

Module name	Introduction to Radiophysics
Module number	EuI-BMT-C-SPG
Lecturer in charge	Prof. Dr. Christian Richter christian.richter@oncoray.de
Objectives	After completing the module, students are familiar with the basics of atomic, nuclear and radiation physics relevant to the application of radiation in medicine and radiation protection. They have the theoretical and methodological skills to independently solve practical tasks relating to the therapeutic and diagnostic use of radionuclides, dosimetry and detection of ionizing radiation and radiation protection.
Contents	The contents of the module are the atomic, nuclear and radiation-physical fundamentals for the application of radiation in medicine. This includes atomic and nuclear physical laws that are relevant for therapeutic and diagnostic applications of radionuclides and the generation of ionizing radiation through atomic and nuclear processes: Fundamentals of quantum mechanics and special relativity; atomic shell: construction and radiation emission; atomic nucleus: phenomenological properties and nuclear models; nuclear magnetic moments; decay of unstable nuclei; nuclear reactions. This includes the basic processes of interaction between radiation and matter, which are relevant for therapeutic and diagnostic applications of ionizing radiation and for radiation protection, in detail: radiation field quantities and radiation transport equation, energy transfer in the radiation field, effects as a result of energy transfer, biological radiation effects.
Modes of teaching and learning	4 hours per week lectures, 2 hours per week exercises and self-study.
Prerequisites	The module requires knowledge of classical physics and advanced mathematics at basic A-level. The knowledge acquired in the modules Introduction to Analysis and Calculus for Functions with Several Variables is required.
Usability	The module is a compulsory module in the basic studies of the degree programme Biomedical Engineering. It creates the prerequisites for the modules that list that module in the "Prerequisites" field.
Requirements for the award of credit points	The credit points are awarded when the module assessment is passed. The module assessment consists of a written exam of 180 minutes.
Credit points and grades	6 credit points can be obtained by the module. The module grade is the grade of the examination.
Frequency	The module is offered every winter semester.
Workload	The total effort is 180 hours.

Duration	The module takes one semester.
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