City University of Hong Kong
Course Syllabus

offered by Department of Physics
with effect from Semester A 2022/23

Part I Course Overview

Course Title:	**Advanced Radiotherapy Physics**
Course Code:	**PHY8524**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**R8**
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)*	**PHY6524 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)

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 self-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. Teaching and Learning Activities (TLAs)

TLA	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)

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

Applicable to students admitted in Semester A 2022/23 and thereafter

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

Applicable to students admitted before Semester A 2022/23

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

Part III Other Information

1. Keyword Syllabus

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

1.	
2.	
3.	
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2.2 Additional Readings

1.	Radiation Physics for Medical Physicists
2.	
3.	
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