PHY4232: RADIOTHERAPY PHYSICS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Radiotherapy Physics

Subject Code
PHY - Physics
Course Number
4232

Academic Unit
Physics (PHY)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
AP4275/PHY4275 Radiological Physics and Dosimetry

Equivalent Courses
AP4232 Radiotherapy Physics

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to lay down the foundation knowledge for external beam radiotherapy, brachytherapy and radionuclide therapy, and for their quality assurance and safety.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain and appreciate external beam radiotherapy			x	
2	Explain and appreciate brachytherapy			x	
3	Explain and appreciate therapeutic nuclear medicine			x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Large classes	Presentation of course material	1, 2, 3	2 hours/week
2	Small classes	Review of recent assignments	1, 2, 3	1 hour/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3	30	

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

To pass the course, students need to achieve at least 30% in the examination.

Assessment Rubrics (AR)

Assessment Task
1. Exam

Criterion
The student can thoroughly identify and explain how the principles are applied to science and technology for solving physics and engineering problems.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not reaching marginal level

Assessment Task
2. Assignments

Criterion
The student can thoroughly identify and explain how the principles are applied to science and technology for solving physics and engineering problems.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not reaching marginal level

Part III Other Information

Keyword Syllabus

- External Beam Radiotherapy Physics
  External beam radiotherapy accelerators
  Characteristics, parameters and dosimetry of photon and electron beams

Point dose calculations and measurement
Dosimetry equipment and tissue equivalent phantoms
Dose calibration
Quality assurance & safety

- Brachytherapy Physics:-
  Brachytherapy radionuclides, dosimetry and calibration
  Treatment techniques and dosimetry systems
  Treatment planning and dose calculation
  Manual and remote after loading treatment systems
  Quality assurance & safety
- Radionuclide Therapy Physics:-
  Therapeutic nuclear medicine
  Treatment techniques and dosimetry systems
  Quality assurance & safety

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Mayles, P Nahum, A. Mayles, P., Handbook of Radiotherapy Physics: Theory and Practice, (2007: Taylor & Francis, KY, USA)
2	Yves Lemoigna and Alessandra Caner (Eds.), Radiotherapy and brachytherapy, NATO Advanced Study Institute on Physics of Modern Radiotherapy & Brachytherapy (2007 : Archamps, France) Dordrecht : Springer, c2009.