Level: bachelor

Course title: Celestial Mechanics

Status: obligatory

ECTS: 7

Requirements: Basis of mathematical physics

Learning objectives

Understanding of the basic laws of motion, primarily of the planets and then of the rest of the bodies in the solar system.

Learning outcomes

After taking the course, students should have developed:

General abilities: basic knowledge of this field, following the literature, analysis of various solutions and the choice of the most adequate solution, application in practice and other subjects.

Subject-specific abilities: knowing the laws of motion of the planets in the solar system in the first approximation; knowing the laws of motion of the planets if interaction of the rest of the planets in the solar system, besides the Sun, is included.

Syllabus

Theoretical instruction

The motion of the particle affected by the central force (Kepler's laws and conic section). The motion of the planet as a problem of two bodies in the solar system in the cases: 1) if initial kinematic states are chosen as integration constants, 2) if the so called vector elements are chosen as integration constants, 3) if elliptic elements are chosen as integration constants. Determination of the position of the planet in the space. Reducing the motion of satellite to the problem of two bodies. Problem of n - bodies. Perturbation functions. The method of variation of constants. The equation of motions of vector and elliptical elements. Developing the perturbation function into the series. Periodical variations, variations of long period and secular variations of elliptic elements.

Practical instruction

Students are doing home-works and seminars. Problem solving sessions.

Weekly teaching load				Other:
Lectures: 3	Exercises: 2	Other forms of teaching: 0	Student research:	