Course name: ***Elements of Nuclear Physics***	
Course status: compulsory	*Course language: english*
Name of the teacher: ***Piotr Magierski***	
Semester:	*Number of hours:* 2/ 1/ 1 (Lect/Classes/Lab)
Code:	*Number of ECTS credits:*
Pre-requsites: ***General Physics course***	
Form of completion: written tests	
Assessment methods: Grading is based on the results of two written tests and five lab exercises. In order to obtain a positive final grade one has to pass both tests and all five lab exercises. The final grade is obtained according to the formula: **2/3 K + 1/3 L** where K and L are the average grades from both tests and five lab exercises, respectively.	
Aims of the course: During the course student gets acquainted with properties of atomic nuclei and nuclear interactions. After completing the course student is able to estimate binding energy of a given nucleus, determine some properties of its ground state and low-energy excitations, as well as determine possible decay channels. He/she possess an understanding of physical processes taking place in nuclear reactors and stars.	
Program of the course: *1. Structure of matter, elementary particles. Fundamental interactions. Typical length and energy scales related to atoms and nuclei.* *2. Structure of atomic nucleus. Sizes and masses. Nuclear chart. Range of stability of atomic nuclei.* *3. Binding energy of a nucleus. Separation energies. Valley of stability. Decay channels. Magic numbers.* *4. Excitation modes od atomic nuclei. Total and differential cross section.* *5. Properties of nuclear interaction. Deuteron properties.* *6. Nuclear models: liquid drop model, independent particle model (shell model), collective models.* *7. Accelerators, detectors, interaction of particles with medium.* *8. Radioactivity. Law of radioactive decay. Nuclear transmutation. Decay chains.* *9. Decay channels: alpha, beta, gamma, fission.* *10. Nuclear reactions. Models of nuclear reactions.* *11. Spontaneous and induced fission. Chain reaction.* *12. Neutron physics. Interaction of neutrons with matter.* *13. Thermonuclear synthesis. Synthesis of light elements in stars, supernova explosion, r-process.* *14. Thermonuclear synthesis on Earth: methods and problems.* *15. Challenges for contemporary nuclear physics. Recent experiments.*	
Basic literature: *1. J.-L. Basdevant, J. Rich, M. Spiro, Fundamentals in Nuclear Physics. From Nuclear Structure to Cosmology, Springer* *2. E. Skrzypczak, Z. Szeflinski, "Wstęp do fizyki jądra atomowego i cząstek elementarnych", PWN* *3. A. Strzałkowski. "Wstęp do fizyki jądra atomowego", PWN* *4. K. Muchin, "Doświadczalna fizyka jądrowa", WNT*	