Welcome at the TU/e Graduate School Event

Presentation Mechanical Engineering - Hans Kuerten and Daniël Lelivelt
Top-ranking Dutch university

At the heart of the Brainport region

Strong technology heritage in Eindhoven

Accounts for 23.1% of total Dutch private R&D expenditure

Student growth

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc</td>
<td>5,591</td>
<td>7,501</td>
</tr>
<tr>
<td>MSc</td>
<td>3,608</td>
<td>4,750</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9,199</td>
<td>12,251</td>
</tr>
</tbody>
</table>

Engineers for the future

- More than 93 nationalities
- 12,251 total number of students
- 92% of the graduated students finds a job within 6 months. Nationwide this is 89%
- 3,298 total degrees awarded
  - 1,441 BSc
  - 1,455 MSc
  - 120 PDEng
  - 282 PhD
- 59,341 total number Alumni
  - 83% Male, 17% Female
The TU/e campus covers an area of 75 hectares

Ecosystem and characteristics
- 47 new patent applications
- 7 patents filed by third parties
- 29 provisionals converted
- 35 transferred via a transfer or license
- 2747* Scientific publications

International working environment
- 3,301.3 Total staff (fte)
- 2,122 Research staff (fte)
- 64.3% Dutch
- 35.7% International
- 61.5% Male
- 38.5% Female

Rankings:
- CWTS Leiden Ranking 2020: TU/e no. 4 in industry cooperation
- Times Higher Education: 2021 no. 187 of 1000
- QS-Ranking 2021: no. 120 of 1003
Why TU/e?

• High Tech Campus
  - Signify (Philips Lighting) and Healthcare
  - Solliance PV solar energy
  - SEAC Solar Energy
  - ECN Energy research Center NL
  - NXP semiconductors

• ASML wafersteppers (Veldhoven)

• Océ a Canon company (Venlo)

• VDL Groep

• DAF trucks

• TNO Applied Scientific Research

• TU/e

• Automotive Campus (Helmond)

• FEI High-performance microscopy
TU/e in a nutshell

- High quality research and education
- International network with prominent universities and institutes
- Modern facilities and lab spaces
- TU/e alumni in high demand among employers
- International community with over 80 nationalities
- Friendly, open culture
TU/e in a nutshell

- One campus in city center
- Compact, green
- Modern student facilities
TU/e in a nutshell

• Student associations
• Excellent sport facilities
• Student teams
• Eindhoven – city of design and technology
Mechanical Engineering

• Why Mechanical Engineering (ME) and why TU/e?
• Content of the Master program at ME
• Specializations in the Master
• Experience Daniel Lelivelt
• Pre-Master’s program (schakelprogramma)
• Why study at a university?
Why Mechanical Engineering at TU/e?

• Excellent chance of good job
• Combination of depth and broad range of topics
• Participation in all research themes of TU/e
• Very good contacts with Brainport industries

Did you know that we are in the global top-50 of Engineering & Technology universities? One of the highest ranked areas is Mechanical Engineering! (rank 37)
Mechanical Engineering

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# Master program MW: overview

2 years, 120 Ecs, English, Master of Science (MSc)

<table>
<thead>
<tr>
<th></th>
<th>Y1</th>
<th>Y2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core</strong></td>
<td>20</td>
<td>4 core courses out of 12 core courses offered</td>
</tr>
<tr>
<td><strong>Specialization</strong></td>
<td>20</td>
<td>20 EC out of a total of ~150 EC offered</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>15</td>
<td>Free choice out of all TU/e Master courses offered</td>
</tr>
<tr>
<td><strong>Professional skills</strong></td>
<td>5</td>
<td>2 compulsory modules</td>
</tr>
<tr>
<td><strong>Internship</strong></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><strong>Graduation project / Thesis</strong></td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

One quartile = 15 EC ≈ 10 weeks
Most courses are 5 EC = 3 courses per quartile
8 weeks courses, 2 weeks exams
Resits in next quartile, only 2 exam possibilities per year
Degree program: professional skills

Each student has to pass two courses:

• 4WM00 – Coaching and tutoring (2.5EC)
  (group dynamics, leadership, project planning, ...)

• 4WM10 – Career Development (2.5EC)
  (orientation of future career, assessment, networking, ...)

* HBO and international students take the course 4WM50 Group work and academic writing.
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Research divisions

| Dynamical Systems Design (DSD) | Thermo Fluids Engineering (TFE) | Computational and Experimental Mechanics (CEM) |

- Each research division contains different sections
- Specializations for MW are the sections
# Sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Chair</th>
<th>Research division</th>
</tr>
</thead>
<tbody>
<tr>
<td>CST: Control Systems Technology</td>
<td>Prof. Steinbuch</td>
<td>DSD</td>
</tr>
<tr>
<td>D&amp;C: Dynamics and Control</td>
<td>Prof. van de Wouw</td>
<td>DSD</td>
</tr>
<tr>
<td>P&amp;F: Power and Flow</td>
<td>Prof. Deen</td>
<td>TFE</td>
</tr>
<tr>
<td>ET: Energy Technology</td>
<td>Prof. Smeulders</td>
<td>TFE</td>
</tr>
<tr>
<td>MoM: Mechanics of Materials</td>
<td>Prof. Geers</td>
<td>CEM</td>
</tr>
<tr>
<td>PT: Polymer Technology</td>
<td>Prof. Anderson</td>
<td>CEM</td>
</tr>
<tr>
<td>MS: Microsystems</td>
<td>Prof. Den Toonder</td>
<td>CEM</td>
</tr>
</tbody>
</table>

A section is the basis for your choice for core and specialization courses, internship, thesis project and possibly your electives.
Dynamical Systems Design

Sections:

• Control Systems Technology, Prof. M. Steinbuch
• Dynamics and Control, Prof. N. van de Wouw

Example research areas:

• Automotive Powertrains
• Advanced Motion Systems (Hybrid and Networked Control Systems)
• Robotics for Care and Cure
• Energy Systems
• Acoustics and Noise Control
• Manufacturing Networks
• Cooperative Adaptive Cruise Control
• Vehicle dynamics, tire dynamics and control
Dynamical Systems Design

Cooperative Adaptive Cruise Control

Master-slave, haptic feedback
Wafer stepper
Fusion reactor
Thermo Fluids Engineering

Sections:

• Power and Flow, Prof. N. Deen
• Energy Technology, Prof. D. Smeulders

Example research areas:

• Efficient Engines
• Multiphase Flows
• Metal Fuels

• Micro-scale Heat Transfer
• Small-scale Renewable Energy Systems
• Heat Storage
Thermo Fluids Engineering

WEDACS

Solar simulator

Master Mechanical Engineering

PVT combipanels and heat storage

TU/e
Computational and Experimental Mechanics

Sections:

• Mechanics of Materials, Prof. M. Geers
• Polymer Technology, Prof. P. Anderson
• Microsystems, Prof. J. den Toonder

Example research areas:

• Mechanics of Micro-Electronics
• Advanced High-Tech Materials
• Materials for Energy
• Applied Rheology and Process Modelling
• Chaotic Mixing and Multiphase Flows
• Micro-Manufacturing Technologies
• Cells and Organs on a Chip
Computational and Experimental Mechanics

- Wearable sweat sensor
- DAF cylinder heads: micro-crack formation
- Novel microactuators for ASML

microstructure → processing history → macroscopic performance
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Experience Daniël Lelivelt

- Bachelor Mechanical Engineering
  - BEP: Energy storage
  - Master ME
  - Power & Flow
Experience Daniël Lelivelt

• Before Master:
  • Visit master-presentations
  • Talk with master-students
  • Look on websites of research groups
  • Check interesting courses
    • Free space
Experience Daniël Lelivelt

- During Master:
  - Develop yourself
    - Soft-skills
    - Self-reflection
  - Internship: Bosch, Tilburg
  - Look into job options
  - Plan your future

MyFuture.tue.nl
Graduation Project

- Characterization of the fluidization and reduction behavior of combusted iron(-oxide)
- Practical

1https://teamsolid.org/our-solution
Extracurricular activities

- SSCE (Student Sport Centre Eindhoven)
  - ± 70 sports
- Part-time job: Teaching Assistant
  - Education team
  - Guided selfstudies of master course
- STEHVEN
- W.S.V. Simon Stevin
- Student team
  - Organizing events for energy enthusiasts
Student teams
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Pre-Master’s program for HBO-students

• Program of 30 EC’s
• Starts in September
• Aim of the program
  • Knowledge deficiency, especially mathematics
  • Does academic education suit you?
# Pre-Master’s program 2022-2023

<table>
<thead>
<tr>
<th>Quartile 1</th>
<th>Quartile 2</th>
<th>Quartile 3</th>
<th>Quartile 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus (5 EC)</td>
<td>Advanced Calculus (2.5 EC)</td>
<td>Solid Mechanics (CEM)</td>
<td></td>
</tr>
<tr>
<td>Linear algebra (2.5 EC)</td>
<td>Dynamics &amp; control of mechanical systems (DSD)</td>
<td>Electives</td>
<td>Electives</td>
</tr>
<tr>
<td>Trainings</td>
<td>Thermodynamics (TFE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5 EC</td>
<td>12.5 EC</td>
<td>10 or 5 EC</td>
<td>0 or 5 EC</td>
</tr>
</tbody>
</table>

- **Trainings:** Matlab, RSI, safety and environment
- **Compulsory courses of 25 EC, one elective of 5 EC**
- **10 EC for mathematics**
- **If interested in new master’s program AIES:** choose specific elective


Regulations in the pre-master’s program

- **Binding Study Advice** of 100% - so 30 EC’s in 1 year
- With good study progress the student can start attending master courses up to a maximum of 15 EC’s
- Yields exemptions in the master
Be prepared

• A pre-master’s program is more work than one might think. You must be willing to work hard.
• It is not advised to do the pre-master in combination with a part-time job in industry.
• Subscription for a pre-master via Studielink before May 1st.
• required minimum level of mathematics: pre-university (VWO) mathematics B or TU/e mathematics B test completed before September 1st
• required minimum level of English proficiency: pre-university (VWO) level English or English language proficiency test completed before September 1st
Admission

• **Direct admission with:**
  - Mechanical Engineering, Applied Physics, Marine Technology and Aerospace Engineering at university level (WO Werktuigbouwkunde, Technische Natuurkunde, Maritieme Techniek en Lucht- en ruimtevaarttechniek)

• **Admission via pre-master’s program with:**
  - Mechanical Engineering, Electrical Engineering, Automotive, Applied Physics, Mechatronics, Aerospace Engineering at HBO level (HBO Werktuigbouwkunde, Elektrotechniek, Autotechniek, Technische Natuurkunde, Mechatronica, Luchtvaarttechniek)
  - Tailor-made pre-master’s programs for other (university + HBO) diplomas via admission committee
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Difference WO and HBO

University of Technology:
• **Developing** new technology and design methods to solve technological problems
• In depth education
• Lecturers are also researchers
• **Internship is a research project**

But also: research in close connection with industry!

University of Applied Science:
• **Applying** existing technology and design methods to solve technological problems
• Education focusses on practical application
• Internship in industry
Or contact:

- Academic advisor: me.academic.advisor.msc@tue.nl
- Program director: J.G.M.Kuerten@tue.nl
- ME-website: www.tue.nl/me (info on our department, Master’s program, etc.)
APPLICATION MASTER PROGRAMS

For Dutch students:
• More information about admission: www.tue.nl/admission
• Application via http://www.studielink.nl/
• Questions: studeren@tue.nl

For international students:
• Check the requirements for admission via www.tue.nl/admission
• Apply at the online application form (available from 1 Oct – 1 May)
• Application fee of €100 for each application (non refundable)
• Application procedure takes +/- 8 weeks
• You will be informed by email about the outcome of your application
• Questions: io@tue.nl