Title:	Introduction to nuclear physics
Lecture hours:	30
Study period: (summer/winter)	winter
Number of credits:	3
Assessment methods:	The condition for passing the course is obtaining at least 50% of points during the final exam. Assessment criteria: 0-49% unsatisfactory (2) 50-59% satisfactory (3) 60-69% satisfactory+ (3+) 70-79% good (4) 80-89% good+ (4+) 90-100% very good (5)
Language of instruction:	English
Prerequisites:	Knowledge of the basics of mathematical analysis and general physics.
Course content:	1. Introduction. A brief history of nuclear physics. Areas of nuclear physics. Important discoveries in nuclear physics. Basic concepts and definitions; orders of magnitude. 2. Quantities characterizing atomic nuclei. Size, charge and mass of the nucleus. Spin and magnetic moment of the nucleus. Binding energy of nuclei. Nuclear lifetime. 3. Models of the atomic nucleus. Liquid-drop model. Valley of stability. Fermi gas model. Nuclear shell model. 4. Spontaneous nuclear decay. Alpha and beta decay; gamma radiation. Excited states of nucleus. Nuclear decay law. Radioactivity. Successive radioactive decay. 5. Interaction of nuclear radiation with matter. Interaction types. Interaction of charged particles with matter. Interaction of neutrons with matter. Interaction of gamma radiation with matter. 6. Nuclear reactions. Conservation laws. Neutron induced nuclear reactions. Nuclear fission reaction. Nuclear fusion reactions. 7. Nuclear technology. Nuclear reactor.

	Particle accelerators. Ionizing radiation detectors. Measurements in dosimetry. 8. Applications of nuclear physics methods in medicine. Nuclear magnetic resonance. Nuclear magnetic resonance imaging. Positron emission tomography. 9. Nuclear radiation in the environment and in practical applications. Radioactive isotopes in the natural environment. Background radiation level. The use of isotopes in scientific research and medicine.
Learning outcomes:	P_W01 - has knowledge of basic branches of physics and general knowledge of basic concepts, principles and theories in the field of physics and related disciplines, as well as of practical applications of this knowledge in professional activities (K_W01) P_W03 - can reproduce basic physical laws and theorems (K_W01) P_W04 - knows and understands the wave-particle and radioactive nature of matter (K_W01) P_U01 - is able to analyse problems and find solutions based on known theorems and methods (K_U01) P_K01 - is ready to critically assess the acquired knowledge and received content, recognize the importance of knowledge in solving cognitive and practical problems, and seek the opinion of experts while having difficulties in solving the problem (K_K01, K_K02)
Name of lecturer:	dr Hubert Cybulski, associate professor
Email address:	hubert@ukw.edu.pl