City University of Hong Kong
Course Syllabus

offered by Department of Physics
with effect from Semester A 2018/19

Part I Course Overview

Course Title:	**Environmental Radiation Measurements**
Course Code:	**PHY4272**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**B4**
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**AP4272 Environmental Radiation Measurements**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

To develop experimental techniques for environmental radiation and problem solving skills in general through lectures, experiments and mini-projects.

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.	Apply basic data-analysis methods to analyze experimental results in environmental radiation.			✓	
2.	Incorporate the concepts of detection limits and minimum detection activity in experimental design and data analyses.		✓		
3.	Apply experimental techniques in various areas of environmental radiation.			✓	
4.	Apply a few experimental techniques selected from the following: gamma spectroscopy, scintillation and solid-state alpha-track.			✓	
** If weighting is assigned to CILOs, they should add up to 100%.*		100%			

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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)

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

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lecture	Course materials will be delivered by the lecturer through presentation.	✓	✓	✓		21 hours/ 13 weeks
Lab work	Laboratory sessions, report writing, lab test	✓	✓	✓	✓	21 hours/ 13 weeks
Mini project	A mini reading project, which is related to the lectures and lab work, and a written test				✓	18 hours/ 13 weeks

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: 50%						
Lab reports	✓	✓	✓	✓	13%	
Mini project				✓	12%	
Mid-term test	✓	✓	✓		25%	
Examination^: 50% (duration: 2 hours)						
** The weightings should add up to 100%.*					100%	

^ For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

5. Assessment Rubrics

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

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Lab reports	The student attends all lab sessions, submits all lab reports, and completes a lab test, and demonstrates excellent understanding of the laboratory skills and the involved scientific principles.	High	Significant	Moderate	Basic	Not reaching marginal level
2. Mini Project	The student reads the assigned literature, and demonstrates excellent understanding of the laboratory skills and the involved scientific principles.	High	Significant	Moderate	Basic	Not reaching marginal level
3. Mid-term test	The student can thoroughly identify the appropriate concepts required in given problems and apply them to formulate suitable solutions.	High	Significant	Moderate	Basic	Not reaching marginal level
4. Examination	The student can thoroughly identify the appropriate concepts required in given problems and apply them to formulate suitable solutions.	High	Significant	Moderate	Basic	Not reaching marginal level

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

1. Keyword Syllabus

- Basic data-analysis methods for experiments in environmental radiation
- Detection limits and Minimum Detection Activity
- Experimental techniques in environmental radiation, with focus on measurements of concentrations of radon gas and progeny
- Experiments and mini-projects

  To be chosen from (but not limited to) the following:

  Measurement of concentrations of radon gas and progeny in different environments, using gamma spectroscopy (activated charcoal canisters and NaI detectors), scintillation (ZnS coupled to PMT), or the solid-state alpha-track technique (CR-39 and LR 115).

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.	S A Durrani, R K Bull, Solid State Nuclear Track Detection. Principles, Methods and Applications. Pergamon Press, (1987).

2.2 Additional Readings

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

1.	S A Durrani, R Ilic (editors), Radon measurements by etched track detectors: applications in radiation protection, earth sciences. Singapore: World Scientific, (1997).