Course Unit Descriptor

Study Programme: Physics, Professor of Physics

Course Unit Title: Theoretical Mechanics

Course Unit Code: F18TM

Name of Lecturer(s): Full Professor Milica Pavkov Hrvojević

Type and Level of Studies: Bachelor Academic Degree

Course Status (compulsory/elective): Compulsory

Semester (winter/summer): winter

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 7

Prerequisites: Mechanics, Fundamentals of Mathematical Physics

Course Aims: Students will affirm and round up the previous knowledge of mechanics and increase it by introduction analytical formalism appearing in modern theoretical physics.

Learning Outcomes: On completion of this module, student should be able to understand basic ideas and reasoning behind the development of mechanics and its application to other fields. Student should also be able to follow the literature in the field, analyse different solution and to choose the most adequate one, to find out the solution independently. Student will know an application of basic dynamical equations of the law of motion of particle under the action of force, Lagrange and Hamilton formalism and the laws of motion of rigid body.

Syllabus:

Theory

Kinematics of the particle. Newton's laws of mechanics. Isolated and non-isolated systems. Basic dynamical equation of particle. Conservative forces. Free and forced motion of the system. Differential equations of motion of the system of particles. Work and effect of the force. Reactions and type of reactions. DeLamber-Lagrange principle. Method of generalized coordinates. Lagrange equations. Hamilton equations. Motion of rigid body. Relative motion. Poasson brackets. Canonical transformations. Hamilton-Jacobi method. Small oscillation and normal coordinates of the system. Central motion, Kepler's problem. Collision of the particles. Dynamical elements and the laws of the motion of rigid body. Dynamics of relative motion.

Practice

Problem solving.

Required Reading:

1. H. Goldstein, Classical Mechanics, John Wiley and Sons, New York, 1965.
2. RA Becker, , R Heller Introduction to theoretical mechanics- American Journal of Physics, 1955
3. Dreizler, Reiner M., Lüdde, Cora S., Theoretical Mechanics, Springer

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		written exam	20

participation			
Practical work		oral exam	40
Preliminary exam(s)	40	…….	
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			