PHY6523: ADVANCED NUCLEAR MEDICINE PHYSICS

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Advanced Nuclear Medicine Physics

Subject Code
PHY - Physics
Course Number
6523

Academic Unit
Physics (PHY)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
NA

Precursors
NA

Equivalent Courses
NA

Exclusive Courses
PHY8523 Advanced Nuclear Medicine Physics

Part II Course Details

Abstract

This course will advance understanding of nuclear medicine for imaging and radiotherapy. Topics covered will include: radionuclide production, transfer, storage, and handling; detection methods; and applications.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Radiation physics related to nuclear medicine. Emphasis will be on radioactive decay sources and interactions interaction of high energy photons and particles with heavy metals and body tissues.	50		x	
2	Nuclear medicine imaging: principles and applications.	30		x	
3	Nuclear medicine therapy: principles and applications.	20		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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Presentation of course material	1, 2, 3	2
2	Tutorial	Review of course material	1, 2, 3	1

Assessment Tasks / Activities (ATs)

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

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Exam (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Understanding of fundamental concepts and applications of radiation physics related to nuclear medicine, imaging and radiotherapy

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even marginal level

Assessment Task
Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Explain key concepts of nuclear medicine for imaging and radiotherapy

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even marginal level

Assessment Task
Exam (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Understanding of fundamental concepts and applications of radiation physics related to nuclear medicine, imaging and radiotherapy

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Not even marginal level

Assessment Task
Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Explain key concepts of nuclear medicine for imaging and radiotherapy

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Not even marginal level

Part III Other Information

Keyword Syllabus

Radiation physics:
- Radionuclide production, transfer, storage, handling, and disposal
- Gamma ray scattering and absorption
- High-energy particle scattering and absorption
- Dosimetry (calculations and measurements)

Imaging applications:
- Uptake measurement
- Scintigraphy
- Single-photon emission computed tomography (SPECT)
- Positron emission tomography (PET)

Therapeutic applications:
- Treating thyroid and blood disorders
- Other disorders

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Radiation Physics for Medical Physicists