Strengthen the world around us

Diploma
Master of Science Civil Engineering
Track: Structural Engineering

Credits
120 ECTS, 24 months

Starts in
September

Language of instruction
English

% International students
35%

Structural engineering is a subfield of engineering. Structural engineers design load-bearing structures, like buildings, bridges, tunnels, and storm surge barriers, to endure the environmental conditions in which they are built. For instance, a high-rise office building in northern Russia must have a roof that can bear the weight of heavy snow, and a stadium in Japan must be able to withstand earthquakes. Load-bearing structures must withstand time, stress and the pressures of human use: not collapse, deflect or vibrate, and last for hundreds of years with minimum maintenance.

Programme
The Structural Engineering track teaches students to formulate and test physical models of structures, materials and load. Students test complex structure models for endurance under stresses that might occur. For instance, the impact of a strong earthquake on a high-rise building, or a concrete dam in the creation of an artificial lake. Students learn to test and apply hand-calculations for quick decision-making in meetings with owners, architects, contractors and local governments and are trained to use computer simulations to determine whether a structure will comply with design specifications.
Curriculum Structural Engineering

The Structural Engineering track offers the following specialisations:

1. **The Structural Mechanics** specialisation trains students to calculate structures using laws Isaac Newton discovered over 300 years ago. In the graduation project, students develop tools other engineers use to design structures. For example, a calculation method for computers, rules of thumb or design charts. Structural mechanics specialists solve structural problems for which others do not know a solution.

2. **The Materials and Environment** specialisation provides students with a deep knowledge of civil engineering materials and their behaviours. Students use sophisticated equipment to investigate many materials and processes, such as the hardening process and durability of conventional and high-strength concrete; crack propagation in concrete and ageing; and healing of bitumen. Innovations in the field are also explored, such as self-healing concrete after cracking.

3. **The Concrete Structures** specialisation teaches students to make the right decisions for optimal design of concrete structures. Reinforced concrete is the most widely used construction material because of its design possibilities, low cost, strength and durability. Designing a reinforced concrete structure is a specialisation in itself. Many innovations have occurred since this building material was first introduced a hundred years ago, such as self-compacting concrete and ultra high strength concrete. This specialisation emphasises construction and applications.

4. **The Steel, Timber and Composite Structures** specialisation focuses on the design, calculation and execution of constructions made of steel, timber, aluminium and fibre-reinforced plastic.

This specialisation also places ample attention on the environmental impact of acquiring materials and the construction and use of civil engineering structures.

These materials are used in high-rise and low-rise buildings, factories, towers, masts, locks, weirs, bridges and viaducts and are encountered everywhere.

The **Road and Railway Engineering** specialisation focuses on infrastructural facilities, such as roads, airfields, port areas, railways and tramways. The structures required for these facilities are complex, consisting of multiple layers and components that must withstand increasingly heavy traffic loads over time. Students learn to design, construct and maintain these structures that are essential for the proper functioning of modern society.

**Hydraulic Engineering Structures** are always part of larger systems, such as flood defence systems or navigation systems. They play an important role in providing safety and prosperity to vulnerable delta regions. In the Hydraulic Engineering Structures specialisation, students research and study various types of hydraulic structures and systems, such as tunnels, quay walls, locks, dykes and storm surge barriers.

"The Structural Engineering track provides students with an in-depth knowledge of the fundamental materials and behaviour of civil engineering structures, such as buildings, roads and bridges. Used daily, the safe, sound and durable design, construction, and maintenance of these structures is imperative for human well-being and society.

Research is fundamental to the educational programme, and well-equipped laboratories enable a wide range; from nano-scale materials research to testing full-scale structures and their components.Sophisticated numerical tools are available for students to analyse the behaviour of materials and structures. For most Master thesis projects, students collaborate with an external party, such as a research institute, consultancy firm, contractor, or manufacturer of concrete or steel components."

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1 EC = 28 hrs study, according to the European Credit Transfer System (ECTS) • One academic year = 60 EC • Total number of credits in the MSc track Structural Engineering = 120 EC

For more information on all courses: [www.studyguide.tudelft.nl](http://www.studyguide.tudelft.nl)
The specialisation focuses on the integral design, construction and maintenance of these structures and coherently addresses their hydraulic, geotechnical and structural aspects.

Example of graduation projects
Students have completed a wide variety of graduation projects in the Structural Engineering track, including:

- The dynamic behaviour of floors and high-rise buildings and their contribution to damping
- Modelling of the seismic response of an unreinforced masonry structure
- Upscaling of strain-hardening cementitious composites
- Finding the strength of glass
- Optimisation of reinforced concrete structures
- Application of ultra-high performance concrete in the new Leiden bridge
- Feasibility of offshore wind substructures in arctic environments
- Printing a stainless steel bridge
- Vibration and comfort analysis of steel composite pedestrian bridge
- The structural feasibility of timber wind turbines towers in the Netherlands
- Towards a design method for bamboo geodesic domes
- The effects of a kraft lignin and wood addition on the ravelling resistance of porous asphalt

Career Prospects
Structural engineers design and build everything from bridges and oil rigs to hospitals and sports stadiums. They also improve existing buildings with additional structural safety features. Structural engineers work with architects, consultants, contractors, mechanical, electrical and chemical engineers to ensure that all parts of the structure are safe and capable of fulfilling their intended function. Upon graduation, students may choose to work in structural design (calculating strength and deformation and supervising drawings), or choose to specialise in building or research. The career prospects for structural engineering graduates are promising, and many find jobs with consultancy firms.

"My Bachelor’s degree was the key factor in my choice of Master’s. Although I did not know in which field I wanted to work in the future, I did know which subjects appealed to me the most. I particularly enjoyed the challenge of Concrete and Steel Constructions and Structural Mechanics. After spending some time wondering about Hydraulic Engineering, I eventually decided upon Structural Engineering. This is concerned primarily with physical models of constructions, materials, and loads. It’s about modelling, calculating, and describing different constructions. You then have to choose a specialisation - Concrete Structures or Structural Mechanics, for example; there are many interesting options. I personally chose Steel, Hybrid and Composite Structures, because I particularly like material sciences. After all, human development has always been closely associated with knowledge of the application of materials. But the Master’s does not just consist of material science subjects like Timber Structures 2 or Fibre Reinforced Polymer Structures. Mathematics aficionados will be at home too, with subjects like Structural Dynamics and Slender Structures. Among other things, you’ll learn how a finite-element programme works, how to write a paper professionally, and even how to weld. In short, the programme prepares and equips you to make a difference in your field!"

Nick Montenij, Master’s student Structural Engineering (The Netherlands)
Admission requirements and application procedures

Dutch BSc degree
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, visit: 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 must first complete a supplementary programme to bring your knowledge to the required level. You can do this during your HBO programme by completing a bridging minor, or through a bridging programme upon completion of your HBO degree.

For detailed entrance requirements in mathematics and English for the bridging minor and the bridging programme see: www.hbodoorstroom.tudelft.nl (some exceptions apply). 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 April 1. To start an MSc application, please complete the online application and pay the refundable application fee of €100. You will then 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, visit: www.admissions.tudelft.nl

Introduction week
An award-winning introduction programme of social and educational activities welcomes all international students. Students are introduced to the CEG faculty, receive helpful information about the Dutch education system and meet fellow students in their programmes. Get to know other international students, visit the highlights of Delft and learn the ins and outs of the TU Delft campus.

For further information
For more details, complete requirements, deadlines and contact information, visit: www.cive.msc.tudelft.nl

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