

Free Minor LV Electronics - Electrical Engineering

Delft University of Technology | Formula Student Team Delft

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Introduction

As with modern age road vehicles electronic intelligence lies at the basis of reliability and performance. As a start the last FS Team Delft race car contains over 400 sensors, measuring for example acceleration, gyration and temperatures throughout the car. Most of this data is collected by PCBs close to the sensors. These are placed in tough environments where temperatures may exceed 60°, where water may penetrate or where mechanical stress may be high.

All data is collected by the central control unit that runs the control algorithms. The most important settings of these algorithms can be altered via the dashboard to streamline the setup procedures during competitions and testing days. All of the PCBs mentioned above and more are designed by the team itself and the overall system as such evolves rapidly towards the state-of-the-art. For the next step we are looking for electrical engineers that seek to apply their knowledge to design electronics in the competitive Formula Student environment.

The design environment in the team differs greatly from that of the university projects. The team goal is to obtain maximum performance which is a result of performance on many different disciplines. As such, interfacing with engineers of different backgrounds is of utmost importance. The minor project therefore improves not only the technical capabilities of the student but also improves project skills that are essential for any engineer. The additional electives should complement this.

The minor student will get the responsibility to design and test PCBs of sufficient complexity. The difficulty of this work, and the time required to successfully fulfil this task will accredit to the 15 EC listed for this project. The assessment will be done by a final presentation, where focus should be put on the process applied and lessons learned. A paper needs to be written which will receive a fail or pass result.

The work that the student will be doing at the team will involve him/her using techniques or knowledge learned in the following Electrical Engineering Bachelor: EE1P21 (Elektriciteit en Magnetisme), EE2C11 (Integrated Circuits), EE1C11 (Linear Circuits A), EE1C21 (Linear Circuits B), EE1D11 (Digital Systems A) and EE1D21 (Digital Systems B).

The idea behind the set-up of this minor is that several students working on different disciplines have 2 courses in common to ensure a basic level of understanding of project- and process management and decision making. This should enable the students to work more independently, while still performing as desired. The remaining ECTS will be gathered by following courses relevant for the discipline the student is working on, in this case Low Voltage Electronics. The table on the next page shows a list with proposed courses:

Course	ECTS	Motivation	Period
CT3101 Project Management Basics	5	Project management skills are a big plus in such a complex, multidisciplinary project.	Q1
WB1630-16 Statica	6	A course to help understand basic mechanical systems. Helps to understand the basics of mechanical design and with that the mechanical considerations relevant to the PCB design and packaging.	Q1
TI3105TU Introduction to Python programming	5	Introductory course into python. Useful for electrical engineers in many applications.	Q1
SPM6102 Process Management and Decision Making	5	A well-structured process and good decision making are of vital importance in such a high-paced project as Formula Student.	Q2
ET4257 Sensors & Actuators	4	Master course that gives an overview of various sensors and actuators. Helpful in understanding sensor limitations and pros and cons of commercially available devices.	Q2
TI2726-B Embedded Software	5	An introductory course to embedded programming. Places may be limited!	Q2

From these courses at least 15 ECTS should be filled. It is advised to take at least one management course. The list above is only a recommendation, other electives are allowed as long as:

- The elective is not part of the Electrical Engineering major.
- The elective complements the project work.

The final course list needs to be approved by the exam committee of the EWI. The project work itself fills the other 15 ECTS.