

## § 36 Bachelor Program Electrical Engineering and Information Technology

### (1) Structure of the Study Program

The Bachelor study program Electrical Engineering and Information Technology comprises the basic study period with a duration of two semesters and the main study period which concludes with the Bachelor's examination in the 7th semester.

It is possible to graduate this study program including a German vocational training. For detailed regulations see section 7.

For a successful graduation, a practical semester and academic courses worth 180 ECTS are required. The total number of 210 ECTS is made up of six theoretical semesters with 30 ECTS each and one practical semester worth 30 ECTS.

There are two course specialization possible (Study-Focus): automation and communication. The students have to chose one of both with the re-immatriculation for the 4th semester (recorded).

German speaking students, who start in the summer semester, have to chose English in the language module.

### (2) Courses

The lectures for students of the english study program will be given in english on a yearly basis, exceptions can be decided by the faculty board (according: General part of the SPO §3.3). The lectures from semester six and seven will be given in german, exceptions can be decided by the faculty board (according: General part of the SPO §3.3).

All courses comprise a proportion of exercise. The required courses as well as the related accredited examinations are shown in the tables.

The following abbreviations are used:

| Type of course         | Type of exam   | Scope of exam   |
|------------------------|--|---|
| V Lecture              | B Bachelor's thesis  | SWS Semester hours  |
| PR Project             | R Seminar Paper and presentation   | ECTS ECTS points in compliance with the European Credit Transfer System |
| S Seminar              | PF Portfolio   | E Medium of instruction is English                                      |
| P Practical, exercises | K(xx) Written examination duration of xx minutes   | D Medium of instruction is German                                       |
|                        | M Oral examination   |   |
|                        | PA Practical work (lab, term or seminar paper or project work)   |   |
|                        | RPA Practical work documented by a seminar paper and presentation (PF: 50% PA graded and 50% R graded) |   |

(3) Elective Modules

The elective modules available are announced by display on the notice board at the beginning of each semester.

If students wish to choose elective modules from the offer of other universities, a special permission by the Examination Committee will be required. Tutorials held by the student can be recognized as elective module, whereby the maximum number of ECTS to be earned is five. The elective modules can be chosen across the specializations (automation or communication) from all subjects of electrical engineering and informatics.

(4) Accredited Examinations

The type of accredited examination and course achievements is shown in the tables 1 to 4. Every accredited examination must be passed. § 8 of this SPO is still valid. The rating of the examinations is according § 13 of this SPO

(5) Practical Semester (Compulsory)

The 5th semester is a practical semester. A prerequisite for beginning the practical semester is that, by the end of the 4th semester, the student has passed examinations of the first two semesters amounting to 60 ECTS. In case of the vocational training version of this study program, the practical semester can be done during the practical phases during the lecture free times in the cooperating companies (see section 7).

During their practical semester, the students shall work on an engineering task from the fields of electrical or automotive engineering, thereby becoming acquainted with the professional requirements, industrial work methods and the operational environment with regard to the planning, development and application of electronic networks and systems.

The fields of work can be as follows:

- Planning and implementation of electronic and information technology systems
- Planning, design and development of electronic circuits
- Testing of networks and systems
- Software development
- Use of computers for the design of circuits and systems (CAD)
- Computer simulations
- Planning, design and development of electric drives
- Planning and implementation of mechatronic systems in automotive engineering

Total duration: 22 weeks with at minimum 95 presence days in the company

(6) Bachelor's Thesis

Prior to beginning the Bachelor's thesis, all examinations and course achievements of the first four semesters as well as the practical semester must have been completed. The professor assigning the Bachelor's thesis must limit the topic, the task and the extent of the thesis in such way that it can be completed in approx. 360 hours of work corresponding to 12 ECTS. See §12 of the general part of the SPO.

(7) Vocational Training Study Program

The curriculum comprises 9 semesters in case of the Vocational Training Study Program and leads at first to a „certified occupation requiring formal training“ (e.g. Elektroniker/Elektronikerin für Energie- und Gebäudetechnik, Elektroniker/Elektronikerin für Betriebstechnik, Mechatroniker/Mechatronikerin). The semester of the non vocational training will be integrated into the adapted curriculum Table 5. The curriculum will be completed with training sections from the cooperating companies and the industrial school. For this parts, the companies and the industrial schools will be responsible (the language is German). The compulsory practical semester will be done during the practical phases during the lecture free times in the cooperating companies. The projects, seminars and the Bachelor’s thesis can be done in the cooperating companies.

(8) Validity

This SPO is valid starting from winter semester 2022/23.

B. Special Part: Bachelor Program Electrical Engineering and Information Technology

Table 1: Bachelor Program Electrical Engineering and Information  
Basic: for students of the english study program

| Module   | Course   | Curricular semester assigned |              |              |              | Graded examination |
|--|--|------------------------------|--------------|--------------|--------------|--------------------|
|  |  |                              | 1            | 2            | 3            |                    |
|  |  | Typ                          | ECTS/<br>SWS | ECTS/<br>SWS | ECTS/<br>SWS |                    |
| Electrical Engineering 1: Basics                     | Analysis of Electric Networks  | V                            | 5/4          |              |              | K90                |
| Electrical Engineering 2: Electrodynamics            | Electrodynamics  | V                            |              | 5/4          |              | K90                |
| Electrical Engineering 3: Time and Frequency Domains | Circuit Analysis in the Time and Frequency Domains                             | V                            |              |              | 5/4          | K90                |
| Metrology 1: Basics                                  | Metrology 1  | V/2                          |              | 5/4          |              | K90                |
|  | Metrology Practical  | P/2                          |              |              |              |                    |
| Metrology 2: Advanced                                | Metrology 2  | V/2                          |              |              | 5/4          | K90                |
|  | Electronics Practical: linear Metrology  | P/2                          |              |              |              |                    |
| Mathematics 1: Analysis 1                            | Analysis 1 with Exercises  | V                            | 5/4          |              |              | K90                |
| Mathematics 2: Linear Algebra                        | Linear Algebra with Exercises  | V                            | 5/4          |              |              | K90                |
| Mathematics 3: Analysis 2                            | Analysis 2 with Exercises  | V                            |              | 5/4          |              | K90                |
| Robotics   | Robotics   | V+P                          |              |              | 5/4          | PF                 |
| Programming  | Programming  | V+P                          | 5/4          |              |              | K90                |
| Electrical Engineering Practical <sup>1</sup>        | Basic Practical Electrical Engineering 1: Basic Circuits                       | P/2                          |              |              | 5/4          | PF                 |
|  | Basic Practical Course Electrical Engineering 2: Implementation & Verification | P/2                          |              |              |              |                    |
| Object-Oriented Programming                          | Object-Oriented Programming  | V+P                          |              | 5/4          |              | K90                |
| Digital Technology                                   | Digital Technology   | V+P                          | 5/4          |              |              | K90                |
| Mathematics 4: Statistics and Numeric                | Statistics   | V+P                          |              |              | 5/4          | PF                 |
|  | Numeric  | V+P                          |              |              |              |                    |
| Computer Technology                                  | Computer Technology  | V+P                          |              | 5/4          |              | K90                |
| Electronics  | Electronics  | V                            |              |              | 5/4          | K90                |
| Computer-Aided Circuit Design 1 <sup>2</sup>         | Basic Practical Electrical Engineering: Programming of uC                      | P/2                          |              | 5/4          |              | PF                 |
|  | Circuit Design Practical   | P/2                          |              |              |              |                    |
| Physics Mechanics                                    | Physics Mechanics  | V                            | 5/4          |              |              | K90                |
| summary ECTS / SWS                                   |  |                              | 30/24        | 30/24        | 30/24        |                    |

1) Electrical Engineering Practical: only in summer semesters.  
2) Computer-Aided Circuit Design 1: only in winter semesters.

B. Special Part: Bachelor Program Electrical Engineering and Information Technology

Table 2: Bachelor Program Electrical Engineering and Information Technology  
Main: for students of the english study program

| Module                          | Course  | Curricular semester assigned |              |              |              |              | Graded examination |
|---------------------------------|---|------------------------------|--------------|--------------|--------------|--------------|--------------------|
|                                 |   |                              | 4            | 5            | 6            | 7            |                    |
|                                 |   | Typ                          | ECTS/<br>SWS | ECTS/<br>SWS | ECTS/<br>SWS | ECTS/<br>SWS |                    |
| Digital Signal Processing       | Digital Signal Processing                               | V+P                          |              |              | 5/4          |              | PF                 |
| Computer-Aided Circuit Design 2 | Circuit Design  | V+P                          | 5/4          |              |              |              | PF                 |
| Language                        | German  | V+P                          | 5/4          |              |              |              | PF                 |
| Communication Technology        | Communication Technology                                | V                            | 5/4          |              |              |              | K90                |
| High Frequency Engineering      | High Frequency Engineering                              | V/4                          |              |              | 5/6          |              | K90                |
|                                 | High Frequency Engineering Practical                    | P/2                          |              |              |              |              |                    |
| Seminar: Scientific Work        | Scientific Work   | S+P                          |              |              | 5/4          |              | RPA                |
| Communication networks          | Communication networks                                  | V                            |              |              | 5/4          |              | K90                |
| Power Electronics               | Power Electronics                                       | V                            | 5/4          |              |              |              | K90                |
| Control Engineering             | Control Engineering with Exercises                      | V/4                          |              |              |              | 6/6          | K90                |
|                                 | Control Engineering Practical                           | P/2                          |              |              |              |              |                    |
| Microcontroller                 | Microcontroller   | V/2                          |              |              | 5/4          |              | RPA                |
|                                 | Microcontroller Practical                               | P/2                          |              |              |              |              |                    |
| Automation                      | Introduction to Automation                              | V/2                          |              |              |              | 7/6          | K90                |
|                                 | SPS-Systems   | V/2                          |              |              |              |              |                    |
|                                 | SPS-Systems Practical                                   | P/2                          |              |              |              |              |                    |
| Modul 1 Study Focus             | Compulsory subject 1 on Study Focus                     |                              |              |              |              | 5/0          | See table 3 or 4   |
| Modul 2 Study Focus             | Compulsory subject 2 on Study Focus                     |                              |              |              | 5/0          |              | See table 3 or 4   |
| Elective Module                 | Elective Module   |                              | 5/0          |              |              |              | See subject        |
| Seminar: Main Study             | Project-Seminar   | PR/2                         | 5/2          |              |              |              | RPA                |
| Bachelor's thesis               | Bachelor's thesis incl. Final Colloquium (15% of grade) |                              |              |              |              | 12/0         | B + R              |
| summary ECTS / SWS              |   |                              | 30/18        | 30           | 30/22        | 30/12        |                    |

Practical Semester

B. Special Part: Bachelor Program Electrical Engineering and Information Technology

Table 3: Bachelor Program Electrical Engineering and Information Technology  
Main: Study Focus Communication for students of  
the english study program (2 out of x)

| Module                             | Course                             | SS or WS |              |              | Accredited examination |
|------------------------------------|------------------------------------|----------|--------------|--------------|------------------------|
|                                    |                                    |          | ECTS/<br>SWS | ECTS/<br>SWS |                        |
|                                    |                                    | Typ      | SS           | WS           |                        |
| Internet Applications              | Internet Applications              | V+P      | 5/4          |              | PF                     |
| Communication Systems              | Communication Systems              | V        | 5/4          |              | K90                    |
| Automotive Electronics Controls    | Automotive Electronics Controls    | V        |              | 5/4          | K90                    |
| Intelligent Transportation Systems | Intelligent Transportation Systems | V        | 5/4          | 5/4          | M                      |
| Selected Topics                    | Special Topics - see announcements | V+P      | announcement | announcement | announcement           |
| Seminar: Communication             | Project-Seminar: Communication     | P        | 5/4          | 5/4          | M                      |
| summary ECTS / SWS                 |                                    |          | 20/16        | 15/12        |                        |

Table 4: Bachelor Program Electrical Engineering and Information Technology  
Main: Study Focus Automation for students of the  
english study program (2 out of x)

| Module                                  | Course                                  | SS or WS |              |              | Graded examination |
|---|---|----------|--------------|--------------|--------------------|
|   |   |          | ECTS/<br>SWS | ECTS/<br>SWS |                    |
|   |   | Typ      | SS           | WS           |                    |
| Introduction to Power Train Engineering | Introduction to Power Train Engineering | V+P      | 5/4          |              | K90                |
| Real-Time Programming                   | Real-Time Programming                   | V/2      | 5/4          | 5/4          | K90 or PF          |
|   | Real-Time Programming Practical         | P/2      |              |              |                    |
| Selected Topics                         | Special Topics - see announcements      | V+P      | announcement | announcement | announcement       |
| Seminar: Automation                     | Project-Seminar: Automation             | P        | 5/4          | 5/4          | M                  |
| summary ECTS / SWS                      |   |          | 15/12        | 10/8         |                    |

B. Special Part: Bachelor Program Electrical Engineering and Information Technology

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Table 5: Bachelor Program Electrical Engineering and Information Technology  
Curriculum Vocational Training Variant (German only)

| Semester | Unternehmen         | Hochschule         | Abschluss    |
|----------|---------------------|--------------------|--------------|
| 1        | Vertrag/Vorstellung |                    |              |
| 2        | Ausbildung          |                    |              |
| 3        |                     | 1. Theoriesemester | Grundstudium |
| 4        |                     | 2. Theoriesemester | Grundstudium |
| 5        |                     | 3. Theoriesemester | Hauptstudium |
| 6        |                     | 4. Theoriesemester | Hauptstudium |
| 7        | Praxis              |                    |              |
| 8        |                     | 6. Theoriesemester | Hauptstudium |
| 9        | Bachelorarbeit      | 7. Theoriesemester | B. Eng.      |