

Civil Engineering and Applied Earth Sciences

Geo-Engineering

MSc Programme



The biggest risks in civil engineering are associated with the ground. Geo-engineers with a thorough understanding of the behaviour of soils and rocks are therefore urgently needed. The Geo-Engineering master track is devised to convey this fundamental knowledge and its application in the design of geotechnical constructions.

Degree	Master of Science
Starts	September
Type	full-time
Credits	120 ECTS, 24 months
Language	English
Application deadline	1 April: International students 1 July: Dutch degree
Tuition fee	€ 18.750 (non EU) € 2.168 (EU)
Scholarships	scholarships.tudelft.nl

Geo-Engineering encompasses topics as diverse as foundation engineering, underground space technology, dykes and embankments, offshore engineering, dredging, geo-environmental engineering and engineering geology. Geo-engineers face new challenges as we try to build a more sustainable society. We increasingly need to build on, in, under and with soils that may be classified as problematic, such as very soft soils, saturated soils, polluted soils and reclaimed soils. We also need to prolong the lifetime of existing structures, and minimise the risk and impact of geo-hazards. It is expected that construction and exploitation activities will move to unknown territories

deeper underground, as well as further and deeper offshore to the Arctic and to less favourable subsurface conditions.

Programme

The Master's programme in Geo-Engineering at TU Delft equips students with fundamental knowledge that can easily be transferred and applied in specialist areas. The emphasis is on problem-solving based on a thorough understanding of the underlying principles, with students obtaining a wide skill-set that is of benefit to industry, public authorities and consultants. The programme is centred on a compulsory core that provides the knowledge

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FIRST YEAR	SECOND YEAR
TRACK-SPECIFIC COMPULSORY COURSES (34 EC) <ul style="list-style-type: none"> • ENGINEERING GEOLOGY • EXPERIMENTAL METHODS IN GEOTECHNICAL ENGINEERING • BEHAVIOUR OF SOILS AND ROCKS • CONSOLIDATION OF SOILS • NUMERICAL MODELLING IN GEO-ENGINEERING • MODELLING COUPLED PROCESSES FOR ENGINEERING APPLICATIONS • RISK AND VARIABILITY IN GEO-ENGINEERING 	FREE ELECTIVES (20 EC) <ul style="list-style-type: none"> • ANY MSc COURSE (10 EC) • CHOOSE ONE (10 EC): <ul style="list-style-type: none"> • ANY FACULTY MSc COURSE • INTERNSHIP • MULTIDISCIPLINARY PROJECT • ADDITIONAL GRADUATION WORK
GEO-ENGINEERING ELECTIVES (22 EC) <p>CONTINUUM MECHANICS • DEEP EXCAVATIONS • BORED AND IMMERSSED TUNNELS • TRENCHLESS TECHNOLOGIES • ENVIRONMENTAL GEOTECHNICS • ROCK MECHANICS APPLICATIONS • GEO-RISK MANAGEMENT • OFFSHORE GEOTECHNICAL ENGINEERING • DESIGN OF EMBANKMENTS • TRENDING TOPICS IN GEO-ENGINEERING • SOIL DYNAMICS • SOIL-STRUCTURE INTERACTION • ENGINEERING GEOLOGY FIELDWORK</p> <p>"REPAIR COURSES": INTRODUCTION TO GEOLOGY • INTRODUCTION TO STRUCTURAL ENGINEERING • INTRODUCTION TO GEOTECHNICAL ENGINEERING • PRINCIPLES OF GEOHYDROLOGY</p>	
ETHICS (4 EC) CHOOSE ONE: <ul style="list-style-type: none"> • CLIMATE CHANGE: SCIENCE & ETHICS • PHILOSOPHY, TECHNOLOGY ASSESSMENT & ETHICS 	MSC THESIS (40 EC)

and tools for specialist and applied courses. Students are able to personalise their curriculum by choosing the study path that will best prepare them for their future careers. The programme challenges students to solve open-ended problems and teaches critical thinking skills, teamwork and discussion skills. It is based on a multi-disciplinary approach that combines theory and practice; students have the possibility of internships and work experience abroad. In this way, students can tailor the programme to their own interests and future career directions.

In brief, Geo-Engineering MSc students can develop expertise that is either oriented towards engineering, management, or geology; or broad, covering several fields of Geo-Engineering (geo-mechanics, geotechnical engineering, engineering geology, and geo-environmental engineering); or focused on specific applications, such as underground space, foundations, dykes and embankments, or offshore engineering.

Specialisations

There are no pre-set specialisations in the Geo-Engineering track. Besides the compulsory core, students select courses from the pool of Geo-Engineering electives. They choose their MSc graduation project and can contribute to the research activities of the Geo-Engineering section or help industrial partners to tackle a geo-engineering challenge. Before embarking on their graduation project, students have multiple options to deepen or broaden their skills, or have a hands-on experience with the 20 EC free electives. In this way, students can

tailor the programme to their own interests and future career directions.

Graduation examples

Different examples of graduation topics in the Geo-Engineering MSc track are:

- Slope stability analysis based on random finite element method and probabilistic approach
- Pipe uplift liquefied sands: The case of induced earthquakes in the Groningen area
- Influence of non-linear sand-mono pile interaction on the dynamics of offshore wind turbines
- Interaction between soil and tunnel lining during cross passage construction using artificial ground freezing
- Protocol for landfill monitoring through Electrical Resistivity Tomography
- Detecting discontinuities using "Monitoring-While-Drilling" data

Career prospects

Industry, consultants and the public sector urgently need specialists with a thorough understanding of the multiphysics behaviour of soils and soil structure interaction. Geo-Engineers therefore cater to a broad and international market. Career prospects are excellent, with many graduates finding employment with leading national and international companies across the civil engineering, dredging and offshore engineering industries.



2nd
in the QS World University
Ranking by subject: Civil and
Structural (2020)



50
first year students in 2020



30%
international students



74%



26%



**Most comprehensive
Geo-Engineering programme
in NL**



**Internationally
experienced staff**