Curriculum ME track High-Tech Engineering

First year (60 EC) *

ME Core courses, choose a minimum of 5 (+/- 20 EC)
Physics for Mechanical Engineers (4 EC) **
Engineering Dynamics (4 EC) **
Mechatronic System Design (4 EC) **
Nonlinear Mechanics (4 EC)
Measurement Technology (3 EC)
Control System Design (5 EC)
Drive & Energy Systems (3EC)
Intelligent Vehicles (5 EC)
Multi-Body Dynamics (5 EC)
Advanced Heat Transfer (4 EC)
Advanced Fluid Dynamics (5 EC)
** *Obligatory for ME-HTE (students are expected to select at least 2 more to complete list of 5)*

1 ME Non-technical course (3-6 EC obligatory)
See for full list of options, studiegids.tudelft.nl

ME-HTE Obligatory course (2 EC)
Intro lab PME (2 EC)
ME-HTE Track courses I, choose at least 3 (11-12 EC)
Precision Mechanism Design (4 EC)
Fundamentals of Mechanical Analysis (4 EC)
Micro- & Nanosystems Design & Fabrication, including MEMS Lab (4 EC)
Engineering Optimization: Concept & Applications (3 EC)
Optics (4 EC)
ME-HTE Track courses II, choose at least 3 (9-12 EC) #
Compliant Mechanisms (4 EC)
Opto-Mechatronics (4 EC)
Application of Materials in High-Tech Engineering (3 EC)
Multiphysics Modelling using COMSOL (4 EC)
Stability of Thin-Walled Structures (4 EC)
Computational Design (3 EC)
Advanced Finite Elements Methods (4 EC)
Intro to Nanoscience (3 EC)
Thin Film Materials (3 EC)
Experimental Dynamics (4 EC)
Predictive Modelling (4 EC)
Nonlinear Dynamics (4 EC)
Micro and Nanofabrication for Cell Biology and Tissue Engineering (3 EC)
Manufacturing for the Micro and Nano Scale (3 EC)
focus areas: Mechatronic System Design (MSD, Computational Design and Mechanics (CDM), Engineering Dynamics (ED), Micro Nano Engineering (MNE) and Optics for Technology (OPT); see for more information: pme.tudelft.nl/education
Common electives (8-15 EC) * **

Second year (60 EC) ***

Internship/ Midterm review (15 EC)
Literature review and project definition (10 EC)
Master thesis project (35 EC)

** tentative, minor changes possible*
**** for more information see studiegids.tudelft.nl*

MSc programme ME MSc Track High-Tech Engineering (HTE)

The purpose of the ME 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 Areas

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 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.

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.

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.

Optics for Technology (OPT) covers the fundamentals of optics in theory and practice which is necessary for engineers in industry and academia. This includes the design of high-end optical systems, micro optical systems and light transport in complex media like tissue. This expertise can be combined with other fields of engineering (e.g. mechanical, materials, civil) to be able to design and build devices which can serve the new generation of societal needs in industry, environmental challenges and healthcare. This gives students more flexibility in choosing electives and building a portfolio for a successful career.

See for more information: pme.tudelft.nl/education