Building with nature – on the ground, in the ground and under the sea

Geo-Engineering is one of the main disciplines underpinning the civil engineering profession. It entails having a fundamental understanding of the behaviour of soils and rocks, as well the application of this knowledge in the design of geotechnical constructions, including those involving soil-structure interaction. 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 classed 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.

The greatest risks in civil engineering tend to be associated with the ground. Industry urgently needs geo-engineers with a thorough understanding of this exciting and important discipline.

Programme
Geo-engineers are specialists who cater to a broad and international market. 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.
The programme is centred on a compulsory core that provides the knowledge 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.

**The programme is based on a multi-disciplinary approach that combines theory and practice. There is a close relationship with industry, with students having the possibility of internships and work experience abroad. In this way, students can tailor the programme to their own interests and future career directions.**

**The programme specialisations**

There are no pre-set specialisations in the Geo-Engineering track. In addition to 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.

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**Let me explain why TU Delft has chosen a joint MSc programme in Geo-Engineering that brings together Applied Earth Sciences and Civil Engineering.**

Thanks to the joint MSc programme in Geo-Engineering, Delft-trained geo-engineers have a broad knowledge. They can easily cross the borders between different disciplines. They can propose innovative solutions to challenging construction and geo-environmental problems.

Some of our students specialise in geotechnical engineering. They understand the importance of geology in ground engineering. This is vital at a time when building activities are booming abroad and engineers have to work with a range of soil types. Others specialise in engineering geology. They are exposed to a variety of challenging ground conditions during our fieldwork trips and excursions. They are skilled at collecting data for specific projects using protocols and procedures developed in Delft. They know how essential their observations are for a sound geo-engineering design – something that’s also true of their geotechnical engineering colleagues! Together, they have gone through the whole chain of calculations for the different projects in the Master’s programme.

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**Dr.ir. Dominique Ngan-Tillard, Master’s Coordinator Geo-Engineering**
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.

Career prospects
Industry urgently needs Geo-Engineers with a thorough understanding of the multi-physics behaviour of soils and soil-structure interaction. Career prospects are excellent, with many graduates finding employment with leading national and international companies across the civil engineering, dredging and offshore engineering industries.

In brief, Geo-Engineering MSc students can develop expertise that is either:

- oriented towards theory, 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.

Studying Geo-Engineering at TU Delft ensures you have a proper background in geotechnical engineering and/or engineering geology. The lectures are diverse, from practical design exercises to laboratory experiments. You also get a theoretical background in finite element analysis and execution of outdoor site investigations. This gives you a broad basis to practise geotechnical and/or engineering geology in industry or to do a PhD at a university. For me, the diversity of subjects and the good balance between practical and theoretical knowledge were two of the main reasons to study Geo-Engineering.

Looking back, I really enjoyed studying and working at the Geo-Engineering department. Due to the small size of the department there’s a close working relationship between the teachers and students, which benefits the education. In addition, I personally enjoyed doing geotechnical tests in the laboratory of the university. As geotechnical problems are often very complex, it is still common to do laboratory tests. For example, to simulate and observe the effects of pile installation in soft clays used in the geotechnical centrifuge, a subject I researched during my thesis.

After their studies, geotechnical engineers can work in various industries. Engineering consultants and contractors are amongst the most common employers. I started as a foundation engineer at Heerema Marine Contractors, an offshore installation contractor. My education gave me the theoretical knowledge I needed to help with related problems in the preparation and execution of offshore projects.
Admission requirements and application procedure

BSc degree from a Dutch university
If you hold a Dutch BSc degree closely related to the Master’s programme, you can be admitted directly. However, if your undergraduate programme is not closely related to the Master’s programme, you will be required to take additional courses in what is called a ‘bridging programme’. This may be a standard programme or it may be tailored to your specific situation.

To see which Master’s programmes are open to you on completion of your Bachelor’s degree at a Dutch university, go to www.doorstroommatrix.nl.

Applications may be submitted through Studielink: www.tudelft.studielink.nl.

Dutch HBO degree
An HBO Bachelor’s degree does not qualify you for direct admission to a TU Delft Master’s programme. You will first need to complete a supplementary programme in order to bring your knowledge to the required level. You can do this during your HBO programme by completing a bridging minor, or taking a bridging programme after completing your HBO diploma.

Entrance requirements for mathematics and English language (some exceptions) apply to both the bridging minor and the bridging programme.

International applicants
To be considered for admission to an MSc programme, you will need to meet TU Delft’s general admission requirements:

1. A university Bachelor’s degree (or proof that you have nearly completed a Bachelor’s programme) in a main subject closely related to the MSc programme for which you are applying, with good grades on the key courses.
2. Proof of English language proficiency: A score of at least 90 on the TOEFL or an overall band score of at least 6.5 on the IELTS (academic version).
   - A TOEFL (Test of English as a Foreign Language) with an overall Band score of at least 90 and a minimum score of 21 for each section. Please note that we only accept the TOEFL internet-based test.
   - or an IELTS (academic version) with an overall Band score of at least 6.5 and a minimum of 6.0 for each section.
   - or proof that you have passed the University of Cambridge ‘Certificate of Proficiency in English’ or the University of Cambridge ‘Certificate in Advanced English’ with a minimum grade B.

For international students, the application period starts on 1 October and closes on 1 April. To apply for an MSc programme, please complete the online application and pay the refundable application fee of €100. You will then receive an email containing a link to upload the required documents.

For more information about the application procedure and studying at TU Delft in general, visit www.admissions.tudelft.nl.

Introduction week
All international students will be welcomed with the award-winning introduction programme. The introduction consists of a variety of workshops and projects, during which you will get to know other international students, visit the highlights of Delft and familiarise yourself with the TU Delft campus. After this fun and interesting, you will be introduced to the Faculty of Civil Engineering & Geosciences. You will receive helpful information about the Dutch education system and meet fellow students from your programme through a variety of social and educational activities.

For further information
Please visit the webpage for full details, requirements, deadlines and contact information: www.cive.msc.tudelft.nl

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