Chemical Engineering

New products and processes for a sustainable future.

Society depends on products and processes that we often take for granted but which require knowledge starting at molecular level to make goods such as cosmetics, food products and electronic equipment, to carry out essential activities such as waste management and to design and produce pharmaceuticals and healthcare products. Chemical Engineering covers a wide range of subjects at all levels: molecular science, including the emerging field of nanochemical engineering; the design and analysis of chemical reactors; and the application of chemical engineering in manufacturing processes. The programme has a strong emphasis on innovative thinking and stresses multi-disciplinary problem solving using a systematic approach, incorporating considerations of sustainability, economics and social welfare into the analytical process. The fundamental goal of the Master’s programme is to provide students with both a breadth and a depth of knowledge sufficient to prepare them for careers in research or to work in industry at either the design or operational level.

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<th>Diploma</th>
<th>MSc Chemical Engineering</th>
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<tr>
<td>Credits</td>
<td>120 ECTS, 24 months</td>
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<tr>
<td>Starts in</td>
<td>September</td>
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<tr>
<td>Language of instruction</td>
<td>English</td>
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<tr>
<td>% International students</td>
<td>40%</td>
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Programme
The TU Delft Master of Science programme in Chemical Engineering aims to provide students with a solid foundation in chemical engineering science while preparing them for a broad range of career opportunities. We believe that chemical engineering is a bridging discipline and that students should be able to work together with chemists, biologists, mathematicians and physicists. The programme, with a primary emphasis on the underlying sciences, gives students the opportunity to personalise their curriculum and to choose the particular 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 open discussion.
The Chemical programme is a two-year Master’s programme and comprises 120 EC. 1 EC = 28 hours of study, according to the European Credit Transfer System (ECTS). The programme has a core of 90 EC, consisting of:

- 30 EC compulsory courses (50% track related)
- 20 EC design courses and project (2 months fulltime project work in teams of 4-5 students)
- 40 EC Master’s thesis work to be carried out in a research group within the university

Combining the core programme with a 30 EC scientific and social orientation completes the Master’s programme. The orientation allows for either a deepening or a broadening of your degree programme. Options available are:

- Research and Development (industrial internship and electives)
- Study Abroad (research and/or courses at a foreign university)
- Management of Technology (one semester coursework)
- Technology in Sustainable Development (courses and internship)

Education (teaching license for Dutch secondary school – courses and practical assignment)

Entrepreneurship (course and project work related to the start-up of a company)

Most students choose the first option. Roughly speaking, the first year comprises course work and a design project, while the second year is primarily devoted to thesis work and an industrial internship.

### First Year

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<tr>
<th>1st quarter</th>
<th>2nd quarter</th>
<th>3rd quarter</th>
<th>4th quarter</th>
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<tbody>
<tr>
<td>Applied Numerical Methods (6 EC)</td>
<td>Track-related courses (see text, 15 EC)</td>
<td>Product &amp; Process Design (5 EC)</td>
<td>Ethics &amp; Engineering (3 EC)</td>
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<tr>
<td>Molecular Thermodynamics (6 EC)</td>
<td></td>
<td>Electives (9-12 EC)</td>
<td>Design Project (12 EC)</td>
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<td>Molecular Transport Phenomena (3 EC)</td>
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### Second Year

- Flexible
- Master Thesis Project (40 EC)
- Industrial Internship (18 EC)
- Elective (0-3 EC)

Programme Tracks

The programme offers three tracks and a scientific and societal orientation for all students with a chemical engineering background. Students choose one of the following three tracks:

- **Process Engineering** involves the design and operation of manufacturing processes and is essential in our technology dependent, industrialised society. The track covers advanced chemical engineering courses and underlying fundamentals.

- Research covers subjects such as microfluidics, nano-particle technology, catalysis and multiphase systems. The track-related compulsory courses are: Reactors and Kinetics, Process Dynamics and Control and Applied Transport Phenomena.

I joined TU Delft’s MSc programme in Chemical Engineering (Process Engineering track) having already gathered a few years of work experience, as I wanted to expand my knowledge within the field. TU Delft offered the opportunity to learn from – and interact with – experienced, knowledgeable and skilled professors, within a multicultural and multi-disciplinary environment. The curriculum offered is of a high standard, building on the various fields of chemical engineering from both a theoretical and applied perspective. The curriculum also offers plenty of scope to explore areas of personal interest. The university campus has a vibrant, international atmosphere, which encourages the exchange and nurturing of ideas. In addition to the academic staff, the support staff is also very helpful, making it easy to adjust to living and studying in the Netherlands. Overall, I feel that TU Delft and the MSc programme in Chemical Engineering have allowed me to grow both professionally and personally, laying a solid foundation for my future.

Malcolm Meyer (South Africa)
Chemical Product Engineering
Involves the design and synthesis of products, ranging from pharmaceuticals to building materials. The development and manufacture of new materials and new devices include nanocapsules, solar cells, energy storage devices, sensors, and advanced polymers. This track has a stronger focus on chemistry and molecular sciences. Research groups work in the field of fundamentals of nanostructured materials, energy conversion and the syntheses of new components. The track-related compulsory courses are: Design and Synthesis of Advanced Chemical Products, Structure/Property Relationships of Advanced Chemical Products, and Soft Matter for Chemical Products.

Nuclear Science and Engineering
encompasses the study and use of nuclear materials and the equipment that makes use of nuclear materials for medical, energy, analytical applications. Research groups work in the field of radiation and isotopes for health, for energy and for materials research. The track-related compulsory courses are: Introduction to Nuclear Science and Engineering, Nuclear Chemistry, and Chemistry of the Nuclear fuel Cycle.

Graduation projects
Some examples of recent graduation projects are:

- Pd-alloy dense metal membranes for hydrogen separation.
- Influence of Pressure on Atomic Layer Deposition on Nanoparticles in Fluidized Bed Reactors.
- Synthesis of Au/Te2O for low temperature water-gas shift reaction.
- Removal of oxygenate organic compounds from a liquid toluene stream by adsorption.
- The loading and retention characteristics of polymersomes as radionuclide carriers.

Career prospects
We live in a time of growing public concern about such issues as the vital role that engineers play in society. Innovative, creative thinking on the part of chemical engineers is essential for process and product innovation. Most of our graduates work in industry, either in the Netherlands or elsewhere. Many graduates have found employment with leading firms such as Shell, AkzoNobel, DSM, Exxon Chemical, Heineken, ING, BASF, Philips, Proctor & Gamble, and Unilever. Others have joined consultancy firms or started their own businesses.

The department of Chemical Engineering (Chemical Product Engineering track) at TU Delft focuses on some of the most exciting and challenging problems in the field of engineering, which are of huge relevance to society. I chose the Chemical Engineering Master’s programme at TU Delft because of its high quality of research in cutting-edge areas of energy and materials. I found the structure of the programme to be very balanced as it gave me ample opportunities to explore both the industrial and the scientific research aspect of the field. The wide array of courses offered by the programme enabled me to develop within my areas of interest. I found the professors and administrative staff very friendly and approachable and they were always there to guide me along the way. It was a great experience to work with students, researchers and professionals from all over the world and I feel confident and well prepared to make my own positive contribution as a Chemical Engineer.
Admission requirements and application procedures

BSc degree from a Dutch university
Graduates with a BSc in Chemical Engineering are eligible for admission. BSc graduates in Chemistry, Life Science and Technology, Applied Earth Sciences, Applied Physics, Mechanical Engineering and Aerospace Engineering may be admitted, but are - in general - required to follow a bridging programme.

As a guideline a minimum Grade Point Average of 75% is required for admission. Application proceeds through Studielink: www.tudelft.studielink.nl

Degree from a Dutch university of applied sciences (Dutch HBO)
Applicants with a degree in Chemical Engineering or a closely related field may be eligible for admission after completing a bridging programme. As a guideline a minimum Grade Point Average of 75% is required for admission to the bridging programme, and proof of English language proficiency of at least 90 on the TOEFL or an overall Band score of at least 6.5 on the IELTS (academic version).

The application procedure is conducted through Studielink: www.tudelft.studielink.nl
Prospective students are advised to contact the Master’s Coordinator before applying.

International applicants
International applicants must meet the general admission requirements of TU Delft.

1. A BSc degree (or a proof that you have nearly completed a BSc programme) in Chemical Engineering or a closely related field.
2. A BSc Cumulative Grade Point Average (CGPA) of at least 75% of the scale maximum
3. Proof of English language proficiency of at least 90 on the TOEFL or an overall Band score of at least 6.5 on the IELTS (academic version).

For international students, the application period starts in October and closes at April 1. To start an MSc application, 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.

Please note that you should apply early, before December 1, if you wish to apply for a scholarship as well. 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 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 learn the ins and outs of the TU Delft campus.

Please visit the webpage for all details, along with a full list of requirements, deadlines and contact information:
www.chem.msc.tudelft.nl

For further information
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www.chem.msc.tudelft.nl

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