Reviewers, 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