

Type of study : Bachelor in physics, Integrated studies- master professor of physics
Module title: Theoretical Mechanics
Module type: Core
No ESPB: 7
Prerequisites : Mechanics, Fundamentals of Mathematical Physics
Module 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: 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.
Reading list: <ol style="list-style-type: none"> 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
Contact hours: 3+2
Methods of delivery: Lectures (3 hours per week), exercices (2 hours per week),