Curriculum 2020-2022

Most of construction materials, everyday household items, energy sources and groundwater originate from the earth. Megatrends like urbanization, climate change and increasing use of natural resources and energy greatly affect our lives. These scenarios generate challenges but also opportunities for specialist with knowledge in applied geosciences and construction. Geoengineers have such skills and many opportunities to work in different evolving expert assignments. Graduates are mainly employed by the industry, but also by government organizations and research institutions. They hold key positions ranging from research, teaching and consultancy, to management, design and engineering. The title in the start of the career can be a project manager, designer, site supervisor or researcher.

Geoengineering relies on a wide range of knowledge including geosciences, material sciences, mechanics and construction. Structures of interest are, for example, foundations, roads and tunnels. Geoengineering covers the whole life cycle from research and design to construction, maintenance and recycling. Field investigations, laboratory experiments and numerical modelling are the tools geoengineers are dealing with.

Learning outcomes

The Master’s programme in Geoengineering offers study tracks allowing specialization in geotechnical engineering, rock engineering or highway engineering. Good geotechnical knowledge is the foundation of all construction activities. In geotechnical engineering the mechanical, hydraulic and thermal properties of the soil and their impact on foundations, soil-structure interaction and soil improvement are the main fields of interest.

Rock engineering provides education to utilize bedrock as an underground space and as a mineral and energy resource. The education gives proficiency in designing optimal structures in the rock and expertise to carry out these plans in a safe, economic and most environmentally friendly way. The core fields are rock mechanics, excavation techniques and a selection of applied geosciences.

Roads and trafficked areas are an important part of societal infrastructure and have profound impact on everyday life and the entire function of the society. The focus areas of in highway engineering are the structural design of roads and their structure including bituminous materials.

Many of the courses are designed and also completed in cooperation with the industry, covering consultants, construction companies and authorities. In addition to conventional lectures, excursions and visits are arranged with industry partners. Assignments and case studies are based on real data and they are often completed by team work to develop student’s social skills, which are of significant importance for example in large civil engineering projects.

Degree structure

The master’s degree consists of major studies, elective studies and a master’s thesis.

- **Major studies**
  - (60 cr)
  - **Master’s thesis 2020-2022**
  - (30 cr)

- **Elective studies 2020-2022**
  - (30 cr)

The major studies (60 cr) are divided into common and advanced studies. The common studies courses (30 cr) are compulsory for all and they are completed during the first year of studies. In the advanced studies (30 cr) students can choose from a list of courses.

For their elective studies (30 cr) students can choose any courses offered at Aalto University. Also additional advanced studies courses can be included in elective studies. A list of recommended elective courses for geoengineers is provided.

At the end of their studies, students are required to complete a master’s thesis (30 cr).