City University of Hong Kong
Course Syllabus

offered by Department of Physics
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	**Advanced Radiotherapy Physics**
Course Code:	**PHY6524**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**P6**
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**NA**
Precursors: *(Course Code and Title)*	**NA**
Equivalent Courses: *(Course Code and Title)*	**NA**
Exclusive Courses: *(Course Code and Title)*	**PHY8524 Advanced Radiotherapy Physics**

Part II Course Details

1. Abstract

This course will advance understanding of radiotherapy related physics and modern radiotherapy methods. The latter includes external beam radiotherapy with x-ray and proton sources, and also brachytherapy.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Physics principles related to radiotherapy. Emphasis will be on production of ionizing radiation and subsequent interactions with matter.	50		✔	
2.	Physics of external beam radiotherapy.	40		✔	
3.	Physics of Brachytherapy.	10		✔	
		100%			

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.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lecture	Presentation of course material	12	11	3				2
Tutorial	Review of course material	7	5	1				1

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4				
Continuous Assessment: _30_%								
Monthly assignments	15	12	3				30	
Final examination	35	28	7				70	
Examination: _70_% (duration: 2 hours)								
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Exam	Having an in-depth understanding of radiotherapy related physics and modern radiotherapy methods; and ability of applying the knowledge and theory to solve problems independently.	High	Significant	Satisfactory	Basic	Below marginal level
2. Assignments	The student completes all assessment tasks/activities and the work demonstrates correct understanding of the key concepts.	High	Significant	Satisfactory	Basic	Below marginal level

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Exam	Having an in-depth understanding of radiotherapy related physics and modern radiotherapy methods; and ability of applying the knowledge and theory to solve problems independently.	High	Significant	Satisfactory	Below marginal level
2. Assignments	The student completes all assessment tasks/activities and the work demonstrates correct understanding of the key concepts.	High	Significant	Satisfactory	Below marginal level

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Physics of radiotherapy:

- X-ray/gamma ray scattering and absorption
- Particle (eg. proton, electron, neutron) scattering and absorption
- X-ray/gamma ray production and attenuation
- High-energy particle production and stopping
- Dosimetry (calculations and measurements)

External beam radiotherapy:

- Linear accelerator (LINAC) therapy
- Proton beam therapy
- Boron neutron capture therapy
- Treatment planning
- Quality assurance

Brachytherapy:

- Source production, transfer, storage, and handling
- Afterloading
- Treatment planning
- Quality assurance

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	
2.	
3.	
…	

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Radiation Physics for Medical Physicists
2.	
3.	
…	