**Level :** master

**Course title:** Advanced Nuclear Physics

**Status:** obligatory

**ECTS:** 8

**Requirements:** Introductory Nuclear Physics, Nuclear Physics

**Learning objectives**

Introducing students to the methods of modern nuclear physics, together with rare nuclear processes.

**Learning outcomes**

Gaining knowledge about methods of modern nuclear physics, which are applied in the research field of nuclear physics and the study of rare nuclear processes.

**Syllabus**

Form factor and distribution of charge of nucleus. Electromagnetic moments of nucleus. The interaction of the nuclear charge distribution with external electric field. Fermi theory of beta decay. Nuclear astrophysical processes. Modern methods of nuclear physics (Investigation of nucleus by Coulomb's excitation. Spectroscopy of nucleus after neutron capture. Measurement of half-lives of nuclear excited states. The angular correlation of nuclear radiation. Low-temperature nuclear orientation. In-beam spectroscopy.) Rare nuclear processes (Proton decay. Neutrino interactions and neutrino mass. Double-beta decay. Problem of solar neutrinos. Neutrino oscillations. The excitation and deexcitation of the isomeric states. LEGINT process. Cluster radioactive decay.).

| **Weekly teaching load** | | | | Other: |
|---|---|---|---|---|
| Lectures:<br>3 | Exercises:<br>1 | Other forms of teaching:<br>3 | Student research: | |