| | |
|---|---|
| **Study programmes**: MASTER STUDIES - Mathematics | |
| **Course name**: Mathematical Methods of Mechanics | |
| **Lecturers**: Darko Milinković | |
| **Status**: Optional | |
| **ECTS**: 8 | |
| **Attendance prerequisites**: Introduction to theoretical mechanics, Introduction to dynamic systems theory | |
| **Course aims**: Acquiring the necessary knowledge from the fundamental mathematical disciplines applied in classical mechanics. | |
| **Course outcome:** The student is able to apply modern methods for describing and solving various problems of classical mechanics. | |
| **Course content**: Basic principles of mechanics. Smooth manifolds. Lie groups and algebras and mechanics. Symplectic and contact manifolds and mechanics. Almost complex and complex structures. Riemannian surfaces. Elliptic curves and elliptic functions in mechanics. Pencils of quadrics. The Hamilton-Jacobi equations. Methods of separation of variables. Poisson's manifolds. Hamiltonian systems. The Liouville-Arnold theorem. Completely integrable systems. Lagrange's and Legendre's submanifolds. Mathematical basics of rigid body dynamics. Frobenius' theorem. The method of the last multiplier, invariant measures and applications. | |

**Literature**:

1. В. И. Арнољд, Математические методи классическои механики, Наука, Москва 1974. (in English: Mathematical methods of classical mechanics, Graduate Texts in Mathematics, 60, Springer 1978)
2. V. Dragović, D. Milinković, Analiza na mnogostrukostima, primene u geometriji, mehanici, topologiji, Matematički fakultet, Beograd, 2003.
3. 3. C. G. J. Jacobi, Vorlesunen Uber Dynamik. Gessamelte Werke VIII, Berlin 1884 (in Russian: Лекции по динамике, ОНТИ 1936)

| **Number of hours**: 7 | **Lectures**: 3 | **Tutorials**: 2 | **Laboratory**: - | **Research**: 2 |
|---|---|---|---|---|
| **Teaching and learning methods**: Frontal / Tutorial | | | | |

| Assessment (maximal 100 points) | | | |
|---|---|---|---|
| **Course assignments** | **points** | **Final exam** | **points** |
| Lectures | 10 | Written exam | 30 |
| Exercises / Tutorials | - | Oral exam | 30 |
| Colloquia | - | Written-oral exam | - |
| Essay / Project | 30 | | |