

Study Programme: Physics, Professor of Physics			
Course Unit Title: Symmetries in physics			
Course Unit Code: F18SIMF			
Name of Lecturer(s): Assistant Professor Petar Mali			
Type and Level of Studies: Bachelor Academic 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: 6			
Prerequisites: Fundamentals of mathematical physics, Mathematical physics, Quantum mechanics.			
Course Aims: Students will gain an extensive knowledge of the application of symmetries in physics.			
Learning Outcomes: After taking the course, students should have developed:			
General abilities: basic knowledge of this field, following the literature, analysis of various solutions and the choice of the most adequate solution, application in practice and other subjects.			
Subject-specific capabilities: - mastering the elements of application of symmetries in physics.			
Syllabus:			
<i>Theory</i>			
Fundamentals of finite and Lie groups. Symmetries in classical and quantum physics. Wigner's theorem. Bloch theorem. Time translations. Unitary group $U(n)$. Special unitary group $SU(n)$. Identical particles. Angular momenta. Clebsh - Gordan coefficients. Wigner – Eckart theorem. Symmetry group of hydrogen atom. Lorentz group. $SU(n)$ group and elementary particles.			
<i>Practice</i>			
Problem solving. Homeworks. Seminars.			
Required Reading:			
1. J. P. Elliot, P. G. Dawber, Symmetry in Physics, London, Macmillan, 1979.			
2. M. Hamermesh, Group Theory and its Application to Physical Problems, Dover Publications, 1989.			
3. W. Greiner, B. Muller, Quantum Mechanics: Symmetries, Springer, 2nd edition, 2004.			
Weekly Contact Hours:	Lectures: 3	Practical work: 2	
Teaching Methods: Lectures			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation	5	written exam	20
Practical work		oral exam	50
Preliminary exam(s)	20	
Seminar(s)	5		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			

