VSB TECHNICAL UNIVERSITY OF OSTRAVA | FACULTY OF MINING AND GEOLOGY

Geoinformatics

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Faculty	Faculty of Mining and Geology
Type of study	Doctoral
Language of instruction	Czech
Code of the programme	P0532D330037
Regular period of the study	4 years
Coordinating department	Department of Geoinformatics
Coordinator	prof. Ing. Jiří Horák, Dr.
Keywords	geoinformatics, remote sensing, geovizualization, geocomputation, GIScience

About study programme

The doctoral study programme Geoinformatics offers a modern interdisciplinary study based on a combination of technical and natural-science foundations. The programme develops knowledge in the field of theoretical concepts of geoinformatics (GIscience) as well as in areas such as remote sensing of the Earth's surface by satellites and unmanned systems, building of spatial databases, use of spatial analysis, spatial modelling and simulations, artificial intelligence or advanced GNSS measurement processing and geovisualisation. Students can focus on applying their own geoinformation solutions, e.g. in transport, agriculture, forestry, geomorphology, hydrology, environment, social geography, criminology or studying social networks. The study programme addresses current trends within the framework of strategic requirements of the state administration expressed in GeoInfoStrategie+, 4.0 industry requirements and 4.0 society, development of remote sensing methods, big geodata, cloud solutions, geoweb services, as well as geocomputation. The Geoinformatics study programme provides highly-erudite creative experts with career prospects in the area of scientific research and development, state administration, or the industrial sphere.

Graduate's employment

A graduate of the Geoinformatics doctoral study programme is prepared for an independent scientific research or a university teaching profession in the studied, as well as the related fields. He/she will thus find career opportunities in institutions engaged in science, research, development and innovation projects, in companies with an innovation potential, in international companies, at universities, in state administration and self-government, or as self-employed persons.
The graduates will be able to become engaged in:
• the building of geoinformation systems;
• development of applications of geoinformation technologies of diverse focus; from hydrological to socio-economic applications;
• analysis, modelling and simulation of space-time data;
• evaluation of aspects of spatial data quality and uncertainty management in the process of processing and evaluation of spatial data;
• planning and implementation of projects in the field of geoinformatics;
• management of project teams in the field of geoinformatics.
Typical professions include a geoinformatics specialist, a specialist geographer, an independent researcher in research institutions, a research group leader and a university assistant professor.

Study aims

The Geoinformatics study programme is based on an extended technical and natural science basis. The aim of the study is for graduates of all forms of study of this doctoral study programme to be prepared for getting involved in development and research

activities in the Czech Republic, as well as abroad, in the area of a relevant field of specialisation, for solving highly-demanding, unconventional and complex geoinformation tasks within the framework of basic or applied research, and to find employment namely as academic staff of universities and researchers workers in research organisations and innovative companies.
The focus and objectives of the study programme builds on the focus of the follow-up Master's degree programme Geoinformatics at the Faculty of Mining and Geology at the Technical University of Ostrava. The students deepen their knowledge in the field of basic theoretical concepts of geoinformatics (GIscience) as well as in a number of specific areas such as advanced methods of spatial data collection using GNSS, remote sensing of the Earth's surface, building large spatial databases, spatial statistics and highly-complex methods of spatial analysis, spatial modelling and simulation, advanced methods of processing images of the Earth's surface and their interpretation, geocomputation and geovisualisation. Depending on the choice of topic of the doctoral thesis, the student is guided individually to expand his/her theoretical knowledge, critical use of scientific literature, application of research methodology, planning and implementation of experimental and practical tasks, synthesis, discussion and interpretation of results so as to be able to engage in independent scientific work.
The study programme addresses current trends within the strategic requirements of state administration (e.g. GeoinfoStrategy), requirements of industry 4.0 and society 4.0, development of remote sensing methods, big geodata, cloud solutions, web services, geocomputation and artificial intelligence.
Based on the above specialisation and according to Government Regulation No. 275/2016, Coll. on university fields of education, the Geoinformatics doctoral study programme is included in the areas of education 33 - Earth Sciences, where it is specifically one of the thematic areas of this field of education.

Graduate's knowledge

The doctoral graduate will have a deep expertise in theoretical concepts of geoinformatics (GIscience), which are systemically developed and deepened in selected specific subdisciplines depending on the topic of the doctoral thesis. These include, in particular, global navigation and position systems, remote sensing, geostatistics and spatial statistics, spatial modelling and simulation, large data processing, digital cartography, geocomputation and geovisualisation.
The students are involved in workplace research projects and learn to work in scientific teams under the guidance of experienced experts. They become familiar with the methods of scientific work concerning a specialised subject matter. The resulting profile of the graduate will be determined by the choice of the topic of the doctoral thesis. The nature of the study programme reflects the fact that in many cases the problem is complex and extends to other fields. The students learn to understand scientific and research problems bordering with multiple disciplines, adapt and develop the ability to communicate in multidisciplinary and international teams. The language training of the graduate is aimed at mastering professional as well as general communication in a foreign language, as a necessary condition for publishing and sharing scientific results in the international professional community.
The achieved professional outputs of the doctoral thesis form a basis for preparation of publications, which the doctoral student presents at national and international conferences, as well as in professional journals.

Graduate's skills

Professional skills allow a doctoral graduate to perform an analysis of the assigned tasks, to propose and evaluate alternative ways of their resolution, to plan and automate workflows. The student is then able to defend his/her solution proposals and translate them into a sequence of steps leading to their implementation. The student is able to conduct professional discussions, communicate with co-workers and contracting entities, which allows him to hold a leading position within the research team. Experience in solving new problems and applying the principles of scientific work allows him/her to acquire new expertise, skills and competences. He/she can also communicate about professional problems in a foreign language. By getting actively engaged at professional conferences, he/she develops his/her abilities to present own results, form a judgement, communicate and get involved in discussions with fellow professionals. As part of his/her involvement in lectures in the form of leading practical lectures on professional subjects, the doctoral student develops his/her pedagogical and communication skills, as well as the ability of lifelong education. The doctoral student acquires professional skills especially in analytical, development and experimental activities in solving research projects and cooperation projects in practice. He/she is independently able to plan, evaluate and put into practice scientific procedures in the application areas of geoinformatics and also control the analytical, experimental and development methods used in the subject matter field.

Graduate's general competence

The graduates are able to approach the tasks assigned in a creative and proactive manner, manage complex specialised activities or projects, inclusive of their planning, implementation and obtaining feedback, be responsible for all the related decisions, become effectively engaged under the guidance or in partnership with qualified experts, and lead multi-member, complex and diverse groups. They are able to acquire and critically evaluate new knowledge and plan large-scale activities of a creative nature. They are able to formulate and present their own opinions, reflecting the views of other members of the group, communicate information, ideas, problems and solutions comprehensively, use knowledge and skills in at least one foreign language. The graduates have the potential to work at research institutes or universities, as scientific and research staff, postdoctoral researchers or academic staff. They can formulate a scientific problem or a hypothesis independently, propose a method of solving it, or an analytical or experimental activity aimed at its resolution. They are able to clearly and convincingly communicate their own scientific knowledge in the subject matter field to other members of the scientific community at an international level in a foreign language, as well as to the general public. They are able to plan and manage research projects and raise resources to carry out their creative activities. In some cases, they have the opportunity to start an academic career with the perspective of a habilitation with a view of being subsequently appointed.

Study curriculum

- form Full-time (cs)
- form Part-time (cs)