



Course Specifications

Course Title:	Radiation Physics
Course Code:	PHY4603
Program:	B.Sc
Department:	Physics
College:	Applied Sciences
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 9 / 3 th Year
4. Pre-requisites for this course (if any): Nuclear Physics 2
5. Co-requisites for this course (if any): No

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description The course will cover the principles of radiation physics and will provide a conceptual and scientific background in radiation physics sufficient to enable students to make proper assessment of radiation hazards on human and in the environment.
2. Course Main Objective To provide the technical background needed to proper understanding of radioactivity and radioactive materials, quantitative risk assessment for radiation hazards on human and in the environment.



3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Describe facts, principle and concepts of radiation Physics	K1 (M)
1.2	Define principal Radiation Quantities and Units	K1(M) K2(M)
2	Skills :	
2.1	Compute the internal and external radiation doses.	S1(M)
2.2	Explain radiation detectors and radiation dosimeters.	S2 (M)
3	Values:	
3.1	Apply the radiation protection measures to protect people and environment which is a moral value in the society.	V1 (M)
3.2	Work effectively in groups and exercise leadership when appropriate.	V2 (M)

C. Course Content

No	List of Topics	Contact Hours
1	Radioactivity and Radiation 1. Definitions 2. Radiation sources 3. Radioactivity calculations 4. Radiation Types 5. Natural Radioactivity	4
2	Interaction of Radiation with matter 1. Interaction of heavy charged particles with matter 2. Interaction of beta particles with matter Interaction of gamma and x-ray with matter 3. 4. Interaction of neutrons with matter	6
3	Radiation Quantities and Units 1. Radioactivity Radiation flux density 2. Exposure. 3. Absorbed dose. 4. Equivalent dose 5. 6. Effective dose	4
4	Biological Effects of radiation 1. Interaction of the ionizing radiati on with living tissue and cell. 2. The deterministic and stochastic effects. 3. The late effects. 4. The hereditary effects	5



5	Radiation Detection and measurements 1. Radiation Detectors 2. Particle-Counting Instruments 3. Dose-Measuring Instruments 4. Neutron Measurements 5. Calibration 6. Counting Statistics.	4
6	Radiation dosimetry 1. Dose calculations 2. Internal Dosimetry 3. External Dosimetry 4. Neutron Dosimetry. 5. Radiation hazard assessment	4
7	Radiation Safety 1. Basic principles 2. Basic practices 3. Dose Limits 4. Legal requirements	3
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Describe facts, principle and concepts of radiation Physics	1- Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams 3. Lecturing method: Board, Power point 4. Discussions 5. Brain storming 6. Start each chapter by general idea and the benefit of it.	Quizzes (E-learning) Mid-term exam Final exam Oral exams Discussions during the lectures. Homework. Writing scientific Reports. Group Work
1.2	Define principal Radiation Quantities and Units		
2.0	Skills		
2.1	Compute the internal and external radiation doses.	1. Perform mathematical analysis of radiation laws and proofs	Quizzes (E-learning) Mid-term exam Final exam
2.2	Explain radiation detectors and radiation dosimeters.		



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	Use of scientific terms in oral and written communication.	2.Perform Radiation detection and measurements 3.practicing problem solving 4.practicing scientific writing and speaking	Oral exams Discussions during the lectures. Homework. Writing scientific Reports. Group Work
3.0	Values		
3.1	Apply the radiation protection measures to protect people and environment which is a moral value in the society.	Group Work Practical Ethical Assignment	Scientific reports. Evaluation of group work Evaluation of the ethical assignment Evaluation of students presentations
3.2	Work effectively in groups and exercise leadership when appropriate.		
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2. Assessment Tasks for Students

#	Assessment task *	Week Due	Percentage of Total Assessment Score
2	Term works	All weeks	20%
3	Mid-term exam	5 th week	30%
4	Final exam	12 th week	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Each student will supervise by academic adviser in physics Department and the time table for academic advice were given to the student each semester. **(4hrs per week)**

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Introduction to Health Physics. Herman Cember. 2009. The McGraw-Hill Companies, Inc James E. Turner. Atoms, radiation, and radiation protection: Wiley-VCH 3rd ed; 2007
Essential References Materials	"Radiation Physics for Medical Physicist", E. B. Podgorsak, Ed. Springer. 2006



	Fundamentals of ionizing radiation dosimetry. Pedro Andreo, Davis T. Burns, Alan E. Nahum, Jan Seuntjens, and Frank H. Attix.: Wiley-VCH; 2017.
Electronic Materials	http://www.lnhb.fr/nuclear-data/nuclear-data-table/ https://www.nrc.gov/reading-rm/basic-ref/students/for-educators.html

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	There are enough classrooms provided with a good accommodation, including good air condition, good Data show, suitable white board There are enough laboratories for experimental physics, provided with air conditions, good data show, and experimental equipment.
Technology Resources (AV, data show, Smart Board, software, etc.)	In each class room and laboratories, there is a data show, and board.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NON

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
· Course evaluation by student	Instructor	Direct oral communication
· Students- faculty meetings	Group of students	communication
· Peer consultation on teaching · Departmental council discussions · Discussions within the group of faculty teaching the course	Instructor	Oral test and quizzes
· Providing samples of all kinds of assessments in the departmental course portfolio of each course · Assigning group of faculty members teaching the same course to grade the same questions for various students.	Instructor	Exams
The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental and higher councils.	Instructor + The head of department	Course report



Evaluation Areas/Issues	Evaluators	Evaluation Methods
· The head of department and faculty take the responsibility of implementing the proposed changes in the course materials.		

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

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

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

