Study programmes: Master studies – Astronomy and Astrophysics	
Course name: Celestial mechanics	
Lecturers: Bojan Novaković	
Status: Optional	
ECTS: 8	
Attendance prerequisites: None	

Course aims: Acquiring general and specific knowledge of the way of the celestial body's motions with a special emphasis on the small Solar system bodies (asteroids and comets).

Course outcome: At the end of the course, the student is familiar with the different characteristics of the movement of celestial bodies, and he is trained to solve complex problems in celestial mechanics as well as for inclusion in scientific - research.

Course content:
1. Motion of celestial bodies: Kepler laws. Newton's law of gravity, 2-body problem, Vector Integral Problem. Trajectory shape. Motion along an elliptical trajectory. Elliptical orbital elements.
2. N-body problem: General Integral n-body problem. Transient movement of the Solar system. Laplase invariable plane. General Theory of Planetary Disorders. Funcional disorders. Basic vector equations of disorders. Differential equations heliocentric motion of the planet. Developing the functions of the disorder in sequence. Rezonance. Integration of different equal movements. Classification of disorders. Secular disorders.
3. Special cases of the 3-body rpoblem: Center of attraction of three bodies. Asteroid issue. Equal motion. Jacobi integral. Lagrange's equilibrium points. Trosky asteroids and their motion.
4. The dynamics of small bodies of the Solar System: Orbital characteristics. Dynamic stability of motion. Orbital Resonance. The effect of Arkovsky. Framily crash asteroids. Asteroids near Earth. Trans-neptun objects. Active asteroids and short-period comet. Probability of collision with the planet.

Literature:
1. Gerhard Beutler: Methods of Celestial Mechanics, Volume I, Springer-Verlag Berlin Heidelberg 2005
2. Carl D. Murray, Stanley F. Dermott: Solar System Dynamics, Cambridge University Press, 2000
3. Bojan Novaković: Dinamika malih tela Sunčevog sistema, skripta, Beograd, 2014
4. Jean Souchay: Dynamics of Extended Celestial Bodies and Rings, Lect. Notes Phys. 682, Springer, Berlin Heidelberg, 2006

Number of hours: 5	Lectures: 3	Tutorials: 2	Laboratory: –	Research: –

Teaching and learning methods: Frontal, group and practical

Assessment (maximal 100 points)				
Course assignments	**points**	**Final exam**	**points**	
Lectures	20	Written exam	20	
Exercises / Tutorials	-	Oral exam	30	
Colloquia	-	Written-oral exam	-	
Essay / Project	30			