

Professional Doctorate in Engineering (PDEng)

Professional Doctorate in Civil and Environmental Engineering



Photo: TU Delft/Frank Auperté

Diploma	Professional Doctorate in Engineering
Credits	120 ECTS 24 months
Starts in	September
Language of instruction	English

Working on strategic innovation

The two year Professional Doctorate programme in Civil and Environmental Engineering at TU Delft is the starting point of an innovation project and a successful career in the industry or business as a designer or engineering expert. The degree Professional Doctorate in Engineering (PDEng) will be awarded upon the successful completion of the programme.

This programme will help you to develop strategic innovations. During the programme, you learn how to initiate, develop and finish a design project which is of interest to the company or your employer. The design project is the core of the programme and is carried out individually. It is supported with different courses as well as an integral project. The individual design project takes the innovation past the phase of prototyping to implementation and market introduction. In the project you demonstrate your ability to apply the knowledge you gathered in the different courses of the programme, in solving a real-life, complex design problem or developing a new system.

Tracks

The new PDEng programme has two tracks: Sanitary & Environmental Engineering and Structural & Railway Engineering.

Sanitary & Environmental Engineering focuses on water management issues related to health technology, such as water collection, water and sanitation, environment and water transportation.

Structural & Railway Engineering is aimed at innovation in civil engineering, for example smart buildings, new materials and sustainable railways.

Curriculum

The PDEng in Civil and Environmental Engineering consists of the following components:

- Compulsory courses (28 ECTS)
- Elective courses (20 ECTS)
- Integral Project (12 ECTS)
- Individual Project (60 ECTS)

1 ECTS = 28 hrs study, according to the European Credit Transfer System (ECTS). One academic year is 60 ECTS.

	First Year				Second Year			
	Semester 01		Semester 02		Semester 03		Semester 04	
	B1	B2	B3	B4	B1	B2	B3	B4
Projects								
Individual Project	60 ECTS							
Integral Project		12 ECTS						
Compulsory Courses								
Advanced Principles in Product & Process Design	6 ECTS							
Techno-Economic Evaluation					6 ECTS			
Research Design		2 ECTS						
Effective Communication for Designers			2 ECTS					
Integral Design		4 ECTS						
Asset Management	4 ECTS							
Risk Management				4 ECTS				
Elective Courses	20 ECTS							

A direct response to market needs

The civil and environmental engineering sector is in urgent need of young professional designers who can provide the sector with a knowledge boost and advanced technical innovations.

Our society is facing various social and environmental challenges, such as climate change, water pollution, ageing infrastructure, a rapid development of technology and increasing demands for mobility. These are all challenges that need solutions from innovative engineers and designers. As a response to this market need, the faculty of Civil Engineering and Geosciences at TU Delft provides a PDEng in Civil and Environmental Engineering that will deliver highly skilled design engineers who can fill the gaps in the rapidly ageing population of specialists at academic level in the civil and environmental engineering sector.

Cooperation with industry

The civil and environmental engineering sector has a huge demand for scientifically educated design engineers with an integral knowledge of technology and different disciplines. Through the professional Doctorate in Civil and Environmental Engineering, young professionals and talented alumni of technical universities can develop into experienced design engineers and experts. Various companies from the civil and environmental engineering sector are closely involved in the setup of our education, so we can make sure our courses, projects and cases reflect the reality of tomorrow.

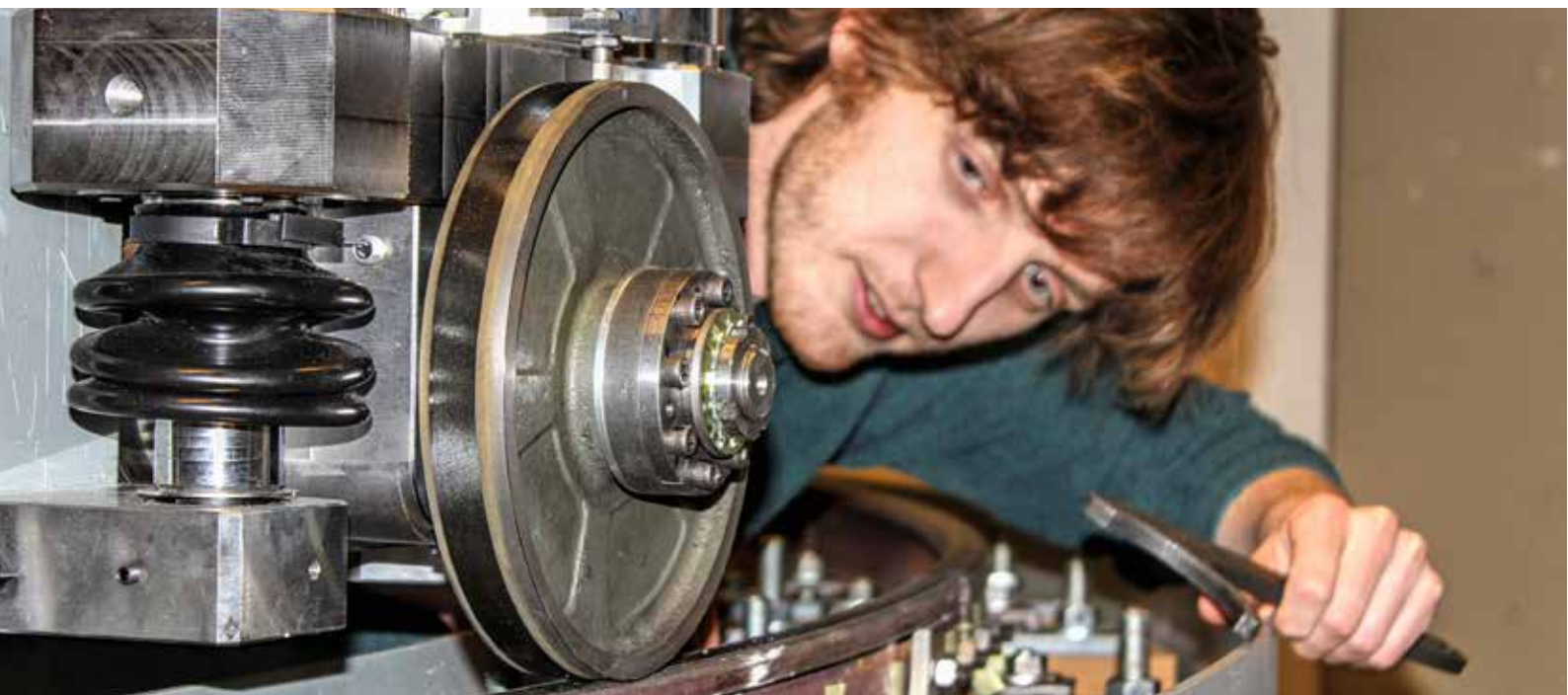
Challenges for the industry

The water sector needs answers to specific problems such as the increased complexity of drinking water production due to residual

concentrations of pharmaceuticals in surface water, salinisation of underground water and new micropollutants in wastewater.

For the building and construction industry, there is a demand for sustainable materials as well as better and faster production of building materials. The railway sector has to work on a system leap that will allow building and maintenance of track without major disturbances of train services.

In addition, the rising complexity of building and civil construction requires specialists with comprehensive knowledge of civil engineering and the ability to integrate new technology and disciplines such as risk management, new materials, concrete structures and sensors.



Projects

Integral project

The integral project is carried out by a team of participants working on a real life case. It begins shortly after the start of the programme. The trainee gains insight in the complexity of innovation and designing but also gains the knowledge and skills needed to launch a new product or system. The topic of the integral design project will be determined in consultation with the companies involved in order to align the content as much as possible with the objectives of the sector. At the start a kick-off meeting will be held with designers from both the industry and TU Delft to share their experiences with the trainees.

Individual project

The individual project is the main part of the programme. It is carried out in relation to the strategic innovation needs of the company. The outline is determined during the admission process by the candidate in consultation with the industry and the selection committee of the programme. Prior to the start of the second quarter of the first year of the programme, candidates must develop a final plan that will be submitted to the selection committee. After approval the participant can commence with the individual design project. A division of the individual design assignment over the two years of the programme will help the trainee to understand the theory of the courses by applying it directly in practice.

Compulsory courses

Advanced Principles in Product & Process Design

The core of this compulsory course consists of an online individual product design assignment, product & process design principles, workshop(s) by industry lecturers, and co-mentoring and critical review and evaluation of a conceptual product or process design (basis of design, and final report).

Techno-Economic Evaluation in the Process Industry

In general, this course examines the state of the economy and the characteristics and working of the civil and environmental engineering processes, the best practice in estimating the capital and operating costs. It also gives a short introduction to finance for non-accountants.

Asset Management

The purpose of this course is to learn to integrate acquired data, tools and new technology for the engineering of improvements in constructions and installations. The course will also focus on performance measurement in an asset management context by looking at context, governance, methods and planning of actions for improvements.

Integral Design

This course integrates different design approaches that are relevant for all disciplines entailing the creation of products, systems and services in the areas of civil, mechanical and environmental engineering. It includes system analysis, design and the development of concepts as well as the ability to apply these within the technical domain of the two projects in the programme.

Effective Communication for Designers

This course helps designers to learn the basics of effective communication with different types of audiences and to present ideas, models or new technology to management and senior staff.

Research Design

This course is designed to define and execute the scientific research steps in the individual project, conceptualising ideas and developing a relevant theoretical framework.

Risk Management

This course deals with the technical aspects of risk management, with emphasis on methods and techniques for analysing and evaluating threats and failures. An important aspect in this course is understanding failure mechanisms in constructions and defining design measures to minimise risk.

Elective courses

The elective courses meet the knowledge requirement for the individual design project. The courses are focused on a deeper understanding of the discipline related to the individual project. They can be chosen from the TU Delft curricula for the existing MSc programmes. The courses will be selected in consultation with the supervisors of the participants. The courses must be completed successfully to the standards of Delft University of Technology.



Rolf Dollevoet
Professor of Railway
Engineering

“Creating new technology and methods for the building and construction industry or developing a rail system that can deliver a sustainable and robust train service, requires design engineers with integral knowledge and multiple skills. Innovations are not only the result of good ideas; they must be worked out in a research-based environment and they need to be sustained with a sound and solid business case. Besides this, an analysis of asset management, risks and the design steps must be carried out before technological innovations can be proved and implemented.

As a PDEng student, you will work on innovation in the civil engineering sector. Our Structural Engineering group will guide you to find a scientifically based answer to make your innovation project work. Our leading researchers, civil engineering laboratory and the TU Delft ‘measurement train’ will help bring out your best innovations and creative techniques. Develop an idea and challenge yourself. Create, test and validate; your ticket to a Professional Doctorate in Civil and Environmental Engineering.”



Luuk Rietveld
Professor of Drinking Water
& Urban Water Cycle
Technology

“Innovation in the civil & environmental engineering industry is complicated. Proper modern water supply and treatment not only depends on innovative process design, but also on factors such as intelligent monitoring and control, social and economic aspects, safety, and environmental impacts of the installations. Therefore, a designer should be able to integrate all these aspect and perform a proper assessment of water infrastructures. It takes time to develop, prove and implement new technologies and ideas, where bringing innovative solutions to the market is the crucial step. The aim for designing better water treatment and construction systems, sustainable building materials or a high performance water supply or drainage system, starts with an excellent understanding of generic design, risk and asset management principles, and knowledge of the latest technological developments. The academic staff of the Water Management department and laboratories can help you to develop your design into a feasible plan or a working prototype.”

Admission

Application

Application is open to university graduates. You will need at least a Master of Science degree or equivalent, preferably in the exact sciences. Application is open to people

1. who are employed and whose company supports this programme and the innovation project, or
2. who are self-funded and have found a company willing to host them for the innovation project.

There will be an assessment and selection procedure before you can enter the programme. TU Delft uses strict selection criteria to ensure the required high quality of participants. Excellent marks, being highly motivated and a design-oriented attitude are vital. You should also have a good command of the English language.

Selection

You can apply by sending your letter of application with a complete curriculum vitae and a letter of recommendation (in English) from your employer or from an executive in the industry, scans of your MSc certificate and transcript of records, and a proposal for the individual innovation project. Suitable candidates will be invited for an interview with the selection committee of the programme.

Appointment

If you are selected for the programme, you will be appointed as a trainee for the duration of the programme (two years). Participants who join this programme as part of an in-company innovation project or other types of personal assignment remain employed by their employer.

Costs

The costs for the PDEng programme are € 15.000 per year for education, supervision and use of the (knowledge) infrastructure of the university.

Diploma and degree

On successful completion of the programme, you will receive a diploma. You are then entitled to use the academic title Professional Doctorate in Engineering (PDEng) and you will be registered as a Technological Designer in the Dutch register kept by the Royal Netherlands Society of Engineers (KIVI). The quality of the programme is assured by an assessment and certification procedure by the Dutch Certification Committee CCTO (Nederlandse Certificatie Commissie voor Opleidingen tot Technologisch Ontwerper).

Further information

Please visit the webpage for full details, requirements, deadlines and contact information:
www.ceg.tudelft.nl/pdeng-ce

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