Automated driving will create a revolution in transport, enhancing safety, mobility and efficiency

Diploma
MSc in Mechanical Engineering, Track Vehicle Engineering

Credits
120 ECTS, 24 months

Starts in
September, February

Language of instruction
English

% international students
25%

Track

Vehicle Engineering

"Automated driving will create a revolution in transport, enhancing safety, mobility and efficiency"

The automotive field is in the midst of a transformation. Cheap sensors and powerful hardware, coupled with smart algorithms and big data rapidly advance the capabilities of modern vehicles. In traditional vehicles, where the driver is under control, the automation level is gradually increased; witness the ever more sophisticated autopilots for the highway introduced in premium cars nowadays. At the same time, the next generation is emerging: that of self-driving vehicles as part of a mobility service, where the human driver is no longer necessary and where any supervision is exerted remotely by an operator. The Vehicle Engineering track offers four specialisations with a focus on automated driving:

- **Perception and Modelling (PM)** – Sensor processing (video, radar, lidar) to obtain a 3D spatial representation of the vehicle environment, to recognize other road users and road objects, and to predict how the traffic situation will evolve.

- **Dynamics and Control (DC)** – Vehicle path planning and control, safely interacting with other road users while optimising traffic flow and driving comfort. Vehicle state estimation and control at handling limits.

- **Human Factors (HF)** - Human perception and performance, driver modelling, human fallback capability in cases which cannot be handled by the automation, perception of motion and comfort.

- **Materials (MAT)** - Lightweight materials including composites, multi-material design, performance in durability, sustainability and energy absorption in crash conditions.

Courses provide in depth multidisciplinary knowledge of current and future vehicle technology, complemented with top level courses in mechanical engineering and human factors. TU Delft develops its own automated vehicles and closely cooperates with the automotive industry.

Toyota Prius vehicles are equipped for automated driving. Two automated shuttle buses are developed for low speed operation in the province of Gelderland (http://wepods.nl). Two BMW 5 series vehicles are equipped with individual wheel braking, wheel load sensing sensors and active suspension for high performance driving. Steer-by-wire systems for single track vehicles (bicycles and motorcycles) are developed. Several fixed-base and moving-base driving simulators are equipped for normal and automated driving of passenger cars, trucks and bicycles. Driver behaviour monitoring includes eye-tracking, muscle and heart activity.
First Year
A solid basis in mechanical engineering with courses in Non-linear Mechanics, Physics and Measurement, Control System Design, Advanced Heat Transfer, complemented with a social course.

Compulsory Vehicle Engineering courses include: Intelligent Vehicles, Vehicle Dynamics and Automotive Human Factors.

A range of elective courses is provided on computer vision, control theory, human factors, haptics, and materials. As good programming skills are increasingly important for the Intelligent Vehicles domain, a course on robot software basics is also offered.

Students can furthermore select elective courses from other Master programmes at TU Delft and elsewhere.

Courses and projects in Vehicle Engineering are open to students from other tracks and masters (e.g. Computer Science, Computer Engineering, Material Science) provided that they have the required entry level.

Second Year

Literature Research (10 EC)
Internship (15 EC - optional)
Master thesis project (50 EC or 35 EC if an internship is performed)

1 EC = 28 hrs study, according to the European Credit Transfer System (ECTS)
Total number of credits in the MSc programme = 120 EC

For more information on all courses please visit: www.studyguide.tudelft.nl
Career prospects and international possibilities
All supervisors actively cooperate with the automotive industry, research institutes and other universities in international and national projects. This offers an excellent scope for internships and jobs in the automotive industry and research community.

TU Delft is a partner in the Dutch Automotive organisation Automotive NL, providing an excellent network with the Dutch Automotive industry.

In April 2014 I graduated from the mastertrack Automotive. What attracted me to this mastertrack is that it concentrates on the interaction between man and machine and therefore has a lot of courses with an interdisciplinary character. In the bachelor Mechanical Engineering there is little attention for the humans that will eventually use a product. The mastertrack Automotive considers both humans and technology as a point of study and this broadening of the area of research was what I found very interesting. Within the mastertrack it’s easy to change your course outline to make it more focused on design or research.

My graduation project was about a system that has been developed to aid drivers with staying in their lane. The system calculates the deviation from the middle of the lane and from that a corrective force is executed on the steering wheel. I developed different algorithms and tested them in a driving simulator. During this I not only considered the objective driving performance of the system and driver, but also subjective measures such as satisfaction of the driver with the system. The experiment was a succes and I eventually wrote a journal publication with my supervisors and won the 2014 Human Factors Award with our entry. Since then I started with a PhD at the Technical University of München.
**Admission requirements and application procedure**

**Dutch BSc degree**
In most cases, if you hold a BSc degree and the Master’s programme is closely related to your Bachelor’s programme, you will be admitted directly into the programme. However, if the Master’s programme does not follow directly from your undergraduate programme, you will be required to take additional courses in what is called a bridging programme. This may be a standard programme, or it may be tailored to your specific situation.

To see which Master’s programmes are open to you on completion of your Bachelor’s degree Dutch university, go to www.doorstroommatrix.nl.

Application goes through Studielink: tudelft.studielink.nl

**Dutch HBO degree**
An HBO Bachelor’s degree does not qualify you for direct admission to a TU Delft Master’s degree programme. To start a Master’s degree programme, you will first need to complete a supplementary programme in order to bring your knowledge to the required level. You can do this during your HBO programme by completing a bridging or by means of a bridging programme after securing your HBO diploma.

Entrance requirements for mathematics and English (some exceptions) apply for both the bridging minor and the bridging programme. See www.hbodoorstroom.tudelft.nl for detailed information.

Application goes through Studielink: tudelft.studielink.nl

**International applicants**
To be considered for admission to a MSc Programme you’ll need to meet TU Delft’s general admission requirements.

1. A BSc degree (or a proof that you have nearly completed a BSc programme) in a field closely related to the MSc programme.
2. A BSc Cumulative Grade Point Average (CGPA) of at least 75% of the scale maximum.
3. Proof of English language proficiency:
   - TOEFL (Test of English as a Foreign Language) with an overall band score of at least 90 (internet-based test). Please note that we only accept the TOEFL internet-based test.
   - or IELTS (academic version) with an overall Band score of at least 6.5.
   - or proof that you have passed the University of Cambridge "Certificate in Advanced English" with a minimum grade B or the University of Cambridge "Certificate of Proficiency in English".

For international students, the application period starts in October and closes on 1 April. To start an MSc application, fill in the online application and pay the refundable application fee of €100. Then send hard copies of the application documents to TU Delft’s International Office. Please note that you should apply early when you want to be considered for a scholarship as well!

For more information about the application procedure and studying at TU Delft in general, go to: www.admissions.tudelft.nl.

**Further information**
Please visit the webpage for all details, complete requirements, deadlines and contact information:
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Further information for international applicants
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