F005	**Classical Mechanics 2**	L	S	P	ECTS
		2	0	1	5

Course objective. To demonstrate knowledge and understanding of the following fundamental concepts in dynamics of system of particles, motion of rigid body, Lagrangian and Hamiltonian formulation of mechanics. To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.
To develop math skills as applied to physics.

Prerequisites. Classical Mechanics 1 (F104).

Course content.

1. Introduction; discrete and continuous systems of particles; mass density; center of mass; the momentum of system of particles; angular momentum of system of particles.
2. Energy of the particles; the work of internal forces and internal potential energy; work of external forces and external potential energy; motion relative to the center of mass (momentum, angular momentum, kinetic energy); Lagrange and D'Alembert's principle; motion missiles; collisions of particles.
3. Small longitudinal vibrations of a discrete one-dimensional system of particles; small transverse vibrations of continuous one-dimensional system of particles; standing wave; traveling wave; wave energy.
4. Planar motion of a rigid body; moment of inertia; theorems about moments of inertia; rotation kinetic energy; physical pendulum; statics of rigid bodies; tensor of inertia; principal moments of inertia; Euler equations of motion; motion of the Earth; precession; Euler angles; top: precession, nutation and spin.
5. Degrees of freedom; conditions on the motion; Lagrange equations for holonomic and nonholonomic systems; Lagrange function of charged particles in the electromagnetic field; Euler-Lagrange equations and Hamilton's principle.
6. Hamilton's equations of motion; Poisson brackets; canonical transformation; Liouville's theorem; transition to quantum mechanics.

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Define and understand basic mechanical concepts related to discrete and continuous mechanical systems
2.	Describe and understand the vibrations of discrete and continuous mechanical systems,
3.	Describe and understand planar and spatial motion of a rigid body,
4.	Describe and understand the motion of a mechanical system using Lagrange-Hamilton formalism

RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Class attendance	0	-	Class attendance	Evidence list	0	0
Knowledge test (preliminary exam)	2.5	1-4	Preparation for written examination	Written preliminary exam	25	50
Final exam	2.5	1-4	Repetition of teaching materials	Oral exam (and written exam)	25	50
TOTAL	5	1-4			50	100

Teaching methods and knowledge assessment. Lectures (30 hours) and auditory exercises (15 hours). Three preliminary exams (90 min.) during the semester (50% weighting)T and oral exam (50% weighting), or one 2-hour written examination (50% weighting) and oral exam (50% weighting).

Can the course be taught in English: Yes

Basic literature:

1. Klasična mehanika, uvod - Z. Glumac, http://www.fizika.unios.hr/~zglumac/utm.pdf
2. Theory and Problems in Theoretical Mechanics - M. Spiegel

Recommended literature:

1. Teorijska mehanika - Z. Janković
2. Classical Mechanics - H. Goldstein
3. Mehanika - L. D. Landau, E. M. Lifšic
4. Teorijska fizika i struktura materije - I. Supek
5. Mathematical Methods of Classical Mechanics - V. I. Arnold
6. Teorijska mehanika - S. M. Targ
7. A Guided Tour of Mathematical Physics - R. Snieder, http://samizdat.mines.edu/snieder/