

GRADUATE PROGRAMME

The graduate study program of Geo-engineering takes two years, and it includes the courses in *Geotechnical Engineering*, *Hydrotechnical Engineering* and *Environmental engineering*. This program is open to graduates with a 1st cycle or foreign equivalent degree and requires a further *120 credits*, which can be accumulated over an average of two years. Previous specific curricula in the first cycle are required for admission. The 2nd cycle aims at providing students with an advanced level of education for highly qualified work in specific areas. Students who have completed the undergraduate study program of *Geo-engineering* are authorised to use the lawfully protected academic title Master of Geoengineering.

The course in Geotechnical Engineering comprises the curriculum in the field of engineering, which evolved over the course of the last century into a separate technical discipline. The foundation of geotechnical engineering is knowledge of the natural geological situation and stability in the lithosphere. In accordance with this knowledge, a geotechnical engineer should be able to find technically, economically and ecologically appropriate solutions to the geology and stability problems in the Earth's crust. Geotechnical engineering is an interdisciplinary area that examines interactions between the rock or soil foundations and the building, the course of groundwater and distribution of pollutants through the soil in smaller regions. Scientific methods used in geotechnical engineering are based on the results of investigation of complex geological structure of soil and rocks as well as on the information about civil engineering structures. It is also becoming increasingly common to examine the effect of human activities on the condition of the environment, which resulted in creation of a new scientific discipline named environmental geotechnics.

The course in Hydrotechnical Engineering comprises the curriculum on water resources, from their research to integral management. A special place in the programme is given to a potable water, which is becoming an ever more important resource of future development at the global and European levels, but other ways of using water are also given an important place. Water resources are very important to Croatia, since Croatia is highly positioned in the European context in terms of quantity and quality of surface and groundwater, so that our experts have a great responsibility for efficient protection and rational use of water resources. The system of integral management and efficient protection includes finding solutions to the problem of waste water and solid waste, which is a big problem today in Croatia and in the countries of the EU, especially in the new members. Special attention in the curriculum is paid to sanitary (health-care) hydrotechnics, and to the issue of determining the quantity and quality of potable water.

Environmental engineering is an interdisciplinary course which comprises an engineering approach to identification, prevention and alleviation of unfavourable impacts on the environment. If modern civilization wants to protect its environment over the long term in balance with economic and social interests, it must choose a path into the future that would gradually lead to sustainable development, and that can be done only with the help of adequately educated experts. Therefore, sustainable development is an ideal and a vision which must provide direction over the long term. In spite of all the challenges, the environment in the Republic of Croatia can be protected over the long-term providing the social and economic development based on the principles of sustainable development.

The education of students within the framework of study programme at the Faculty of Geotechnical Engineering is focused today on the most current methods of research and integral management, primarily in accordance with the EU directives on waters, EUROCODE 7 standards for geotechnical design, and other global standards in the area of geotechnical, hydrotechnical and environmental engineering.

The increasing attention to the environment and its components justifies the need for experts educated according to the study programme of the Faculty of Geotechnical Engineering in public institutions as well as in the private sector. The increasingly strong legislation in this interdisciplinary profession certainly provides the favourable context for employing experts educated in the study programme of the Faculty of Geotechnical Engineering.

The manner of organizing instruction facilitates the mobility of graduated students and their preparation for inclusion into the system of lifelong learning. In case that the student decides to continue studies at the graduate level, he or she could enrol into appropriate programmes at Faculties of civil engineering, at the Faculty of Mining, Geology and Petroleum Engineering, and at the Faculty of Chemical Engineering and Technology.

GEOTECHNICAL ENGINEERING

1st TERM

Course	Hours per week		<i>ECTS</i>
	lectures (lectionum)	exercises (exercitationum)	
Mathematics III	2	2	6
Applied geophysics	2	2	6
Slope stability	2	2	6
Blasting	2	2	6
Optional course 1MG	2	2	6

Group 1MG

Soil mechanics II
Foundation II

Students enrol in one optional course.

2nd TERM

Course	Hours per week		<i>ECTS</i>
	lectures	exercises	
Theory of structures	2	1	5
Introduction to research	2	0	2
Geotechnical monitoring	2	2	6
Earth retaining structures	2	2	6
Underground structures	2	2	6
Optional course 2MG	2	1	5

Group 2MG

Geotechnical design

Mining design

Students enrol in one optional course.

3rd TERM

Course	Hours per week		<i>ECTS</i>
	lectures	exercises	
Grouting	2	1	5
Exploitation of mineral resources	2	1	5
Business economics	2	1	4
Communication skills	2	1	4
Optional course 3MG	2	2	6
Optional course 4MG	2	2	6

Group 3MG
Soil dynamics
Concrete structures

Group 4MG
GIS in geotechnics
Geostatistics

Students enrol in one optional course from each group.

4th TERM

Course	Hours per week		<i>ECTS</i>
	lectures	exercises	
Numerical modeling	2	3	7
Sanitary landfills	2	1	5
Thesis			18

HYDROTECHNICAL ENGINEERING

1st TERM

Course (Index lectionum)	Hours per week		<i>ECTS</i>
	lectures (lectionum)	exercises (exercitationum)	
Mathematics III	2	2	6
Applied geophysics	2	2	6
Groundwater hydraulics	2	2	6
Optional course 1MH	2	2	6
Optional course 2MH	2	2	6

Group 1MH

Hydrothermal reservoirs
Environmental risk assessment

Group 2MH

GIS in hydrotechnics
Environmental law

Students enrol in one optional course from each group.

2nd TERM

Courses	Hours per week		<i>ECTS</i>
	lectures	exercises	
Hydrogeochemistry	2	2	6
Water quality management	2	2	6
River engineering	2	1	5
Introduction to research	2	0	2
Hydrotechnical ameliorations	2	1	5
Optional course 3MH	2	2	6

Group 3MH

Karst water resources
Earth retaining structures

Students enrol in one optional course.

3rd TERM

Courses	Hours per week		<i>ECTS</i>
	lectures	exercises	
Water resources management	2	2	6
Applied hydrology	2	1	5
Communication skills	2	1	4
Business economics	2	1	4
Optional course 4MH	2	1	5
Optional course 5MH	2	2	6

Group 4MH

Groundwater modeling
Disperse systems

Group 5MH

Concrete structures
Geostatistics

Students enrol in one optional course from each group.

4th TERM

Course	Hours per week		<i>ECTS</i>
	lectures	exercises	
Numerical modeling	2	3	7
Groundwater protection	2	1	5
Thesis			18

ENVIRONMENTAL ENGINEERING

1st TERM

Courses	Hours per week		<i>ECTS</i>
	lectures	exercises	
Mathematics III	2	2	6
Applied geophysics	2	2	6
Environmental protection methods and measures	2	2	6
Optional course 1ME	2	2	6
Optional course 2ME	2	2	6

Group 1ME

Renewable energy
Environmental hydrology

Group 2ME

Environmental risk assessment
Environmental law

Students enroll in one course from each optional group.

2nd TERM

Courses	Hours per week		<i>ECTS</i>
	lectures	exercises	
Hydrogeochemistry	2	2	6
Environmental microbiology	2	2	6
Water quality management	2	2	6
Introduction to research	2	0	2
Waste management	2	1	5
Optional course 3ME	2	1	5

Group 3ME

Mechanical and biological waste treatment
Hydrotechnical ameliorations

Students enrol in one optional course.

3rd TERM

Courses	Hours per week		<i>ECTS</i>
	lectures	exercises	
Environmental physical factors	2	1	5
Abiotic resources protection	2	2	6
Disperse systems	2	1	5
Communication skills	2	1	4
Business economics	2	1	4
Optional course 4ME	2	2	6

Group 4ME
Concrete structures
Ecological modeling
Geostatistics

Students enrol in one optional course.

4th TERM

Courses	Hours per week		<i>ECTS</i>
	lectures	exercises	
Groundwater protection	2	1	5
Numerical modeling	2	3	7
Thesis			18