

SOFIA UNIVERSITY "ST. KLIMENT OHRIDSKI"

CURRICULUM

Approved by the Academic Council with protocol
№ 6 / 30.03.2016g.

Sciences

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Specialization in Nuclear and Particle Physics

Qualification characteristics

Specialty:

Nuclear and Particle Physics

1. Focus and educational purposes

The specialty of Nuclear and Particle Physics (NPP) comprises disciplines related to studies of matter at the subatomic level, and to application of physical methods developed in other areas of physics and engineering.

The program of study is especially geared toward providing the students with specific expertise allowing for immediate employment in the corporate research world or in government laboratories, or for further graduate study. Students obtain a solid physics background plus significant experience in computational science, physics of elementary particles, fundamental and applied nuclear physics, dosimetry of ionizing radiation, radioecology, accelerators and their applications. The teaching takes place entirely in English. The training methods are based on modern information technologies that rely on the well-developed Internet network of the Sofia University. Workload allows students to perform scientific research in one of the research groups at the Department of Atomic Physics from the beginning of their training.

2. Training (knowledge and skills required for successful professional activity; general theoretical and specialized training, etc.).

To perform their professional activities in accordance with the expectations the NPP bachelors must be well educated and must possess practical skills in the following fields:

1. Mathematics and Information Technology - linear algebra and analytic geometry; analysis of functions of one or more variables; probability theory and mathematical statistics; vector, tensor and complex analysis; differential equations; basic computer skills, programming and computational physics; fundamentals of information technology including object-oriented programming and database architectures.
2. Physics – mechanics, molecular physics, electricity and magnetism, optics, atomic, nuclear, and elementary particle physics, thermodynamics and statistical physics, theoretical mechanics, electrodynamics, quantum mechanics, astrophysics and cosmology.
3. Specialized training – nuclear and elementary particle physics, dosimetry and radiation protection, nuclear electronics, mathematical statistics for data, analysis, computer simulation of physical processes.

3. Professional competences

NPP Bachelors can perform advanced research in all areas where the quantum physics plays a central role. This includes both fundamental and applied research in nuclear and particle physics, computer science and computational physics, dosimetry and radiation protection, and technological developments in nuclear engineering.

Bachelors in this specialty can be involved in activities related to measurements and construction of detectors of ionizing and non-ionizing radiation, and the risk assessment upon radiation exposure, including in emergency situations. NPP Bachelors can identify various radiological factors of natural and technogenic origin, can establish procedures for monitoring and evaluation of radiation risks, and can determine the mitigation criteria for implementation and use of new technologies.

4. Professional realization

NPP Bachelors hold a university bachelor's degree in physics and can work in research institutes and laboratories, universities, high-tech companies and enterprises, as well as in many state institutions where the respective knowledge and skills are relevant.

Good language skills (in English) allow them to develop a career in international research institutes such as the European Organization for Nuclear Research (CERN) in Geneva, the Joint Institute for Nuclear Research (JINR) in Dubna, near Moscow, European Space Agency (ESA) and others. The solid training in computer science and statistical methods in various fields of human activity, as well as the additional training, which is offered via optional courses, enable the NPP bachelor diploma holders to be employed in banks, in the management of companies and enterprises and in statistical institutions.

The envisaged high and broad academic level of education in the program allows the NPP bachelors to continue their education in MSc or PhD programs not only in our university but also in other internationally well-recognized universities all over the world.

5. Admission requirements

The programme is open to citizens of countries from the European Union (EU, including Bulgarian citizens) as well as to citizens of countries outside the EU.

The EU and Bulgarian citizens are admitted according to the general rules of the St. Kliment Ohridski University of Sofia available at:

https://www.uni-sofia.bg/index.php/eng/admission/international_students/application_procedure/applicants_from_eu_member_countries

In addition to the general requirements they have to provide: (i) a grade from a State (matriculation) exam in physics or mathematics held in EU member country or to pass an admission exam in physics; (ii) a grade from a State (matriculation) exam in English language or internationally recognized certificate in English corresponding to the Level B1 or higher according to the Common European Framework of Reference for Languages.

The candidates from non-EU member countries have to comply with the general rules for admission in the St. Kliment Ohridski University of Sofia as foreign students: (http://www.uni-sofia.bg/index.php/eng/admission/international_students/applicants_from_non_eu_member_countries/).

In addition to the general requirements they have to provide a grade in physics from the high-school diploma and an internationally recognized certificate in English corresponding to the Level B1 or higher according to the Common European Framework of Reference for Languages.

Admitted foreign students are required to take a course of Bulgarian language during the first four semesters of their study.