

Study program	Level of studies		Third cycle	
	Title of the study program		Doctoral studies in physics	
Course title	SYMMETRIES IN ELEMENTARY PARTICLE PHYSICS			
Course ID	Semester	Course status	ECTS credits	Teaching hours
PTH8031	I/II	Elective	10	30
Course aims and expected learning outcomes	<p>Strengthening student knowledge of Symmetries in Physics, a subject from master's studies, is the goal of this course. With a focus on particle physics, students will study the function of symmetries in physics.</p> <p>Upon the completion of course, students should be able to:</p> <ul style="list-style-type: none"> - make computations with Lie groups and Lie algebras and construct root and weight diagrams - analyze the properties of physical systems under spacetime symmetry - analyse gauge theories and a gauge transformation for electromagnetic field 			
COURSE CONTENT				
Symmetries and particles. Intro to Lie groups and Lie algebras. $SU(2)$ and Isospin. $SU(2)$ in particle physics. $SU(3)$ and Quark model. Roots and Weights in $SU(3)$ groups. Spacetime Symmetry. Gauge theories. Electromagnetism as a Gauge theory. Unified theory, $SU(5)$ and $SU(10)$.				
LITERATURE			ASSESSMENT OF LEARNING	
1. Howard Georgi, <i>Lie Algebras In Particle Physics: from Isospin To Unified Theories</i> (Frontiers in Physics), Westview Press; 2 edition (October 22, 1999).Yourk, 1999. 2. A. Zee, <i>Quantum Field Theory in a Nutshell</i> , Princeton University Press, 2 edition (February 1, 2010). 3. I. Doršner, <i>Simetrije u fizici</i> , Prirodno-matematički fakultet, Sarajevo, 2013. 4. I.J.R. Aitchison, A.J.G. Hey, <i>Gauge Theories in Particle Physics Vol1</i> , CRC Press, 2013			Assessment Method	Points
			Homeworks	20
			Seminar paper	40
			Final exam	40
			Total	100
Remarks				