Subject Description Form

Subject Code	AP50002
Subject Title	Radiation Protection and Radiation Safety
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	AP50001 or Completed BSc in Radiology / BSc in Radiography / or equivalent
Objectives	This subject aims to provide students' knowledge of the physical properties of radiation, and principle in radiation protection and safety of radiation sources that enable them to perform practice of radiation protection according to the regulations and standards.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: (a) explain the origin, nature and production of radiation; (b) explain the basic radioactive decay processes and perform fundamental radioactivity decay calculations; (c) evaluate and compare the common methods of radiation detection and dose measurement; (d) describe the operation of various radiation detectors and radiation dosimeters; (e) demonstrate the practical use of different common radiation monitoring and dose measurement instruments; (f) discuss the principle of radiation protection practices in line with rules and regulations; (g) demonstrate understanding and applying the philosophy of radiation protection with regard to both risks and benefits
Subject Synopsis/ Indicative Syllabus *(Note 2)*	**Introduction and historical perspective** Source of ionizing and non-ionizing radiations the environment: natural and artificial; Sources of radiation-natural man made & internal exposures; Activity, half-life, exponential attenuation, half-value layer (HVL), inverse square law, tenth-value layer (TVL). **Radiation Protection and the Safety of Radiation Sources**: Radiographic Equipment; Radiation Units; Biological Effects ; Principles and practices of radiation protection; Time, distance and shielding; shielding properties and design; Justification, optimization and dose limitations; Calculations for Radiation Protection ; Storage of Radiation Sources; Transport of Radioactive Substances; Personal Dosimetry; **Radiation Detection and Measurement**: Radiation monitoring and dose measurement instruments; Ionisation chambers; Scintillation spectrometer; Geiger Muller counter; DAP meter; Semiconductor detector and thermoluminescent dosimeter (TLD); portable survey and contamination radiation monitoring devices; personal radiation monitoring; internal exposure; environmental dispersion; biological effects.

	International and local rules and regulations in radiation protection: Cap 303 Radiation Ordinance (HK); ICRP Report 26, 60 and 103; Code of practice.
Teaching/Learning Methodology *(Note 3)*	Lectures are the basic medium to explain and discuss the principles and knowledge deliverable for learning outcomes (a), (b), (c), (d), (f) and (g). Tutorials are used to reinforce lectures for achieving outcomes (c), (d), (f) and (g). Practical enable students to practice the proper use of various kinds of common radiation detectors. Experiments are designed to promote a deeper learning and understand to the content in lectures for achieving outcomes (b), (c), (d), (e) and (g).
Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	g
1. Continuous assessment	40	√	√	√	√		√	√
2. Lab Report	10		√	√	√	√		√
2. Examination	50	√	√	√	√	√	√	√
Total	100							

Continuous assessment consists of assignments. Assignments are used to strengthen the basic knowledge of students and their analytical skill to solve the problems related to radiation protection.

Problem questions, in different structures such as multiple choices, short and long questions, are used in tests and final examination to measure the student knowledge of radiation protection. The questions are designed to cover all the intended learning outcomes. The students are required, through answering the questions, to demonstrate their capability in comprehending, explaining and analyzing radiation protection matters.

Student Study Effort Expected	
Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial	6 Hrs.
▪ Practical / Lab	3 Hrs.
Other student study effort:	
▪ Self-study / Revision	39 Hrs.
▪ Assignments	36 Hrs.
▪ Lab report	6 Hrs.
Total student study effort	120 Hrs.

Reading List and References	Bushong, Stewart C. Radiologic science for technologists: physics, biology, and protection. 11th ed. 2016. St. Louis, Mo.: Mosby/Elsevier. Martin, James E. Physics for Radiation Protection. Third Completely Updated ed. Weinheim, Germany: Wiley-VCH Verlag GmbH & KGaA, 2013. Web. ICRP (International Commission on Radiological Protection) Report No.60, 1990. Oxford: Pergamon Press. ICRP (International Commission on Radiological Protection) Report No.103, 2007. Oxford: Pergamon Press. Laws of Hong Kong, Radiation Ordinance and its subsidiary regulations, Caption 303, 1996 HK Government. IAEA (International Atomic Energy Agency), Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources, Standard Syllabus and Training materials, 2002. Martin Alan. An introduction to Radiation Protection, 2019, 7th ed. London: Hodder Arnold. Yves Lemoigne. Radiation protection in medical physics, 2011, Springer.

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon subject completion. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time, overcrowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method is intended to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.