



Course Specification

— (Bachelor)

Course Title: **Radiation Therapy**

Course Code: **MPHY6457**

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 covers the radiation therapy physics that consist of the atomic and nuclear structure, radioactive decay, interactions of electromagnetic and particulate radiation with matter, quantification and measurement of dose, characteristics of photon beams, dosimetry of photon beams in a patient, dosimetry of electron beams and radiation protection and safety.

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

MPHY26353

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

NA

7. Course Main Objective(s)

Recognize the radiation therapy physics and radiation protection and safety.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%





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

3. 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			
1.1	explain Atomic and Nuclear Structure, Radioactive Decay, and Interactions with Matter.	K1	Lecturing	Quizzes Homework Midterm exam Final exam
1.2	Describe the Quantification of Dose, Dosimetry of Photon Beams in a Patient and Radiation Protection and Safety.	K1		
2.0	Skills			
2.1	Solve problems in the Radiation Therapy.	S1	Solve problems. Self-learning	Quizzes Homework Midterm exam Final exam





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	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.	Atomic and Nuclear Structure Atomic and Nuclear Nomenclature. The Four Fundamental Forces. On Mass. Nuclear Binding Energy. Binding Energy Per Nucleon. Electron Orbits.	5
2.	Radioactive Decay Alpha (α) Decay. Beta (β) Decay. Beta-Minus (β^-). Beta-Plus (β^+). Electron Capture (EC).	5
3.	Gamma Emission. Internal Conversion. Mathematics of Radioactive Decay. Man-Made Radioisotopes.	4
4.	Interactions of Electromagnetic Radiation with Matter How Do Photons Interact. Definitions. Coherent Scatter. Photoelectric Effect. Compton Scatter. Pair Production. Triplet Production.	5
5.	Interactions of Particulate Radiation with Matter. Definition of Range. How Do Charged Particles Interact. Charged Particle Specifications. Stopping Power and Dose. Ionization and Biological Action.	5
6.	Quantification and Measurement of Dose	4





	Dose. Equation Terms. Relative Biologic Effectiveness (RBE). Dose Equivalent. Exposure. Methods of Measuring Dose.	
7.	Characteristics of Photon Beams Intensity Versus Penetration. Attenuation Coefficients. Mathematics of Attenuation. Filtration in Clinical X-Ray Beams. Beam Quality. Effective Energy.	5
8.	Dosimetry of Photon Beams in a Patient Dose Calculation. Corrections For Patient Contour. Classical Methods.	4
9.	Parallel Opposed Fields. Mixed Modality Therapy (Photon/Electron Mix). Field Matching. Dose Delivery Accuracy and Precision.	4
10.	Radiation Protection and Safety Regulatory Bodies. Types of Radiation Effects and Limits. Structural Shielding Design for External Beam Therapy.	4
Total		40

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

	Course Learning Outcomes						
	1.1	1.2	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: 10	5 %
2.	Achievement file (Practical experience reports).	1: 10	5 %
3.	First term exam	7: 8	10 %
4.	Second term exam	12:13	10 %
5.	Practical exam	15	20 %
6.	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	Basic Radiotherapy Physics and Biology, 10th Edition, by David S. Chang • Foster D. Lasley, Indra J. Das • Marc S. Mendonca, Joseph R. Dynlacht, Springer New York Heidelberg Dordrecht London, 2014.
Supportive References	Introduction to Biological Physics for the Health and Life Sciences, 2 nd Edition, by Kirsten Franklin et. All, Willey, 2019.
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.	١
DATE	5 September 2023

