

Study programmes: PhD – Mathematics				
Course name: Symplectic geometry				
Lecturers: Srđan N. Vukmirović, Zoran P. Rakić, Mirjana Đ. Đorić				
Status: Optional				
ECTS: 9				
Attendance prerequisites: Riemannian geometry A, Riemannian geometry B, Groups in geometry A, Groups in geometry B (or Lie groups and algebras)				
Course aims: Acquisition of general and specific knowledge about symplectic geometry. Preparing student for individual scientific work: studying of literature from this theory and gradually including student for individual research work.				
Course outcome: Upon completion of the course, the student has necessary knowledge about: the Euler-Lagrange equations, Lagrangian mechanics. Hamiltonian mechanics, symplectic group and algebra, symplectic manifolds, co-adjoint orbits, theorem about canonical coordinates, symplectic and Hamilton vector fields, submanifolds of symplectic manifold, symplectic reduction, application of reduction on hyper-Kahler manifolds. Student is qualified to individual understanding basic examples and solving problems from this area. Also, student is qualified for individual studying of scientific papers from this area.				
Course content: The Euler-Lagrange equations. The law of conservation of energy. Lagrangian mechanics. Hamiltonian mechanics. Symplectic group and algebra. Symplectic vector spaces. Symplectic manifolds. Co-adjoint orbits. Darboux's theorem about canonical coordinates. Symplectic and Hamilton vector fields. Space of symplectic structures. Submanifolds of symplectic manifold. Symplectic reduction. Application of reduction on hyper-Kahler manifolds.				
Literature:				
<ol style="list-style-type: none"> 1. V. I. Arnol'd, Mathematical Methods of Classical Mechanics, 1989, Springer-Verlag, Berlin, Heidelberg. 2. A T. Fomenko, Symplectic Geometry, 1988, Gordon and Breach, New York. 3. R. L. Bryant, An Introduction to Lie Groups and Symplectic Geometry, 1993, free web draft. 				
Number of hours: 10	Lectures: 4	Tutorials: -	Laboratory: -	Research: 6
Teaching and learning methods: Lectures/ Tutorials				
Assessment (maximal 100 points)				
Course assignments	points	Final exam	points	
Lectures	-	Written exam	-	
Exercises / Tutorials	20	Oral exam	60	
Colloquia	-	Written-oral exam	-	
Essay / Project	20			