

Level : PhD		
Course title: Application of Nuclear Physics Measuring Techniques		
Status: elective		
ECTS: 15		
Requirements: Adequate Master degree		
Learning objectives Acquiring the necessary knowledge that some specific measurement techniques of nuclear physics can be used in all applied and research areas based on radiation or radioactivity.		
Learning outcomes - General Skills: Introduction to the principles of nuclear analytical techniques and some of the application of standard measurement techniques of nuclear physics in different kind of applied or research fields. - Specific Competencies: Developed skills in the use of standard measurement techniques of nuclear physics for application in different types of disciplines. Some skills concerning measurement and analytical techniques will be developed to allow the candidate to use this knowledge in non-nuclear physics disciplines.		
Syllabus <i>Theoretical instruction:</i> Generation and detection of X-rays. X-ray fluorescence analysis. Emission of X-ray induced by charged particles (PIXE). Neutron activation analysis. Nuclear reactors as sources of neutron. Neutron generators. Gama spectrometry of products of neutron nuclear reactions. Gama spectrometer measurements. Selected alpha and beta spectroscopy techniques. Specificity of application of nuclear analytical techniques in different materials (soil, water, atmosphere, biological samples, fuels) and areas (industry, medicine, environmental protection, archeology). <i>Practical instruction:</i> Experimental exercises and individual term paper.		
Literature 1. Industrial and Environmental Applications of Nuclear Analytical Techniques, IAEA-TECDOC-1121, International Atomic Energy Agency, Vienna, 1999. 2. V. Valkovic: X Ray Spectroscopy in Enviromental Sciences, ISBN 0849347491. 3. H.R. Verma, Atomic and Nuclear Analytical Methods, Springer, 2007		
Weekly teaching load	Lectures: 6	Exercises: 4