Study programmes: BACHELOR STUDIES – Astronomy and Astrophysics

Course name: Nuclear physics

Lecturers: Jovan Puzović and other lecturers

Status: Optional

ECTS: 7

Attendance prerequisites: Physics of atoms, Quantum mechanics 1 and 2

Course aims: Introduction to basics of modern nuclear physics, historical progress, radioactivity, ionization effects, nuclear astrophysics, property and models of nuclei, fission and fusion.

Course outcome: Students are introduced to basics of modern nuclear physics; they are able to use their knowledge (nuclear medicine, industry) and follows recent results of modern research in this area.

Course content:

Short history of Nuclear Physics. Nuclear physics and particle physics. Chart of isotopes. Static properties of nucleus. Dimensions of nucleus. Mass of nucleus. Electromagnetic moments. Spin and parity of nuclear states. Isospin. Basic properties of nuclear forces. Nuclear models: liquid drop model, shell model. Instability of nucleus: alpha, beta and gamma decays. Nuclear reactions. Nuclear spectroscopy. Physics of neutrons. Physics of neutrinos. Spontaneous fission. Induced fission and chain reaction. Fusion. Nuclear astrophysics.

Literature:

1. K.S.Krane: "Introductory Nuclear Physics", Wiley, New York 1988
2. L. Marinkov: "Osnovi nuklearne fizike" Univerzitet Novi Sad 1976
3. W.E.Bucham: "Nuclear Physics" Longman Group 1973
4. J. Puzović: "Nuklearna fizika kroz eksperiment", Faculty of Physics 2017
5. D. Krpić, I. Aničin, I. Savić: "Nuklearna fizika kroz zadatke" Univerzitet u Beogradu 1996

Number of hours: 9	**Lectures**: 4	**Tutorials**: 2	**Laboratory**: 3	**Research**: -

Teaching and learning methods:

Lectures; Solving problems; Consultations; Practical classes.

1. Ionization chamber 2. Absorption of gamma rays 3. Statistics of counts 4. Measurements of low activity 5. Magnetic beta spectrometry 6. Scintillations gamma spectrometry 7. Semiconductors gamma spectrometry

Assessment (maximal 100 points)

Course assignments	points	Final exam	points
Lectures	10	Written exam	30
Exercises / Tutorials	-	Oral exam	40
Colloquia	-	Written-oral exam	-
Essay / Project	20		