

Course Unit Descriptor

<b>Study Programme:</b> Master Academic Studies in Physics			
<b>Course Unit Title:</b> Simulation Techniques in Nuclear Physics			
<b>Course Unit Code:</b> M18STNF			
<b>Name of Lecturer(s):</b> Full Professor Dusan Mrdja			
<b>Type and Level of Studies:</b> Master Academic Degree			
<b>Course Status (compulsory/elective):</b> Elective			
<b>Semester (winter/summer):</b> Summer			
<b>Language of instruction:</b> English			
<b>Mode of course unit delivery (face-to-face/distance learning):</b> Face-to-face			
<b>Number of ECTS Allocated:</b> 8			
<b>Prerequisites:</b> Nuclear Physics			
<b>Course Aims:</b> Introducing students to the concepts of simulation techniques in the research field of nuclear physics.			
<b>Learning Outcomes:</b> Understanding the principles of simulation techniques, which are applied in the research field of nuclear physics.			
<b>Syllabus:</b> <i>Theory</i> Monte-Carlo method. Random and pseudorandom numbers. Uniformly distributed random numbers. The random number generator. Non-uniform distribution of random numbers. Monte-Carlo simulation. Geant4 software package. Structure of Geant4 software package. Geant4 physical models and processes. Building of simulation settings. Influence of the detector geometry in the process of simulation. Selected examples of Monte Carlo simulation in nuclear physics. Comparison of simulation results with experimental data. General characteristics of a MCNP computer program for Monte-Carlo simulation. <i>Practice</i> Analysis of some results of simulations in nuclear physics (interactions of gamma rays with matter, radioactive decay, nuclear processes induced by neutrons).			
<b>Required Reading:</b> 1. Introduction to Geant 4, Geant4 Collaboration, 2011. 2. Geant4 User's Guide for Application Developers, Geant4 Collaboration, 2011.			
<b>Weekly Contact Hours:</b>	<b>Lectures:</b> 3	<b>Practical work:</b> 2	
<b>Teaching Methods:</b> Lectures, practical work and seminars.			
<b>Knowledge Assessment (maximum of 100 points):</b>			
<b>Pre-exam obligations</b>	points	<b>Final exam</b>	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.			