Course Unit Descriptor

Study Programme: Physics

Course Unit Title: Application of Nuclear Physics Measuring Techniques

Course Unit Code: FD18MTNF

Name of Lecturer(s): Full Professor Miodrag Krmar

Type and Level of Studies: PhD Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 15

Prerequisites: -

Course Aims:

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:

Theoretical instruction:

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).

Practical instruction:

Experimental exercises and individual term paper.

Required Reading:

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 Contact Hours:	**Lectures:** 6	**Practical work:** 4

Teaching Methods:

Lectures, seminars and practical work.

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	**Final exam**	points
Active class participation	-	written exam	-
Practical work	10	oral exam	70
Preliminary exam(s)	-	…….	
Seminar(s)	20		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			