Course Specification

(Postgraduate Programs)

Course Title:	Radiation Physics
Course Code:	PHYS651
Program:	Master of Science in Physics
Department:	Physical Sciences
College:	Science
Institution:	Jazan University
Version:	
Last Revision Date:	20/4/2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (٣)				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☐Required		☒ Elective	
3. Level/year at which this course is offered: (level 2 or 3 / year 1 or 2)				
4. Course general Description:				
This course is designed to provide an understanding of radiation physics and dosimetry. Knowing the international standard radiation standards, and effective use of radiation doses and materials. Developing scientific research skills in the field of radiation physics.				
5. Pre-requirements for this course (if any): Non				
6. Co-requirements for this course (if any): Non				
7. Course Main Objective(s):				
The main objectives of this course are focused on the following: 1. Describe the radiation and dosimetry. 2. Outline the international standards. 3. Discuss the proper usage of radioactive doses and materials. 4. Solve problem related to the radiation and dosimetry. 5. Illustrate the important radiation detections and instruments				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	١٠٠
2	E-learning		
3	Hybrid		

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

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
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 completing the course students will be able to**			
1.1	**Describe** background radiation, cosmic radiation, naturally radioactive series, Radon and its Progeny, Measurements of Radon, Alpha Particles and Heavy Nuclei, Beta Particle, Energy Transfer and Absorption by Photons, Different types of dosimeters, solid state nuclear track detectors	**PLO 1.1**	Lectures, discussion	**Direct:** In class interactive questioning, quizzes, written exams **Indirect:** student survey

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	**Identify** types of radiation , calculation of activity, types of naturally radioactive series, types of radon and half-life of it, type of beta particles and interaction, Particle and energy flux and fluence, absorbed dose, Organic& Inorganic scintillators.	**PLO 1.1**	Lecture Discussion	**Direct:** In class interactive questioning, quizzes, written exams **Indirect:** student survey
1.3	**Discuss** types of radiation detectors and dosimeters. cosmogenic radionuclides, measurements of radon, , interactions of alpha particles, heavy nuclei, and beta particles, photon interactions, Equivalent and effective dose, Solid state nuclear track detectors, Detectors, Organic& Inorganic scintillators, Semiconductor Detectors Biological effects of radiation, radiation protection,. different types of dosimeters	**PLO 1.2**	Lecture Discussion	**Direct:** In class interactive questioning, quizzes, written exams **Indirect:** student survey
2.0	**Skills: Upon completing the course students will be able to**			
2.1	**Solve** problems of binding energy, the activity of radiation, measurement of radon, radioactive dating, Radiation dose, Photon Interactions, Photon attenuation, and range,	**PLO 2.1**	Lecture Discussion	**Direct:** In class interactive questioning, quizzes, written exams **Indirect:** student survey

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	time of flight, weighting factors			
2.2	**Apply** the application of radiation and radioactive sources, energy transfer, absorption of photons, and biological effectiveness.	**PLO 2.1**	Lecture Discussion	**Direct:** In class interactive questioning, quizzes, written exams **Indirect:** student survey
3.0	**Values, autonomy, and responsibility: Upon completing the course students will be able to**			
3.1	**Adopt** the practices of self-learning in the field of preserving the environment from radioactive contamination.	**PLO 3.2**	Groups discussion	**Direct**: In-class interactive questioning, Homework reports and projects **Indirect:** student survey

C. Course Content:

No	List of Topics	Contact Hours
1.	**Naturally Occurring Radiation and Radioactivity** Discovery and Interpretation Background Radiation, Cosmic Radiation Cosmogenic Radionuclides, Naturally Radioactive Series	6
2.	Singly Occurring, Primordial Radio nuclides, Radio activity Dating, Radon and its Progeny (Radon Subseries, Working, Level for Radon Progeny, Measurements of Radon	7.5
3	**Interaction of radiations with matter** Radiation Dose and Units, Radiation Dose Calculations Interaction Processes, Interactions of Alpha Particles and Heavy Nuclei, Beta Particle Interactions and Dose, Photon Interactions, Photon Attenuation and Absorption	9
4	Energy Transfer and Absorption by Photons, Particle and energy flux and fluence, absorbed dose	7.5

	Biological effectiveness, weighting factors, Equivalent and effective dose, Primary and secondary dosimeters, Different types of dosimeters , Clinical and calorimetric devices, Radiation survey meter for area monitoring,	
5	**Radiation detection and instrumentation** Solid state nuclear track detectors, Detectors, Organic& Inorganic scintillators, Semiconductor Detectors Biological effects of radiation Radiation protection, shielding, transport, and time of flight.	7.5
6	Final Revision.	7.5
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	**Assessment Activities**	**3, 7, 10, 13**	**20**
2	**Quiz I**	**5**	**5**
3	**First Mid-term Exam**	**6**	**10**
4	**Quiz II**	**9**	**5**
5	**Second Mid-term Exam**	**12**	**10**
6	**Final Exam**	**16**	**50**

*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. James. E. Martin, Physics for Radiation Protection, A Handbook.ISBN: 3-527-40611-5 (2006) **2.** Basic of radiation protection for everyday use – How to achieve ALARA working tips and Guidelines, Leonie Munro, 2004.
Supportive References	1. G.F.Knoll, Radiation detection and measurement,(John Wiley&sons, New York, 2000). 2. K.Thayalan, Basic radiological physics,(Jaypee brothers medical Publishers,NewDelhi2003). 3. G.C.LowenthalandP.L.Airey, Practical applications of radioactivity and nuclear radiation sources (Cambridge University Press 2005). 4. M.A.S. Sherer, P.J. Visconti, E.R. Ritenour, Radiation Protection in medical radiography, Mosbey, (Elsevier 2006).
Electronic Materials	https://www.dropbox.com/sh/ggfohd98jubmwj6/AABc607ZNHac5JmEhNqYw_2-a/%D8%A7%D9%84%D9%88%D9%82%D8%A7%D9%8A%D8%A9%20%D9%85%D9%86%20%D8%A7%D9%84%D8%A7%D8%B4%D8%B9%D8%A7%D8%B9/1.ppt?dl=0

Other Learning Materials	Multi media / CD associated with the textbooks (when available).

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room
Technology equipment (projector, smart board, software)	data show, Smart Board, software
Other equipment (depending on the nature of the specialty)	NON

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation
Effectiveness of student's assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department Council**
REFERENCE NO.	**Psci2415**
DATE	**1/10/2024**