

# Civil Engineering

## Hydraulic Engineering

### MSc Programme



**What if deltas were not protected against flooding? What if beaches no longer existed for recreation, and rivers and coastal seas lost their incredible value for nature? What if major ports like Shanghai and Rotterdam could not expand through land reclamation? Can we imagine a world without hydraulic engineering? Hydraulic engineers analyse and model natural systems, develop state-of-the-art infrastructure solutions, and implement them in practice. They do so in the context of climate change, economic growth, rapid urbanisation and increasing environmental awareness. Hydraulic engineering is fundamental to healthy ecosystems and prosperous societies.**

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	<a href="https://www.scholarships.tudelft.nl">scholarships.tudelft.nl</a>

### Programme

The Master track Hydraulic Engineering in the Civil Engineering programme educates students to solve complex hydraulic engineering problems. Students learn how to design hydraulic structures, port areas and coastal protection systems, build with nature, analyse coastal and river systems, model flow around structures and study waves in estuaries and ocean basins. Also, students learn how to perform flood risk analyses, evaluate the reliability and safety of hydraulic structures and deal with uncertainty. Moreover, this MSc track addresses the impact of human activities on the environment, consequences of climate change

and stakeholder interests in engineering solutions. During the first year, students acquire advanced knowledge of hydraulic engineering by taking specialised courses in physical processes, engineering applications and design. In the second year, this knowledge is brought into practice by doing an internship, a consulting project or additional thesis. The final part of the programme is the MSc thesis project. The track combines practical knowledge with fundamental principles of physics, design of structures, laboratory experiments, field measurements and advanced numerical models to answer research questions. There is also a

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FIRST YEAR	SECOND YEAR
<b>TRACK-SPECIFIC COURSES (TOTAL OF 56 EC)</b> <ul style="list-style-type: none"> <li>• COMPULSORY COURSES (24 EC)</li> <li>• SPECIALISATION-RELATED COMPULSORY COURSES (16 UP TO 24 EC)</li> <li>• TRACK-RELATED ELECTIVE COURSES (8 UP TO 16 EC)</li> </ul>	<b>SPECIAL SUBJECTS (TOTAL OF 20 EC, WHICH MAY INCLUDE)</b> <ul style="list-style-type: none"> <li>• ADDITIONAL GRADUATION WORK, RESEARCH PROJECT (10 EC)</li> <li>• ELECTIVE COURSE (10 EC OR 20 EC)</li> <li>• INTERNSHIP (10 EC)</li> <li>• MULTIDISCIPLINARY PROJECT, CIVIL ENGINEERING CONSULTANCY PROJECT (10 EC)</li> </ul>
<b>ETHICS COURSE (4 OR 5 EC)</b>	<b>ELECTIVE COURSES (10 EC)</b>
	<b>MSC THESIS (40 EC)</b>

strong link with practice providing opportunities for students to obtain experience in practice and to get acquainted with (large) projects. A choice for the MSc track Hydraulic Engineering at TU Delft means a choice for one of the world's leading MSc programmes in this field. After graduation you will have the skills to work on complex hydraulic projects and to contribute to the well-being of people living and working in delta regions.

## Specialisations

The MSc track Hydraulic Engineering offers the following specialisations:

### The specialisation Coastal Engineering

concentrates on the coastal zone and introduces various approaches to coastal protection using natural processes in the building with nature concept as well as the design of hard sea defences and breakwaters. Students study coastal morphology, dune dynamics, estuaries and tidal inlets.

### The specialisation River Engineering

focusses on the response of a river to man-made and natural changes, nature-based solutions to fluvial problems and the design of effective engineering solutions.

### In the specialisation Dredging Engineering

civil, maritime and mechanical engineering play a central role. Focus lies on the main elements of the dredging process: excavation, vertical and horizontal transport of dredged sediment and its deposition.

The multi-disciplinary **specialisation Ports and Waterways** focusses on integrated planning and design of ports, terminals and inland waterways, wherein operational, logistic, economic, environmental, safety and hydraulic aspects are addressed.

### The specialisation Environmental Fluid

**Mechanics** emphasizes fundamental aspects of environmental flows and related transport processes, such as open channel flow, turbulence, stratified flows, free-surface waves and ocean dynamics. Interactions between water motion and structures, bed protection, embankments and vegetation are investigated.

### The specialisation Hydraulic Structures

focuses on the design and construction of locks, storm surge barriers, weirs, quay walls, tunnels and other hydraulic structures. This requires insight in geotechnical and hydraulic aspects, as well as knowledge of materials. Probabilistic and structural dynamic analyses are often applied.

### The specialisation Flood Risk

aims at identifying current and future flood risks through analysis of flood hazards, performance of defences and flooding consequences. We assess flood risk reduction strategies, such as interventions in coastal and river systems, early warning and emergency management.

## Graduation examples

- Stability of a new type of single layer armour unit, called XblocPlus, for breakwaters
- Mitigation of ongoing bed degradation in the Rhine
- Impact of high-end sea level rise scenarios on storm surge barriers in the Netherlands

See for more examples the TU Delft repository.

## Career prospects

Hydraulic engineers work in projects around the world for employers such as contractors, engineering companies, dredging companies, water management authorities and water boards, consulting companies, and in academia.



**11<sup>th</sup>**  
in Shanghai subject ranking  
Water Resources 2020



**2<sup>nd</sup>**  
in QS subject ranking  
Civil Engineering 2020



**102**  
first year students in 2020



**15%**  
International students



**78%**



**22%**

## Career perspective



**97%**  
Job within 6 months



**60%**  
Job as Consultant  
or Contractor



**59%**  
Work at large companies