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 Imaging Physics**
Course Code:	**PHY6522**
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)*	**PHY8522 Advanced Imaging Physics**

Part II Course Details

1. Abstract

This course will advance students' understanding of applied imaging technologies from conceptual, theoretical, and clinical aspects. Imaging techniques including radiography, fluoroscopy, mammography, computed tomography, magnetic resonance imaging, and ultrasound imaging will be discussed.

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.	Conceptual and theoretical understanding of the physics of imaging technologies	70		✔	
2.	Practical and clinical use of the imaging technologies	20	✔		
3.	Basic digital imaging concepts, processing, and reconstruction	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. 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				
Lectures	Presentation of course material	18	5	3				2
Tutorials	Review of course material	9	2	2				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					
Continuous Assessment: _50_%								
Monthly assignments	14	4	2				20	
Midterm examination	21	6	3				30	
Final examination	35	10	5				50	
Examination: _50_% (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. Examination	1. Ability to describe and explain the clinical use of a few key imaging techniques. 2. A solid understanding of the physics theory behind the imaging technologies.	High	Significant	Moderate	Basic	Not reaching marginal level
2. Assignments	1. Ability to describe and explain the clinical use of a few key imaging techniques. 2. A solid understanding of the physics theory behind the imaging technologies.	High	Significant	Moderate	Basic	Not reaching 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. Examination	1. Ability to describe and explain the clinical use of a few key imaging techniques. 2. A solid understanding of the physics theory behind the imaging technologies.	Significant	Moderate	Basic	Not reaching marginal level
2. Assignments	1. Ability to describe and explain the clinical use of a few key imaging techniques. 2. A solid understanding of the physics theory behind the imaging technologies.	Significant	Moderate	Basic	Not reaching 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.)

- Week 1. Structure of Matter and Radioactive Decay (chapter 2&3)
- Week 2. Probability and Statistics (chapter 11)
- Week 3. Interactions of Radiation and X-ray (chapter 4&5)
- Week 4. Radiography (chapter 13)
- Week 5. Fluoroscopy (chapter 14)
- Week 6. Radiation Detectors (Chapter 8) and Mammography
- Week 7. Midterm Exam
- Week 8. Computed Tomography (chapter 15)
- Week 9. Ultrasound Waves (chapter 19)
- Week 10. Ultrasound Imaging (chapter 21)
- Week 11. Fundamentals of Magnetic Resonance (chapter 23)
- Week 12. Magnetic Resonance Imaging (chapter 25)
- Week 13. Human radiobiology (chapter 27)
- Week 14. Final exam

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.	Medical Imaging Physics, Fourth Edition, (2002) by William R. Hendee and E. Russell Ritenour.

2.2 Additional Readings

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