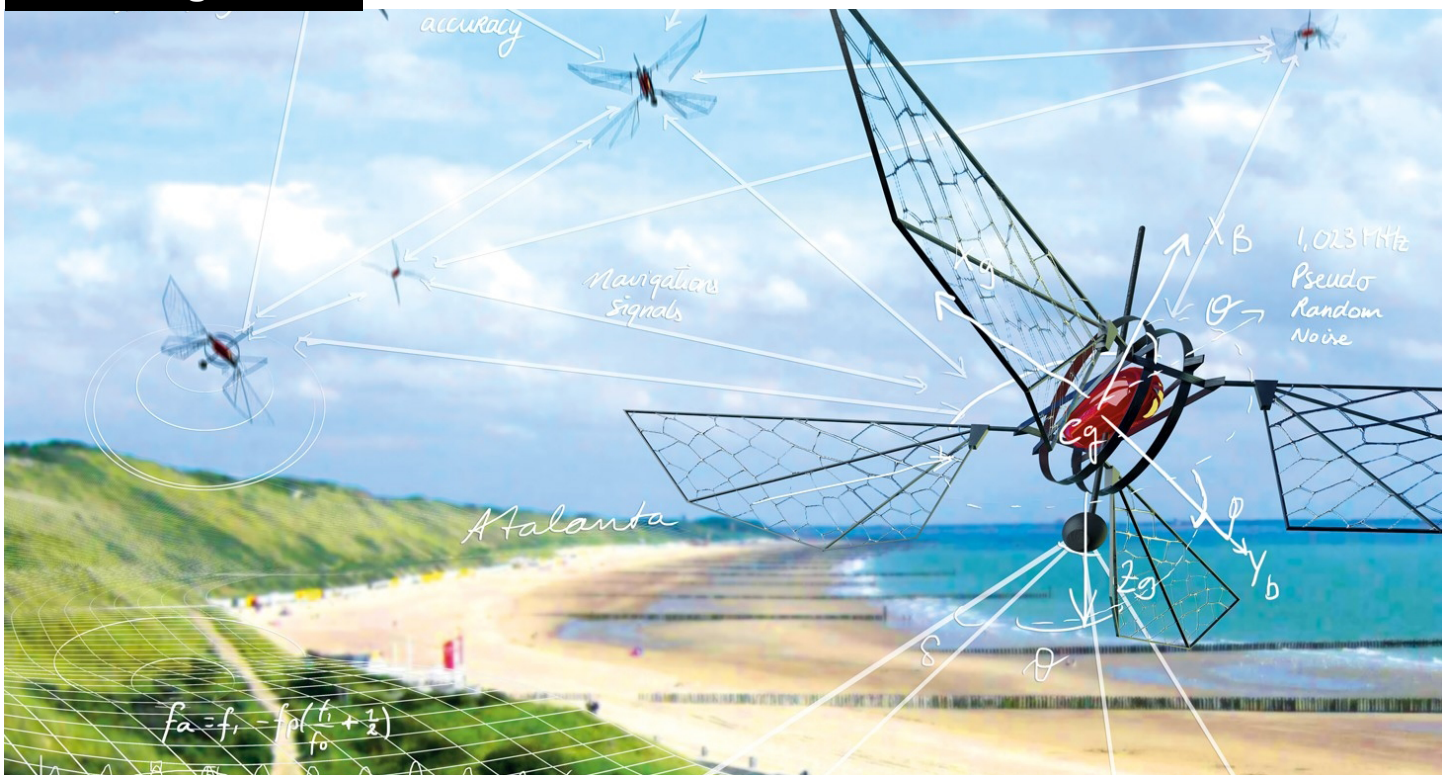
Mechanical Engineering
High-Tech Engineering

MSc Programme



To meet the steadily increasing requirements in all high precision engineering application areas, traditional mechanical engineering is pushed to extremes in precision, miniaturisation and multi domain integration both for the products of tomorrow and the equipment to make those products. This requires a science-based engineering approach based on thorough understanding of not only mechanics and dynamics but also aspects such as thermodynamics, mechatronics, optics and system miniaturisation and integration.

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
Scholarships	scholarships.tudelft.nl

Course Programme

The purpose of the MSc Track in High-Tech Engineering (HTE) is to educate engineers in the technological knowledge and skills they need to design a new generation of both the products and the required equipment that will enable even greater achievements.

Starting from the fundamentals of physics and mechanics, students gain the insights and understanding they will need to push beyond the current limits. The programme includes analysis, design and implementation of solutions, using analytical models, computational methods and experimental work to reach new performance and understanding. With this focus on the 'ultimate in mechanical engineering' the program confronts students with the daunting conceptual and design challenges of developing (and utilising) tools for precision mechanical engineering. Although the emphasis is on high tech equipment and instrumentation, the same knowledge and methodology applies to energy systems, medical equipment, automotive and aerospace design and many other fields of mechanical engineering, enabling these future engineers to address the needs of our modern society.

Focus Area

Next to the HTE obligatory courses students choose a research focus in which they want to deepen their knowledge. Focus Areas within the High-Tech Engineering track are:

- Mechatronic System Design (MSD) aims at designing integrated systems of mechanisms, sensors, actuators and control to perform complex tasks while interacting in a

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First year	
Mechanical Engineering courses (total of +/- 20 ECTS)	
• Physics for Mechanical Engineers (4 ECTS)* • Engineering Dynamics (4 ECTS)* • Mechatronic System Design (4 ECTS)* ** Obligatory for ME_HTE, students are expected to select 2 more to complete list of 5 (see studiegids.tudelft.nl)*	
• Recommended non-technical course (3-6 ECTS)**	
ME_HTE Obligatory course (2 ECTS) • Intro Lab PME (2 ECTS)	
ME_HTE Track courses I, choose at least 3 (11-12 ECTS)	
• Optics (4 ECTS) • Fundamentals of Mechanical Analysis (4 ECTS) • Precision Mechanism Design (4 ECTS)	• Micro- & Nanosystems Design & Fabrication, incl. MEMS lab (4 ECTS) • Eng. Optimization: Concept & Applications (3 ECTS)
ME_HTE Track courses II, choose at least 3 (9-12 ECTS)	
• Compliant Mechanisms (4 ECTS) • Opto-Mechatronics (4 ECTS) • Applications of Materials in H-T Eng. (3 ECTS) • Multiphysics Modelling using COMSOL (4 ECTS) • Stability of Thin-Walled Structures (4 ECTS) • Advanced Finite Elements (4 ECTS) • Intro to Nanoscience (3 ECTS)	• Thin Film Materials (3 ECTS) • Experimental Dynamics (4 ECTS) • Predictive Modelling (4 ECTS) • Nonlinear Dynamics (4 ECTS) • M-N fabrication for Cell Biology (3 ECTS) • Manufacturing on the M-N Scale (3 ECTS)
Elective courses (8-15 EC)** *** See for more information studiegids.tudelft.nl*	
Second year (60 ECTS)	
• Internship/ Midterm review (15 ECTS) • Literature review and project definition (10 ECTS) • Master thesis project (35 ECTS)	

multi-physical environment, typically at high speed and high accuracy, at various length scales. Recent trends include distributed motion, as in compliant mechanisms, as well as distributed actuation and sensing, and control techniques based on fractional order calculus and reset strategies.

- Engineering Dynamics (ED) studies the time-dependent linear and non-linear motion of mechanical structures to engineer dynamical systems. Material properties, thermodynamic interactions and physical actuation forces are studied for enhanced performance of high-speed devices, using mathematical and experimental methods to elucidate and control their complex motions. Explore the ultimate limits of high-frequency nanoelectromechanical systems of atomic-scale dimensions.

- Micro and Nano Engineering (MNE) bridges the gap between the ultimate small and the macro world. Students learn to develop and optimise production and assembly processes and technologies which make use of phenomena at the nanometre level. The primary focus within the Micro and Nano Engineering group is on the production and assembly of precise and small parts and products of micrometer and nanometre scale.

- Computational Design and Mechanics (CDM) deals with mechanical and dynamic behaviour of structures and systems, and their analysis and design through computer algorithms. Topics range from theoretical foundations of mechanics, modelling approaches (e.g. finite element analysis), to structural design and optimization.

- Optics for Technology (OPT) covers the fundamentals of optics in theory and practice. This includes the design of high-end optical systems, micro optical systems and light transport in complex media like tissue. This expertise is often used in the design of high end opto-mechatronic and measurement systems needed to meet societal needs in industry, environmental challenges and healthcare.

Career prospects

The track prepares students to fulfil key positions in leading high-tech companies, such as NXP, ASML, Siemens, or VDL, or pursue a successful academic career in leading universities.

Students Association Taylor

The very active student association Taylor, establishes a strong, active link between students and the department staff. Lectures, receptions, visits to industry, and the annual international "Taylor Trip" are organized.

20% international students

3/2 Student/staff ratio

International "Taylor trip", prev. to e.g. Japan, USA, Canada, China

6+ Company visits per year

12+ Company lunch lectures / drinks per year

Career perspective:

80% Job in High-Tech Engineering/research

99% Job within 3 months

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