

# Study programme Bioinformatics and Computational Biology

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<b>Faculty</b>	Faculty of Electrical Engineering and Computer Science
<b>Type of study</b>	Doctoral
<b>Language of instruction</b>	English
<b>Code of the programme</b>	P0588D140004
<b>Title of the programme</b>	Bioinformatics and Computational Biology
<b>Regular period of the study</b>	4 years
<b>Cost</b>	500 CZK per semester
<b>Coordinating department</b>	Department of Computer Science
<b>Coordinator</b>	doc. Ing. Petr Gajdoš, Ph.D.
<b>Key words</b>	molecular biology, bioinformatics, biomedicine, big data analysis, statistics

## About study programme

The Doctoral Study Program (DSP) Bioinformatics and Computational Biology is a combined study program aimed to three areas of education (Informatics; Biology, Ecology and the Environment; General Medicine and dentistry). It is a multidisciplinary "doctoral degree" program between two universities. All subjects offered to students of this DSP are a combination of subjects focused on informatics - guaranteed by VŠB-TUO (50%), and subjects focused on biology and medical sciences - guaranteed by Palacky University in Olomouc (30% + 20%). Also the interuniversity ratio 50:50 appears to be optimal from perspective of the offer of subjects, staffing of the program, the profile of the graduate and the demand for graduates at labor market.

## Professions

- Senior programmer and developer specialist in the area of bio-medical data analysis
- Team leader (director of technology)
- Data analyst (specialist)
- Specialist in science, research and development
- Academic staff member

## Hard skills

- Software development
- Process analysis
- Algorithms and data structures
- Data analysis
- Parallel data processing
- HPC programming

## Graduate's employment

Graduates will be prepared to perform their profession in medical facilities of higher types, in laboratories performing analysis of biological samples, in the academic sphere, in other institutions dealing with science, research, development and innovation, in specialized laboratories, in the application sphere, in the pharmaceutical industry, in purely commercial sphere and in state administration. They can find positions in teams dealing with the analysis of medical and biomedical data, in solving new tasks as leaders of research teams or researchers.

## **Study aims**

The aim of the study is to educate experts with interdisciplinary domain knowledge of natural and medical sciences and informatics with emphasis on practical experience and skills necessary for bioinformatics analysis of various types of large and small data sets, knowledge extraction from data and database systems. Graduates will be theoretically and experimentally prepared to be able to perform independent research work involving stages from the acquisition of large and small data sets (laboratory, clinical) to their professional bioinformatics and statistics analysis and interpretation. The study of this program allows direct output into practice. Graduates can find job positions in the field of basic research as well as in the field of industrial research and experimental development, and can find positions not only in research institutions and universities of biomedical specialization but also in private pharmaceutical and diagnostic companies.

## **Graduate's knowledge**

The graduate has a professional overview across the multidisciplinary areas of Biology and Informatics, in a breadth and depth exceeding the level of the master's degree student at the Faculty of Medicine or the Faculty of Informatics. Theoretical knowledge of basic disciplines (e.g. statistics, data analysis, informatics, etc.) are deepened so that they are directly applicable to applied and basic research in the chosen field. The student has deep theoretical and practical knowledge, especially in the field of bio-medical data processing. Understands the scientific methods used in his field of focus and is able to apply them independently.

## **Graduate's skills**

The students can design new, effective, and well-theoretically substantiated solutions based on original ideas that are accepted by the international scientific and professional community. The students can implement, evaluate, and compare even very complicated existing procedures, they can solve interdisciplinary problems requiring knowledge from multiple interconnected domains, especially medicine, biology, and informatics. They can anticipate trends in his field and propose solutions to problems from the position of a team leader. They can choose appropriate procedures and appropriate technologies, based on the use of the latest knowledge. Finally, they can independently prepare extensive professional texts in a foreign language, especially in English, presenting specific procedures for solving practical tasks, and they are able to defend the proposed solutions in a professional discussion at the international level.

## **Graduate's general competence**

The graduate can use a scientific approach to problem solving, set goals, determine strategies, choose theoretical starting points, choose alternative solutions, communicate with people in solving problems, such as managing the work of a team of solvers, presenting and defending their views and solutions in an international forum. The student can communicate with top experts in the field in a foreign language, especially in English, popularize their field, influence developments in their field, take responsibility for their decisions and teamwork, take into account the social impact of decisions made.