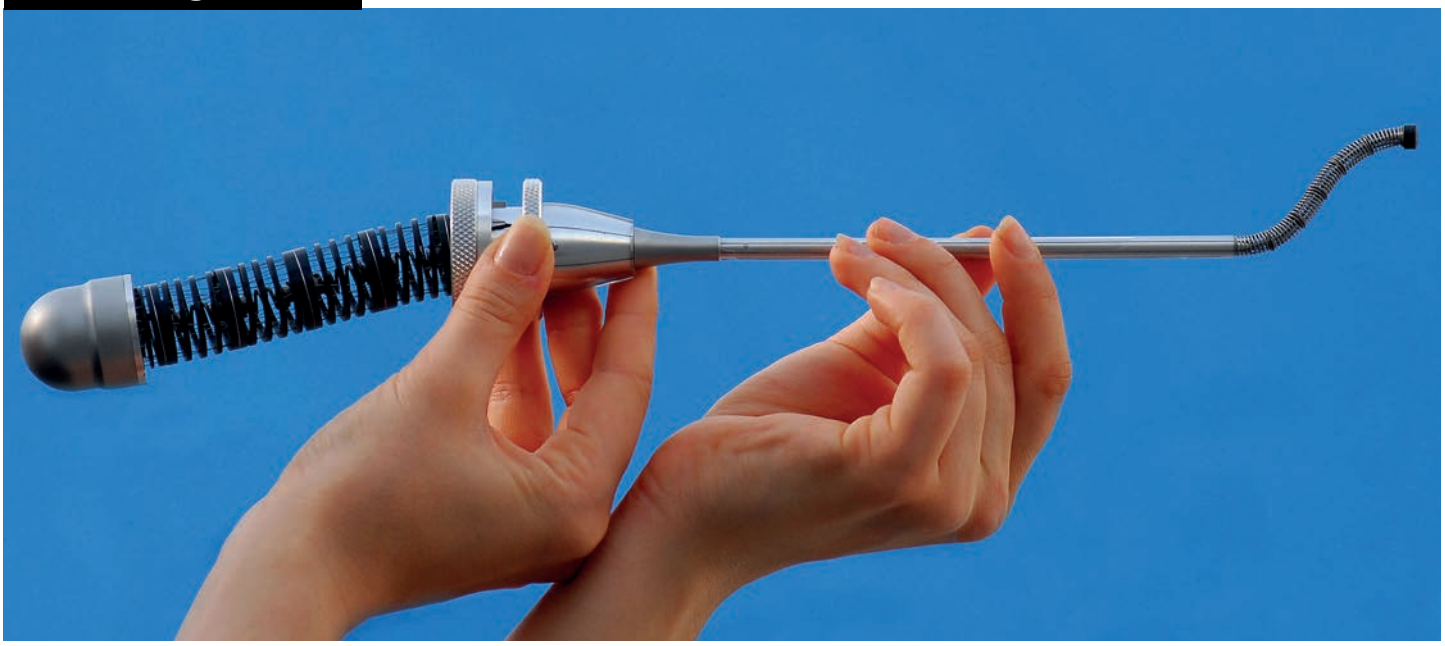
Mechanical Engineering
Biomechanical Design

MSc Programme



Biomechanical Design deals with the interaction of mechanical technology with biological systems. This means investigating human movement, perception, and control characteristics, and designing adaptive, user friendly, and intuitive technologies. In contrast to the more clinically oriented MSc programme in Biomedical Engineering, Biomechanical Design focuses on the engineering challenges of learning from biological systems for engineering applications, developing robust and forgiving robotics, and developing more effective user interfaces.

Degree	Master of Science in Mechanical Engineering
Starts	September
Credits	120 ECTS, 24 months
Language	English
Application deadline	April 1st: international students July 1st: Dutch degree
Tuition fee	€ 18.750 (non EU) € 2.083 (EU)
Scholarships	scholarships.tudelft.nl

Programme

The first year consists of a set of courses common to all Mechanical Engineering tracks, a social or ethics course, track-specific courses, courses in your chosen specialisation, and individual electives. In the first weeks of the programme, you put together your own individual study programme. During the second year, you complete your MSc thesis project, preceded by an internship and literature study. These projects are often closely connected to cutting-edge research and development.

Specialisations

Bio-Robotics (BR)

Until recently, robots were mainly found in industrial settings. But robots are performing an ever wider variety of tasks in our society. The requirements for these service robots are very different from those for industrial machines. Instead of accuracy and power, service robots require adaptability, safety, and a gentle touch. The Bio-Robotics specialisation focuses on the analysis and development of robots that physically interact with humans and operate in uncontrolled, unpredictable environments. Topics include humanoid robots, robot vision, and robot touch. You will learn how to design, simulate, and control robots, how to model the human body and brain as a control system, and how to create mechanisms that interact successfully with humans.

Bio-Inspired Technology (BITE)

Probably the greatest diversity of mechanical designs is found in nature. For each challenge posed by an often hostile environment, a wealth of solutions has evolved. Inspiration from nature drives the search for innovative solutions in such fields as medicine, rehabilitation, microsystems, and mechatronics. In the Bio-Inspired Technology specialisation, an

TU Delft

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First Year (60 EC)			
Obligatory for Master (19-22 EC)		Obligatory for Track (13 EC)	
Control Systems Design	Physics and Measurement	Experimental Design, Statistics & the Human	The Human Controller
Nonlinear Mechanics	Advanced Heat Transfer	Multibody Dynamics B	Human-Machine Systems
Ethics or Social Course			
Obligatory for Specialisation (15-16 EC)			
Bio-Robotics (BR)	Bio-Inspired Technology (BITE)	Haptic Interfaces (HI)	
Control Systems Lab	Bio Inspired Design	Applied Experimental Methods: Human Factors	
Neuromechanics & Motor Control	Compliant Mechanisms	Neuromechanics & Motor Control	
Robot Motion Planning and Control	Precision Mechanism Design	System Identification and Parameter Estimation	
Human and Robot Locomotion / Knowledge Based Control Systems / Robotics Practicals	3D Printing / Bio Mechatronics / Physiology and Engineering		
Electives (9-13 EC)			

Second Year (60 EC)		
First Semester		Second Semester
Internship / Research Project (15 EC)	Literature Survey (10 EC)	Graduation Project (35 EC)

extensive excursion into biology provides the inspiration to search for innovative solutions to what are often uncommon challenges. You will learn, for example, how to use springs and elastic materials to make lightweight and inherently safe constructions, and how to develop mechanical systems that naturally complement the behavior of humans and other biological systems. You will gain knowledge about innovative design approaches and study methods to translate biological working principles into technological solutions.

Haptic Interfaces (HI)

Traditionally, most human-machine interfacing has focused on providing visual and auditory feedback, neglecting an important communication channel: haptics. Haptic sensation incorporates the sense of touch and proprioception, which allows quick and intuitive physical interaction with our environment. Haptics has seen a great surge of interest in fields such as restoring the feeling of physical interaction in teleoperation systems, simulating physical interaction for medical and automotive simulators, and enhancing physical interaction in rehabilitation or driver support systems. The Haptic Interfaces specialisation focuses on developing human-centered haptic interfaces in all of these fields. This requires a thorough understanding of the mechatronics of haptic interfaces as well as of human control strategies, perception, and motion control. You will focus on the development of haptic devices (hardware and controller software), on the design requirements of devices for specific tasks, and on investigating the way humans interact with such devices.

Career prospects

The knowledge obtained during the study of Biomechanical Design is highly regarded within the traditional mechanical engineering industries. Our graduates find jobs in all major industrial sectors, including management or technical project leadership positions in multinationals, positions in technical development in academic medical centers, and scientists in university or technology transfer institutions. A growing number of graduates are setting up their own businesses.

90
new students per year

20%
of students are women

10%
International MSc students