Manage the earth’s resources for today and tomorrow

Everything we build and use on the surface of our planet comes from the earth. Engineers in the applied earth sciences know where these resources can be found and how they can be extracted and processed. As the world becomes more and more committed to sustainability, the need for a new generation of engineers to stand up is crucial. In the coming decades we will see a focus on finding, processing and utilising natural resources in a manner that is responsible and viable. How can we heat buildings with geothermal energy? Is it possible to sustainably exploit groundwater? What layers of the earth can be used to store the greenhouse gas CO2 safely? How do you prevent subsidence? As a student in the Applied Earth Sciences (AES) programme, you will not only learn to answer such questions, but also how to drive innovation in these areas.

Programme

The programme integrates fundamental knowledge with applied technology. You learn how to approach issues related to the challenges of energy production, raw materials technology and geo-engineering in an imaginative and resourceful manner. In gaining practical experience to complement your academic studies, you have the opportunity to work intensively with TU Delft’s partners in industry. For example, TU Delft is a participant in ISAPP (Integrated System Approach Petroleum Production), a large collaborative project involving TU Delft, Shell and TNO. This project was established for the purpose of boosting oil production by improving the flow of oil and water in oil reservoirs. TU Delft is also a participant in CATO, a consortium that conducts research on the collection, transport and storage of CO2.
Curriculum Applied Earth Sciences

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| **Second year**                      |                    |                      |                |                               |
| Electives                            | RWTH Aachen:       | Electives            | Electives      | Electives                     |
| Field Development Project            | Petrophysics & Geothermal Geophysics |                   |                |                               |

One academic year = 60 EC • Total number of credits in the MSc programme in Applied Earth Sciences = 120 EC

For more information on all courses: [www.studyguide.tudelft.nl](http://www.studyguide.tudelft.nl).

Programme specialisations

The programme offers five tracks:

**Petroleum Engineering and Geosciences** addresses all aspects of the extraction of underground fluid energy resources (e.g. oil, natural gas and geothermal energy), as well as new ways of exploiting the deep underground (e.g. CO2 storage).

**Resource Engineering** covers aspects of the life-cycle of mineral resources.

Students learn how to recover minerals and mineral ores from the earth, how these materials can be processed and how useable materials can be recycled from waste.

**Geo-Engineering** will give you essential knowledge and understanding of the earth’s sub-surface and insights into its properties and behaviour. This is vital in projects ranging from the drilling of tunnels and the excavation of mines to the construction of foundations for buildings and the maintenance of ports and waterways.

**Applied Geophysics** trains students in all geophysical and related aspects of environmental and engineering investigations, and in the exploration and exploitation of hydrocarbon and geothermal energy. This track is part of a joint programme run by TU Delft, ETH Zurich and RWTH Aachen.

As an MSc-student in our programme you are an active member of our scientific community. Each track has a compulsory core programme, but you are also expected to choose your own path for about half of the programme, using elective courses and by defining the research topic for your final thesis. Our ambition is to enable you to learn how to apply your knowledge from science, technology, engineering, mathematics and geology in order to understand and solve the complex challenges from the Applied Earth Science field. While doing this there are ample opportunities for you to prepare for a career in industry in the very broad sense or science.

Prof.dr.ir. Timo Heimovaara, Director of Studies Applied Earth Sciences
Geoscience and Remote Sensing is based on the question of how advanced observation technology in combination with innovative data processing and modelling techniques can provide us with all the information we need to make the right decisions, based on empirical results and their interpretation.

Examples of graduation projects
- Power Plant Mátra. Research to development of a coal quality concept for the lignite deposits Visonta and Bükkbárány, Hungary (Resource Engineering)
- The Shale Oil Potential of the Posidonia Formation in the Netherlands (Petroleum Engineering and Geosciences)
- Seismic deblending by shot repetition (Applied Geo-Physics)
- The Parallel Seismic detection of defects in pile foundations (Geo Engineering)
- Spaceborne Remote Sensing for Near Eastern Archaeology: a case study on archaeological site-detection in Jordan’s Black Desert (Geoscience and Remote Sensing)

Career prospects
There is currently a great need for well-trained, innovative engineers and scientists in the energy and natural resource industry. TU Delft has an excellent reputation in these industries, and its graduates are eagerly sought for positions as engineers, geophysicists, geologists, consultants or business analysts. The interdisciplinary nature of the programme in Applied Earth Sciences provides TU Delft graduates with an added advantage. Besides this, graduates from Delft are in great demand in both the private and the public sectors and have a worldwide reputation. They are renowned for their creativity and their ability to solve complex problems, challenges that often lead them to work in complex and unpredictable professional environments and to assume leading roles in organisations across the world.

A mere seven months ago, I graduated as a Bachelor of Bio-Engineering Sciences from a university in Belgium. I felt that I had acquired a lot of valuable theoretical knowledge, but that I needed a different educational approach for my Master’s. I was looking for a programme that would allow me to put that knowledge into practice. Today, I am writing a testimonial for the Master’s programme in Geo-Engineering at TU Delft.

For me, this short time frame is important, because it reveals what I appreciate the most about the programme. The Geo-Engineering programme is intensive. It moves forward quickly, and you have to keep up with the lectures and assignments. Luckily, the results are very rewarding. Most of all, I appreciate how the importance of practical applications is highlighted in each course. This is also reflected in the assessment method, where expert judgement is often key. The success of the programme as a whole lies in the combination of several courses in a core programme. Despite the very broad field of application, I can see why each part is relevant and how it builds up my knowledge, step by step. Another remarkable aspect is the international character of the programme, with no fewer than 15 different nationalities. The group assignments are an excellent opportunity to learn how to profit from this diversity.

At the moment, I am not sure what I want to do once I get my degree. Maybe work as a consultant in environmental geotechnics? There are two main reasons why I am not too worried about this uncertainty. First, I still have time to reflect on my ideas, during my internship and the thesis. Second, the professors are very approachable and often have work experience outside the university, which they are eager to share when asked. And as I have mentioned, things are moving very quickly, so I have no doubt that the coming months will bring more insight.
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 will 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 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 by means of a bridging programme after completing your HBO diploma.

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

See www.hbodoorstroom.tudelft.nl for detailed information. Applications through Studielink: www.tudelft.studielink.nl.

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 to which you are applying, with good grades on the key courses.

2. A BSc Cumulative Grade Point Average (CGPA) of at least 75% of the scale maximum.

   - 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 October 1 and closes at April 1. To start an MSc application, please complete the online application and pay the refundable application fee of €100. Next, you will receive an email with the link to upload the required documents.

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

Introduction week
All international students are welcomed with the awardwinning introduction programme. The introduction consists of a variety of workshops and projects, during which you get to know other international students, visit the highlights of Delft and learn the ins and outs of the TU Delft campus. After this very interesting and fun week, you will be introduced to the CEG faculty. You will receive helpful information about the Dutch education system and meet fellow students form your programme in a variety of social and educational activities.

Further information
Please visit the webpage for full details, requirements, deadlines and contact information: www.aes.msc.tudelft.nl

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