Introduction in Automotive Elective Package

EINDHOVEN UNIVERSITY OF

Introduction in Automotive		
Offered by	Department of Electrical Engineering	
Language	English	
Primarily interesting for	All students, but most relevant for students with background in AU, EE, ME, AP, CSE, SI	
Prerequisites	Required courses: Check individual courses below!	
	Recommended courses:	
Contact person	Title + initials and last name, e-mail address	

Content and composition

This elective package will give you hands-on experience in the field of Automotive. It includes three projects in which you will work in teams of 4-8 students.

Course code	Course name	Level classification
5XIA0	Automotive design project "Energy challenge"	1.
5XSC0	Automotive design project "Electronic differential"	2.
5XWF0 Design project on wireless charging		3.

Course description

Automotive design project "Energy challenge" (5XIA0)

Hands-on design project (OGO) in which students work in small teams (6-8 students). The ultimate goal of the project is to develop strategies for maximally efficient city and open-road driving using an electrically-driven model car. At the end of the project you will practically demonstrate the effectiveness of your driving strategy to the project management. You will perform tests and calculations on the TU/e Vehicles model car in order to

determine its energy consumption and efficiency. Furthermore, using a built-in digital circuitry, you will develop a speed measurement system which will help you efficiently drive the car and illustrate your strategy to the audience. The project brings challenges from various disciplines of Automotive, Electrical and Mechanical Engineering. The project is concluded with a presentation, report and demonstration (competition).

Prior knowledge: 5EIA0 Computation I: hardware/software interface

Automotive design project "Electronic Differential" (5XSC0)

Hands-on design project (OGO) using electric model cars. Students work in small teams on the "Electronic Differential".

Formula Student is a very challenging international design competition for students to design, build, test, and race a single seated formula style racecar. University Racing Eindhoven (URE) participates yearly in this competition. Every year a lighter, faster and more reliable car is developed. With the electric competition came lots of new challenges which the team has handled well for three years, resulting in three award winning cars!



Introduction in Automotive Elective Package

EINDHOVEN UNIVERSITY OF TECHNOLOGY

In the current URE racing car, a single motor powers both rear wheels through a conventional mechanical differential. In order to achieve higher energy efficiency, the power train is to be modified to four-wheel drive, having a single (smaller) electric motor per wheel. In that case, the functionality of the differential has to be realized electronically. As an added advantage, traction control can be applied to each wheel individually in order to achieve better vehicle control and higher accelerations. As a step towards this ultimate goal for URE, in this project your team will work on implementing an electronic differential on a rear-wheel driven model car, powered by two electric motors.

Prior knowledge: 5ASC0 Dynamics in Automotive Applications 5ESB0 Systems (recommended)

Design project on wireless charging (5XWF0)

In the project teams of 7-8 students design, manufacture and test a system for the wireless charging of vehicles. The design includes several power electronic converters, transformer and inductor design and control of power flows in the system. The power for the charging system is supplied by a wind turbine. The system should be able to detect the presence of a chargeable vehicle. In the project a proof-of-principle contactless energy transfer system for the charging of electrical vehicles should be designed, tested and demonstrated. The system is scaled with respect to power level and operates independent from the electricity grid. The input of the system is a wind turbine. Using power electronic converters the power from the wind turbine should be maximized by Maximum Power Point Tracking (MPPT). The power should be transferred over realistic distances to a load. Load detection should be present to detect whether there is a chargeable load.

Prior knowledge: 5EWA0 Electromechanics (compulsory) 5APA0 Power Electronics (recommended)

Precedence relationships within the package: No precedence relationships