

Mining and Mining Geomechanics

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Faculty	Faculty of Mining and Geology
Type of study	Doctoral
Language of instruction	English
Code of the programme	P0724D290005
Title of the programme	Mining and Mining Geomechanics
Regular period of the study	4 years
Coordinating department	Department of Mining Engineering and Safety
Coordinator	prof. Ing. Vlastimil Hudeček, CSc.

About study programme

The doctoral study in the Mining and Mining Geomechanics programme is designed for graduates of the master's degree programme in Mining of Mineral Resources.

This degree programme is designed to provide students with the opportunity to prove successful in various academic and research institutions, as well as in companies and public institutions engaged in the creation and development of applications covering relevant procedures and technologies used to support the work activities of these entities in practice.

The study programme aims to prepare students who will have a deep and systematic knowledge of the subject and scope of the study field that will match the current state of knowledge in this field. This will allow them to use advanced research procedures in the field in a way that allows them to expand their knowledge of the field via original research, as well as the implementation and management of projects introducing new ways of solving various issues concerning the raw materials industry into practice.

Graduate's employment

Graduates of the doctoral study programme in Mining and Mining Geomechanics will be able to apply themselves:

- in all management positions within the scope of Decrees (up to "underground mine manager" or "quarry manager"),
- in the area of state authorities,
- in the operations of geomechanical services,
- in mining and land registry offices, as well as building authorities and property authorities departments,
- as managers in companies dealing with reclamations of lands,
- as executives in the areas of ventilation and air-conditioning systems,
- as managers in the areas of design and preparation of mining activities, and for activities carried out using mining techniques,
- as scientists specialising in geomechanics and geophysics or rocks,
- as a process line technologist,
- as a processing technologist,
- as a designer of equipment intended for a particular material,
- as a head of research teams,
- in quality control of engineering works,
- as various specialists,
- as university lecturers.

Study aims

Doctoral studies in the Mining and Mining Geomechanics programme follow the completed master's degree programme in Mining of

Mineral Resources.

The study programme covers current trends in the extraction of deposits such as coal, ore and building materials provided by underground mining and quarrying, as well as methods of opening, equipment and technology used in the mining processes. It also includes geomechanical evaluation of massifs concerning deep underground mining (coal, ore and non-metallic raw materials) and quarrying of coal and non-coal deposits, including their block extraction and subsequent activities related to the mining. The following areas are monitored: stress-forming manifestation of rocks, the mountain massif and its influencing factors, a rheological manifestation of rocks and the mountain massif, residual stress in rocks and residual tension of the mountain massif, technological properties of rocks, limit states in rocks and the mountain massif, thermal regime of the mountain massif and its use, gas and water regime of the mountain massif in underground mines, movements of disconnected rocks, anomalous geomechanical phenomena, the impact of anthropogenic activity on geomechanical changes and disruption of the mountain massif, methodology for monitoring geomechanical changes in rocks and the mountain massif, and geomechanical tasks related to the liquidation of old mining pits. The programme also covers the issues of ventilation, air conditioning and safety of mining work, as well as automation in the mining industry, including the use of computing technology. It also includes the economics of mining activities and the management of the extraction of economic raw materials. An integral part is also the mineral processing, processes related to the transport of mined and processed material and reclamation of affected terrains and ecological issues related to mining activities. The doctoral study in the Mining and Mining Geomechanics programme is, based on the above-stated information and according to Government Regulation no 275/2016, Coll. on Higher Education, 100 per cent included in the areas of education part 29 – Mining and processing of minerals/mineral raw materials.

Graduate's knowledge

The doctoral graduate will gain expert knowledge concerning the interrelations of natural sciences and engineering disciplines that are part of the relevant study programme. During their studies, students gain a high motivation and professional approach due to their systematically active participation in the process of solving various projects, practical issues and learning about new findings in the field of mining and geomechanics. The graduate is expected to have a deep theoretical knowledge of theories and methods, the ability to systematically assess anomaly phenomena, use their conceptual and analytical capabilities and current modern methods in solving actual situations, actively communicate with field experts, and develop new procedures and methods for mining and geomechanics. Accepting new trends related to our EU membership and participation in vast European structures and projects must also be an essential part of these graduates' professional orientation. The graduate will be sufficiently linguistically educated and prepared to participate actively in foreign internships, international conferences, and symposiums, as well as to publish abroad.

Graduate's skills

Professional skills allow a doctoral graduate to analyse the assigned tasks, as well as to design and evaluate alternative ways of solving them. He/she can defend his/her proposed solutions and convert the ideas into a sequence of steps leading to their implementation. The graduate can participate in a professional discussion, communicate with colleagues and contracting entities, which allows him/her to take a leading position in the problem-solving team. Experience in dealing with new issues and applying new principles of scientific work into practice allows acquiring new expertise, skills, and capabilities. He/she can communicate about technical issues in a foreign language. By active participation in professional conferences, he/she develops the abilities to present his/her results and achievements, comes to his/her conclusions and communicates with the professional public. As a part of his/her involvement in teaching, provided in the form of practicals from special subjects, the doctoral student develops his/her pedagogical and communication skills, as well as the ability to further deepen his/her knowledge. Doctoral students acquire professional skills especially in laboratories, carrying out various experiments of the relevant doctoral student training unit and in solving research and other projects in close cooperation with practice. The person can independently design, evaluate and use an advanced scientific procedure in the application areas of mining and mining geomechanics, and also master experimental methods used in the relevant study programme.

Graduate's general competence

Our graduates can approach the assigned tasks creatively and proactively, manage more complex technical or professional activities or projects (including planning, implementation, and feedback), bear responsibility for all relevant decision-making, effectively

operate under the guidance or in partnership with qualified experts, and lead multi-member, complex and miscellaneous groups of people. They are eligible to evaluate new findings and plan large-scale activities of a creative nature. They are able to formulate and present their own opinions, reflecting the view of other members of the team, comprehensively communicate information, express ideas, present problems and solutions, and use knowledge and skills using at least one foreign language. Graduates have the potential to work at various research institutes or universities as researchers or postdoctoral researchers. They can independently formulate a scientific problem, propose a method for its solution and experimental activities leading to a resolution. They can communicate their scientific knowledge to other members of the scientific community clearly and convincingly, at an international level, using an international language, as well as present it to the general public. They can acquire the resources to carry out their creative activities. In some cases, they have the opportunity to start their academic career with the prospect of habilitation and subsequent appointment procedures.