

## MSc Programme



The technology industry is changing rapidly. Robotization and digitization are no longer vistas but an everyday reality. Previous developments in electronics have led to mechatronics. Nowadays, mechatronics is indispensable in mechanical engineering. At this moment, rapid advances in artificial intelligence lead to the emergence of a new discipline: that of cognitive robotics, in which an artificial ‘brain’ is integrated with the mechanical ‘body’ of a robot. Robotics – if well designed and integrated into society – has the potential to contribute to solutions to the complex challenges in the areas of food supply, transportation, production, energy, and medical care.

### What you will learn

The MSc Robotics offers students a multidisciplinary education, allowing them to develop innovative and intelligent products and systems that meet today’s challenges. The focus of the programme is on the interaction between human and machine. You will acquire broad knowledge on Robotics and apply it on the multidisciplinary intersection of mechanical engineering and artificial intelligence. You will learn how to model, design, and control robotic systems, how to analyse, evaluate, and validate robotic systems in complex environments, and how to relate scientific knowledge to robotic systems, by critically considering their interaction with societal aspects.

### Profile of the Robotics Engineer

The Robotics Engineer will supervise the

transition towards further robotization of society. The Robotics Engineer masters a variety of mechanical engineering and computer science disciplines: mechatronics, artificial intelligence, embedded systems, control, human-machine systems, ethics, and security. The Robotics Engineer can solve complex and multi-functional robot problems, is a critical thinker beyond cultural boundaries, has a can-do mentality, and understands privacy, security, and ethical aspects of working with robots in human environments.

### Programme

During the first year, eight obligatory courses will contribute to a solid common background in Robotics for all students. In addition, students have the freedom to choose elective courses (Robotics, Transferable skills, General). The




Degree	Master of Science in Robotics
Credits	120 ECTS, 24 months
Language	English
Start	September
Tuition fee	€ 18.750 (non EU) € 2.143 (EU)
Scholarships	<a href="https://www.tudelft.nl/scholarships">scholarships.tudelft.nl</a>

FIRST YEAR				
Introduction Week	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
	RO47001 Robot Dynamics & Control 5 EC	RO47004 Machine Perception 5 EC	RO47008 Robot & Society 5 EC	RO47007 Multidisciplinary Project 5 EC
	RO47002 Machine Learning for Robotics 5 EC	RO47005 Planning & Decision Making 5 EC	Elective Courses (Robotics, Transferable skills, General) 20 EC	
	RO47003 Robot Software Practicals 5 EC	RO47006 Human-Robot Interaction 5 EC		
	RO47000 Vision and Reflection 0 EC			

SECOND YEAR		
Choose: TUD4040 Joint Interdisciplinary Project RO57015 Internship / Assignment In-Depth Elective Courses 15 EC	RO57010 Literature Research 10 EC	RO57035 MSc Thesis 35 EC

 OBLIGATORY COURSES	 PROJECTS	 ELECTIVE COURSES
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goal of the second year is to let students work on complex research problems both individually and in groups, apply the tools and methods taught in the first year, and develop new theories or design methods to solve complex mechanical engineering problems. Robotics Engineers are not expected to have only technical knowledge, but also so-called transferable skills and an understanding of the role of Robotics Engineers in relation to society's needs. In addition, Robotics Engineers must be able to reflect on their behaviour and that of others, and understand how their behaviour affects teamwork. Finally, Robotics Engineers must be able to communicate clearly and reflect on their choices and prospects. The curriculum is designed in such a way that there are plenty of opportunities to gain such experiences.

## Research

The research of the Cognitive Robotics department focuses on the interaction between humans and robots. The researchers work on robotics solutions within a complex environment. Examples are: a robot that manages to make its way through an environment with obstacles and humans, a robot arm that responds to a person when the person pushes the robot, robots that work together, or an intelligent vehicle that can predict where someone will cross the street. The research aim is to enable future robotic

systems to learn effectively from diverse experiences and to achieve performance with a high degree of autonomous action.

## International opportunities

There are several options for students to study abroad. These include opportunities to do internships or a MSc project with an international industrial or academic partner. The department of Cognitive Robotics maintains a strong international network with contacts in many leading industries and research institutes.

## Career prospects

There is a need for engineers with state-of-the-art knowledge in a broad technical domain of robotics. The connection between mechanical engineering and artificial intelligence is a complex matter. The MSc Robotics is of great added value because such knowledge and skills are currently not contained in one engineering programme.

Companies indicate that a Robotics Engineer is indispensable for the further technological development of society and the economy. This includes a wide variety of companies, such as Philips, Lely, TomTom, ABB, Hankamp Gears, Seatools, 2Getthere, Festo, and Heemskerk Innovative Technology. The combination of mechanical engineering and artificial intelligence in the programme makes Robotics Engineers also attractive for a

broader spectrum of companies, such as retailers (e.g. Ahold Delhaize), engineering consultancy companies (e.g. Royal HaskoningDHV), and business consultancy companies (e.g. Roland Berger).

 **MSc started**  
in September 2020

 **100-150**  
students

[tudelft.nl/msc/rb](http://tudelft.nl/msc/rb)