Study programs: Bachelor studies – Astronomy and astrophysics, Mathematics	
Course name: Basics of mechanics	
Lecturers: Anđelka Kovačević	
Status: Elective	
ECTS: 6	
Attendance prerequisites: No prerequisites	
Course aims: Acquiring knowledge of mechanics and physics and the principles of modeling in these scientific fields.	
Course outcome: Upon completion of the course, the student is qualified to solve various mechanical and physical problems and to model them in the Python programming language.	

Course content:

Introduction to Python (short comparison with S language).

Basic modeling and analysis of the oscillatory movement of the pendulum with: one and two masses. Basic modeling of wave motion. Animation of the movement function. Simulation and analysis of a 1-dimensional random walk of a body of negligible mass. Modeling and analysis of missile launch and movement. The impact of the atmosphere's resistance. Ballistic shot. Cosmic speeds.

The theory of motion of artificial satellites. Launch of a vehicle. Orbital maneuvers. Landing the vehicles. Kinematics of moving coordinate systems. Dynamics of solid body with modeling application of marine vehicles and land vehicles. Basic principles of modeling the movement of airplanes in the atmosphere.

Basic modeling of planetary motion. Modification of the basic model of orbital motion by adding relativistic term in the expression for the force of gravity. The basic hyperbolic model of the close approach of the body of large mass and body of negligible mass. Application to close approaches between asteroids. Elastic collision modeling. Modeling the rotation of solid bodies.

Literature:
1. Python documentation (https://www.python.org)
2. T. Anđelić, R. Stojanović, *Racionalna mehanika,* Zavod za izdavanje udžbenika, 1965, Beograd
3. Robet Green, *Astronomija, klasika u novom ruhu,* Vesta, Beograd, 1998
4. Frank W.F. Kirik: *Essential physics I,* ebook, 200
5. A. Kovačević: *O određivanju masa asteroida,* Zadužbina Andrejević, 2008

Number of hours: **5**	Lecures: **2**	Tutorials: **3**	Laboratory: **-**	Research: **-**

Teaching and learning methods: Frontal, Interactive, Tutorial, Lectures, Exercises

Assessment (maximal 100 points)				
Course assignments	**points**	**Final exam**	**points**
Lectures	4	Written exam	-
Exercises / Tutorials	-	Oral exam	-
Colloquia	32	Written-oral exam	60
Essay / Project	4		