Program	Level of studies		**First cycle**	
	Program name		**Physics**	
Course name	**CLASSICAL MECHANICS II**			
Course ID	Semester	Course status	ECTS credits	L+E
PTH4711	**IV**	**MANDATORY**	**7**	**3+3**
Lecturer	**Prof. dr. Azra Gazibegović - Busuladžić**			
Aims and intended learning outcomes	The aim of the course is to teach students how to analyze and solve the motion of a rigid body; mechanics in noninertial frames; relation of the equations of classical mechanics with the equations of modern physics through variational principles and Hamilton formalism. After mastering the subject, a student knows how to: - Describe and solve the motion of a rigid body; - Analyze and solve the equations of motion for a system that performs small oscillations. - The student knows the Variational principles and Hamilton's formalism.			

Course content

Rotational motion of rigid body: Kinematics. Translational and rotational motion. Angular velocity. Eulerian angles.
Mechanics in noninertial frames: kinematics and dynamics, inertial forces. Examples: free fall, Foucault's pendulum.
Rigid body dinamics. Rotation about a fixed axis: moment of inertia, physical pendulum. Rotation about a fixed point: equations of motion, inertia tensor, principal axes and principal moments of inertia, Euler's equations, free precession, inertia ellipsoid. Some special cases. General rigid body motion, examples.

Small oscillations, Coupled oscillators, normal modes and normal coordinates. Forced oscillations, damped oscillations. Driven damped oscillations.
Variational principles of mechanics: Hamilton's principle, Maupertuis-Lagrange-Jacobi's principle. The Catenary. Fermat's principle.
Hamiltonian mechanics. Hamilton's equations. Poisson brecket. Canonical transformations, Hamilton-Jacobi equation. Symmetries and conservation laws. E. Noether 's theorem.
Longitudinal oscillations of the system of springs. Introduction to continuum mechanics. Elastic string. Lagrange's and Hamilton's equations. Transverse motion of a taut string.

Student workload (hours)		Grading	
Lectures and Exercises	90	Assessment method	Bodovi
Exam preparation	85	Midterm exam	55
Total	175	Final exam	45
		Ukupno	100

Literature

1. K. Suruliz, Klasična mehanika, FLAMMULA, 2013
2. Corresponding material from the web-site "e-nastava" and notes from the lectures

Additional readings :

1. H. Goldstein, C. Poole, J. Safko, Classical Mechanics, Third Edition,Pearson/Addison-Wesley, Upper Saddle River 2002
2. John R. Taylor, Classical Mechanics, University Science Book, 2005

Remarks

The final exam is oral when possible. Students must score a minimum of 55% of the tests in order to enter the final exam. In order to successfully pass at the final exam, the student must score at least 50% of the points, with the total score at least 55 points.