

Teacher(s)	Froment Pascal ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	- Basic concepts of physics. Structure of matter. - Radiation-matter interaction.
Main themes	This course aims to introduce the basic concepts of radiation protection, including Belgian and European legislation. Practical applications of radioisotopes in industrial, medical and veterinary settings will be presented and analysed.
Learning outcomes	At the end of this learning unit, the student is able to : Contribution of the teaching unit to the learning outcomes of the programme (PHYS2M) 1 1.2, 1.3, 2.2, 2.5, 5.3, 9.1, 9.2, 9.3. Specific learning outcomes of the teaching unit 2 At the end of this teaching unit, the student will be able to correctly manage the use of sources of ionizing radiation (radioactive sources and X-ray tubes) in a laboratory, a medical establishment or an industrial establishment.
Evaluation methods	The evaluation consists of a written examination consisting of about ten questions followed directly by a discussion with the teacher. Complementary questions make it possible to specify the answers given at the written exam
Teaching methods	Teaching activities will be provided by the holder of the teaching unit. The concrete examples are adapted to the questions and wishes of the students.
Content	All aspects of on-site radio management: production, packaging, transport, implementation and disposal for various applications. Module 1: Radiation Protection - Basic (10 hours) 1. Interaction radiation-matter. Types of radiation. Energies. Absorption and attenuation. 2. Effects of radiation: stochastic and deterministic effects 3. Sources of radiation. Sealed and unsealed sources, X-rays. 4. Physical quantities in radiation protection. Detectors (review) 5. Estimation of absorbed dose rate for photons (build-up) and electrons. 6. External exposure: principle of minimisation 7. Internal exposure: principles of minimisation 8. Principles of radiation protection. ALARA Vol. 2. Practical Session – All: Hands-on session with radiation protection detectors. (2 hours) given by P. Froment as part of the theoretical course. Practical – Non-Veterinary: Laboratory session on 'The stochastic nature of radiation'. (2 hours) given by E. Cortina Practical – Veterinary: Positioning in veterinary practice (4 hours) given by the veterinary department Module 2: Legislation (4 hours) 1. Role of international organisations (ICRP, ICRU, IAEA, etc.): introduction 2. European legislation (based on Directives and Directive 2013/59) 3. Legislation in Belgium. Entities (FANC, accredited bodies, site and practitioner authorisations, Health physics, control, etc.) 4. Classification of nuclear incidents in radiation protection and INES Module 3: Advanced radiation protection (12 hours). 1. Radiation protection for external sources: attenuation, shielding (4 hours) 2. Radiation protection during the use of sources (radioactive sources, accelerators, X-rays): industrial and medical applications, as well as NORM (natural sources) (2 hours) 3. Occupational radiation protection. Individual protection, natural sources (1 hour) 4. Waste management (1 hour)

	5. Decontamination (personnel and equipment) (1 hour) 6. Transport (2 hours) 7. Public protection: environmental monitoring, public protection (1 hour) Vol. 2. Practical session: Alpha, beta and gamma spectroscopy (2 hours) Laboratory visit (CRC) The teaching unit contains many current and concrete examples. These examples are chosen according to the orientation chosen by the students.
Inline resources	The materials used during the course are provided by the lecturer as and when required. The course is tailored to the students' future interests (with practical examples).
Bibliography	Des ouvrages en relation avec les disciplines seront présentés lors des cours. Books related to the disciplines addressed will be presented during the theoretical lectures.
Faculty or entity in charge	PHYS

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biomedical Engineering	GBIO2M	6		
Master [120] in Medical Physics	PHMD2M	6		