Course Unit Descriptor

Study Programme: Physics, Professor of Physics

Course Unit Title: Celestial Mechanics

Course Unit Code: F18NM

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

Type and Level of Studies: Bachelor Academic Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

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

Number of ECTS Allocated: 6

Prerequisites: Fundamentals of Mathematical Physics, Theoretical Mechanics

Course Aims: Students will gain basic knowledge of the laws of the motion in the first row of planets, and afterwards of the rest of the bodies in the solar system.

Learning Outcomes: On completion of this module, student should be able to understand basic ideas and reasoning behind the development of celestial 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 the laws of motion of the planets of solar system in the first approximation and have basic knowledge of the laws of motion of planets if, except Sun, interaction with other planets of Solar system is included.

Syllabus:

Theory

Particle motion under the action of central force (Kepler's laws and cosine intersection). Motion of planet as a problem of two-bodies in the solar system if 1) the integration constants are chosen to be initial kinematical state, 2) the integration constants are chosen to be so called vector's elements, 3) the integration constants are chosen to be elliptical elements. Determining the position of planet in the space. Reduction of the problem of satellite motion to two-bodies problem. Problem of n-bodies. Perturbation function. Method of variation of constants. Equations of motion of vector's and elliptical elements. Series expansion of perturbation function. Periodical variation, variation of long periods and secular variations of elliptical elements.

Practice

Problem solving.

Required Reading:

1. Forest Ray Moulton, An Introduction to Celestial Mechanics, New York, The Macmillan Company
2. Richard Fitzpatrick, An Introduction to Celestial Mechanics, Cambridge University Press

Weekly Contact Hours:	**Lectures:** 3	**Practical work:** 1

Teaching Methods: Lectures

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	20
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.			