

# New undergraduate and graduate studies in Applied geology and geological engineering in Croatia

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МАКЕДОНСКО ГЕОЛОШКО ДРУШТВО СКОПЈЕ 1952  
MACEDONIAN GEOLOGICAL SOCIETY SKOPJE 1952

5<sup>-ти</sup> КОНГРЕС / 5<sup>-th</sup> CONGRESS

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Геолозите на Република Северна Македонија  
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**КНИГА НА ПРОШИРЕНИ АПСТРАКТИ**  
**BOOK OF EXTENDED ABSTRACTS**



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## NEW UNDERGRADUATE AND GRADUATE STUDIES IN APPLIED GEOLOGY AND GEOLOGICAL ENGINEERING IN CROATIA

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**Key Words:** occupational standard, qualification standard, study program, applied geology, geological engineering

### INTRODUCTION

The landscape of higher education is constantly evolving to meet the dynamic needs of various industries. In response, the University of Zagreb's Faculty of Mining, Geology, and Petroleum Engineering has undertaken a crucial initiative to develop new undergraduate and graduate study programs in Applied Geology and Geological Engineering. This effort highlights the Faculty's commitment to both academic excellence and industry relevance. The new programs, set to commence in the academic year 2024/25, mark a significant advancement in geological education in Croatia. This presentation aims to illustrate the comprehensive approach taken in developing these programs, starting with the establishment of occupational standard and culminating in the implementation of curricula that align with both industry demands and academic expectations.

### EXPERIMENTAL PART

The journey of developing these new study programs began with the meticulous establishment of occupational standards. These standards are crucial as they define the skills, knowledge, and abilities required for effective job performance in the fields of Applied Geology and Geological Engineering. Crafted through extensive collaboration with industry experts, employers, educators, and stakeholders, the occupational standards emerged from a detailed job analysis, identifying the tasks and responsibilities associated with each role in the applied geosciences.

Following the development of occupational standard, the next phase involved creating qualification standards. These standards articulate the competencies needed for

individuals to excel in their professions. By analyzing the skills and competencies identified in the occupational standards, the qualification standards were designed to serve as a blueprint for the educational and training programs. This process ensured that the educational offerings would adequately prepare students for the evolving demands of the job market and align with contemporary industry practices.

From these qualification standards, learning outcomes were derived to guide the formulation of the study programs. These outcomes were mapped onto individual courses, designing a curriculum that encompasses both theoretical knowledge and practical applications. To ensure the relevance and quality of the programs, a review and approval process was conducted, incorporating feedback from industry professionals, international academic peers, and other stakeholders.

### RESULTS AND DISCUSSION

The new undergraduate and graduate programs in Applied Geology and Geological Engineering have been designed to address the practical and theoretical aspects of the field comprehensively. The undergraduate program emphasizes the application of geological knowledge in real-world scenarios, offering students the opportunity to acquire essential skills and hands-on experience necessary for a successful career in various sectors. Through an interdisciplinary approach and practical examples, students will be equipped to tackle complex challenges related to geological resources, hazards, infrastructure projects, and environmental protection. Graduates of the undergraduate program will receive a Bachelor's degree in Geological Engineering.

The graduate program allows students to specialize further by selecting one of four modules: (1) Hydrogeology, (2) Engineering Geology, (3) Geoenergy, and (4) Mineral

Resources and Environmental Geology. Each module offers specific expertise.

**Hydrogeology** focuses on groundwater and the modeling of its flow and contamination, essential for sustainable management of this vital resource. Specialists in this module will be prepared for roles in water supply projects, infrastructure projects such as roads and tunnels, and the safe disposal of hazardous materials.

**Engineering Geology** provides competencies for land-use planning, environmental impact assessments, and the design and construction of structures. Graduates will be equipped to assess geological hazards, material properties, and contribute to construction planning.

**Geoenergy** centers on exploring the deep subsurface for energy sources and underground fluid storage, crucial for the energy transition. Specialists will be trained in sustainable energy resource utilization and reducing dependence on fossil fuels, supporting global efforts to cut greenhouse gas emissions and protect the environment.

**Mineral Resources and Environmental Geology** focuses on exploring mineral resources, particularly those critical for the European Green Deal, supporting the transition to a sustainable and resource-efficient economy. Specialists will be able to determine the existence, location, and quality of mineral deposits, their exploitation conditions, and environmental protection.

Graduate students will enrich their academic experience through intensive fieldwork, laboratory experiments, and mandatory internships with industry-relevant organizations, providing practical skills and real-world connections.

Upon completion of the graduate program, Master's degree holders in Geological Engineering will have a broad range of employment opportunities both in Croatia and internationally. Their competencies will be essential for (1) planning, designing, executing, and supervising natural resource exploration (water, soil, minerals, and energy resources) for both exploitation and preservation, (2) protecting against natural hazards (geohazards), and (3) participating in infrastructure projects (such as dam and tunnel construction).

## ACKNOWLEDGEMENT

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