

# Automotive Technology\*

The automotive industry needs highly qualified professionals with a clear automotivation.

In the fast-moving automotive industry, with new technologies developing for low emissions and safe mobility, the possibilities seem unlimited. The traditional nuts-and-bolts vehicle has become a controlled high-tech system full of mechanics, electronics, sensors and informatics. This rise in vehicle intelligence has led to substantial demand for highly educated engineers: able to think at system level, work across a range of disciplines and see the system in its entirety rather than as separate components.

The Master's degree program Automotive Technology aims to address these automotive industry demands and the nature of the program's systems approach is unique. No comparable programs exist in Europe.

Given this system approach, the program is a joint initiative of the following 6 departments:

- Mechanical Engineering
- Electrical Engineering
- Chemical Engineering and Chemistry
- Mathematics and Computer Science
- Industrial Engineering & Innovation Sciences
- Industrial Design

The multidisciplinary nature of the program means that you will not only be perfectly suited for a job in the automotive industry but also in related sectors, such as mechatronics and aerospace, that work with materials, energy and high-tech systems.



## Program overview

The two-year program consists of 120 ECTS which are divided proportionally:

### Year 1

- Compulsory program, consisting of
  - eight generic core courses (24 ECTS)
  - project assignment (6 ECTS) that aims at integrating the multidisciplinary knowledge gathered so far
  - a course 'Cars in context: Emergence of an automobile system in a mobile world' (3 ECTS)
- Specialization, 9 elective courses (27 ECTS)

### Year 2

- Master Traineeship (10 ECTS)
- Graduation project (50 ECTS)

## Compulsory program

The eight core courses are clustered into two core components: Driving Guidance and Efficient Vehicle. These are the same categories as used by the HTAS (High Tech Automotive Systems) program. This market-driven innovation program has been established and is steered by the Dutch automotive industry and knowledge institutes to focus automotive innovation on areas that match the strengths and ambitions of the Dutch automotive sector. The Master's degree program Automotive Technology addresses the research needs of the modern automotive industry. It will prepare you for a future in the industry in both the Netherlands and abroad.

“The program offers a unique opportunity to become a specialist and will also teach you to think at system level. A perfect preparation for the automotive high-tech industry.”



## Driving Guidance courses:

- 1. Vehicle Dynamics Control:** this course is an introduction to vehicle dynamics. Different vehicle models will be presented and analyzed. Special attention is paid to tire modeling and behavior. At the end of the course a vehicle model will be developed.
- 2. Automotive Human Factors:** this course focuses on the interdependence between a car or a truck, its human driver and the dynamic environment that is navigated. It is concerned with the goals of productivity (getting from A to B in a reasonable time), safety and driver comfort.
- 3. Realtime Architectures:** this course is organized around the issue of real-time requirements and their impact on the hardware-software architecture of a system. The main part involves networked embedded systems. Examples are drawn from the automotive domain, among others.
- 4. Software System Engineering:** this course is about basic notions of software engineering. Its goal is to learn how to model communication between software components and how to perform basic behavioral analysis on those models.

## Efficient Vehicle courses:

- 1. Powertrain Components:** this course examines the basic principles of the automotive drive train and its components. The first part involves basic principles and internal combustion engine modeling, in the second part followed by the basic transmission elements and basic overall powertrain modeling and control techniques.
- 2. Electric Components:** this course provides insight into electrochemical power sources as well as power electronic converters and their application in electric drives. Modeling and analysis of mechanical systems coupled to electric drives will be effected both conceptually and using computer simulation.
- 3. Energy Management in Automotive Applications:** this course examines the physics and mathematical models of components used by energy management: internal combustion engines, generators/motors, batteries, super capacitors and drive trains. Control oriented optimization strategies for energy management systems will be discussed, using dynamic and quadratic programming with or without future drive-cycle information.
- 4. Secondary Batteries and Hydrogen Storage:** this course outlines the main principles of electrochemical energy storage and will present state-of-the-art battery technology related to automotive applications, focusing on Li-ion and NiMH batteries in detail as well as the basics of battery management systems.



Paul's **AUTOMOTIVATION**

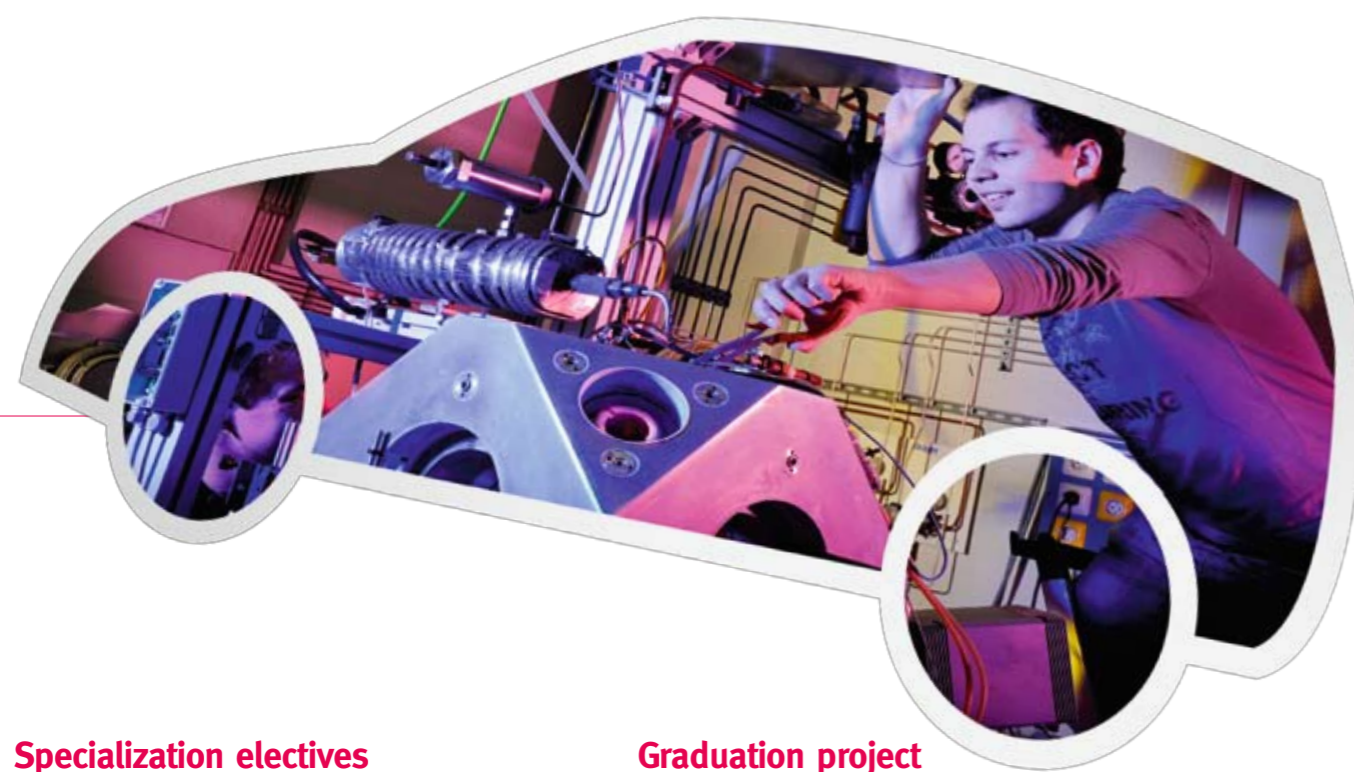
Build intelligent trucks!



Yan's **AUTOMOTIVATION**

Solve the worlds mobility problem!

\*A special master's track which – until official approval as an independent Master of Science program - is formally a track of the Master of Mechanical Engineering degree program



### Specialization electives

To enable you to become either a specialist or a generalist you will choose nine of the fifty courses offered in the fields of:

- Electrical Systems for Driveline and Communication
- Embedded Software
- Chemistry in Automotive
- Powertrain Components and Control
- Vehicle Dynamics Control
- Systems Engineering
- Automotive Materials
- Automotive Human Factors

### Master Traineeship

You will start the second year with a Master Traineeship. The type and content depend on your background. During your traineeship you will put into practice what you have learned and gain more insight into the career opportunities in the automotive industry. At the TU/e you will study in the heart of the Dutch high-tech automotive region that offers numerous opportunities for interesting traineeships. A wide range of options for traineeships in other countries is offered by the associated international network.

### Graduation project

After the Master Traineeship the program is concluded with a final project in which you show your ability to independently carry out a research or design project. This can take place within the university or in partnership with a company in the automotive industry.

### Facilities

Studying Automotive Technology in Eindhoven implies high-tech research and educational facilities. Within the university there is a unique automotive laboratory where you can set up a diverse range of experiments and do simulations. There are many other study facilities with modern PC systems / equipment and there are many self-study rooms.

### Admission

Because of the multidisciplinary nature of the program several Bachelor degrees provide admission to Automotive Technology. The academic level and quality of the completed Bachelor's program must be at the level of Western European universities. You are expected to be proficient in English. The deficiency program for students who have a Dutch HBO (Higher Vocational Education) degree consists of an obligatory component and a component that is background dependent. You can find more information about admission as well as information about future career opportunities at [www.tue.nl/masterprograms/at](http://www.tue.nl/masterprograms/at).

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#### Study possibilities

- Full-time, part-time (by arrangement)

#### Degree

- Master of Science (MSc)

#### Language

- English

#### Entry date

- September

#### Duration

- Two years (120 ECTS)

**TU/e** Technische Universiteit  
Eindhoven  
University of Technology



Become a master of  
**Automotive Technology**

Where innovation starts

Kerem's **AUTOMOTIVATION**

Build the cleanest  
vehicles!

