



Course Specification

(Bachelor)

Course Title:	Radiation Medical Physics
Course Code:	MPHY6456
Program:	Medical Physics
Department:	Physics
College:	Science
Institution:	University of Bisha
Version:	1
Last Revision Date:	5 September 2023

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A. General information about the course:

1. Course Identification

1. Credit hours: 3

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: 7th Level / 4th year

4. Course general Description

This course aims to present General properties & production of X-ray, most technological advances in medical use of ionizing radiation to improve in efficient x-ray beam delivery, Particles Accelerators in Medicine, Interaction of Ionizing radiation with matter. Photoelectric, Compton effects & pair production Processes & their clinical importance. Attenuation & absorption coefficients. Exponential law, Half value layer & simple calculations, General aspect of Interactions of Charged Particles and neutron with Matter.

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

MPHY26352



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

NA

7. Course Main Objective(s)

Recognize properties of X-ray, particles produced by accelerator used in medicine and their interaction with the matter.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> • 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	40

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			
1.1	Recognize the different radiation used in medicine and their interaction with matter	K2	Lecturing	Quizzes Homework Midterm exam Final exam
2.0	Skills			
2.1	Solve problems related to radiation in medical physics	S1	Solve problems. Self-learning	Quizzes Homework Midterm exam



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				Final exam
2.2	Illustrate the different interaction with matter in particular for human tissues	S1	Solve problems. Self-learning	Quizzes Homework Midterm exam Final exam
2.3	Communicate positively with others.	S4	Presentation Work group	Reports Presentation
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently.	V2	Self-learning	Reports Presentation
3.2	Ability to work in team effectively.	V3	Work group	Reports Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Production of X-Rays X-Ray Line Spectra Emission of Radiation by Accelerated Charged Particle Synchrotron Radiation Čerenkov Radiation	4
2.	Particle Accelerators in Medicine Basic Characteristics of Particle Accelerators Practical Use of X-Rays Practical Considerations in Production of X-Rays	5
3.	Particle Accelerators in Medicine Traditional Sources of X-Rays: X-Ray Tubes Circular Accelerators Clinical Linear Accelerator	4
4.	Interactions of Photons with Matter General Aspects of Photon Interactions with Absorbers Thomson Scattering Incoherent Scattering (Compton Effect)	5
5.	Interactions of Photons with Matter	5



	<p>Rayleigh Scattering</p> <p>Photoelectric Effect</p> <p>Pair Production</p> <p>Photonuclear Reactions</p>	
6.	<p>Energy Transfer and Energy Absorption in Photon Interactions with Matter</p> <p>Macroscopic Attenuation Coefficient</p> <p>Energy Transfer from Photons to Charged Particles in Absorber</p> <p>Energy Absorption</p>	4
7.	<p>Energy Transfer and Energy Absorption in Photon Interactions with Matter</p> <p>Coefficients of Compounds and Mixtures</p> <p>Effects Following Photon Interactions with Absorber</p> <p>Summary of Photon Interactions</p> <p>Sample Calculations</p>	5
8.	<p>Interactions of Charged Particles with Matter</p> <p>General Aspects of Energy Transfer from Charged Particle to Medium</p> <p>General Aspects of Stopping Power</p> <p>Radiation (Nuclear) Stopping Power</p> <p>Collision (Electronic) Stopping Power for Heavy Charged Particles</p> <p>Collision Stopping Power for Light Charged Particles</p>	5
9.	<p>Interactions of Charged Particles with Matter</p> <p>Total Mass Stopping Power</p> <p>Range of Charged Particles</p> <p>Mean Collision Stopping Power</p> <p>Restricted Collision Stopping Power</p> <p>Bremsstrahlung Targets</p>	5
10.	<p>Interactions of Neutrons with Matter</p> <p>General Aspects of Neutron Interactions with Absorbers</p> <p>Neutron Interactions with Nuclei of the Absorber</p> <p>Neutron Beams in Medicine</p>	5
Total		50





Table: The matrix of consistency between the content and the learning outcomes of the course.

	Course Learning Outcomes					
	1.1	2.1	2.2	2.3	3.1	3.2
Topic 1	√	√	√		√	√
Topic 2	√	√	√		√	√
Topic 3	√	√	√		√	√
Topic 4	√	√	√	√	√	√
Topic 5	√	√	√	√	√	√
Topic 6	√	√	√	√	√	√
Topic 7	√	√	√	√	√	√
Topic 8	√	√	√	√	√	√
Topic 9	√	√	√	√	√	√
Topic 10	√	√	√	√	√	√

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %
4.	Final exam	End of Semester	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

- Radiation Physics for Medical Physicists, Third Edition, Ervin B. Podgoršak, Faculty of Medicine, Department of Oncology and Medical Physics Unit McGill University Montreal, Springer International Publishing Switzerland 2016.

- An Introduction to Medical Physics, Maqbool, **Muhammad, Springer, 2017**





Supportive References	INTRODUCTION TO RADIOLOGICAL PHYSICS AND RADIATION DOSIMETRY, FRANK HERBERT ATTIX, WILEY-VCH Verlag GmbH & Co. KGaA, 2004.
Electronic Materials	- Blackboard. - PowerPoint presentations. - Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector or smart board
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students.	Indirect (Questionnaire).
Effectiveness of students assessment	Students, Staff members, Program Leader.	Indirect (Questionnaire).
	Peer Reviewer.	Direct (Review exam)
Quality of learning resources	Students, Staff members, Program Leaders.	Indirect (Questionnaire).
The extent to which CLOs have been achieved	Students, Staff members, Program Leader.	Indirect (Questionnaire).
	Course coordinator.	Direct (Course Learning Outcomes Assessment).

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	\





DATE

5 September 2023

