

Study Programme: PhD Studies in Physics		
Course Unit Title: Experimental techniques and methods of nuclear physics		
Course Unit Code: FD18ETNF		
Name of Lecturer(s): Full Professor Istvan Bikit		
Type and Level of Studies: PhD Degree		
Course Status (compulsory/elective): Elective		
Semester (winter/summer): Winter		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): Face-to-face		
Number of ECTS Allocated: 30		
Prerequisites: Introduction Nuclear Physics, Nuclear Physics		
Course Aims: To introduce students to the nuclear methods and experimental techniques.		
Learning Outcomes: Students should develop: - Basic abilities: become familiar with principles of nuclear methods and experimental techniques; - Specific abilities: since some technologies are studied in detail, the knowledge could be applied for practical purposes.		
Syllabus: <i>Theory</i> Measurement techniques: Basic nuclear processes in radioactive sources. Passage of radiation through matter. The ionization and scintillation detectors. Semiconductor detectors and cryogenic detectors. Magnetic spectrometers. Electronic signal processing, analogue and digital circuits. Coincident techniques. Methods based on measuring the time characteristics of signals. Accelerator techniques. Handling of radiation beams. Dosimetric techniques. Measurement methods: The research methods of schemes of nuclear decay. The research of nucleus through Coulomb excitation. Spectroscopy of nucleus after neutron capture. Half-life measurements of excited states of nuclei. Half-life measurements of the ground state of nuclei. Measurement of spin and electromagnetic moments of nuclei in the ground state. Angular correlation of nuclear radiation. Low-temperature orientation of nuclei. Methods of measurement the recoil of nucleus. Methods of measuring the polarization of nucleus radiation. <i>Practice</i> -		
Required Reading: 1. W.R. Leo, Techniques for Nuclear and Particle Physics Experiments, Springer-Verlag, Heidelberg, 1994. 2. K. Siegbahn, α , β and γ ray spectroscopy, North Holland, Amsterdam, 1965. 3. L. Marton, Methods of Experimental Physics, Nuclear Physics Acad. Press, New York, 1961. 4. W. Hamilton, The electromagnetic interaction in nuclear spectroscopy, North Holland, 1975.		
Weekly Contact Hours:	Lectures: 5	Practical work: 15

Teaching Methods:

Lectures, practical work and seminars.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	Final exam	points
Active class participation	5	written exam	
Practical work	10	oral exam	70
Preliminary exam(s)		
Seminar(s)	15		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.