

# Newly Developed Bachelor and Master Studies at the TUM

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**Abstract** — At TU Muenchen we are introducing new Bachelor and Master courses fully complying with the rules defined by the Bologna process. Our new Bachelor has started this year, the Master will start next October. Together they will completely replace the old Diploma course. In this contribution we will describe the principles and rules for the new courses.

**Keywords** — Bachelor, Master, Bologna process

## I. INTRODUCTION

Up to now here in Munich we have supported a study model, where students could take a combined Bachelor/Diploma degree or, alternatively, a consecutively Bachelor/Master degree. Since October 2009 we now have only one new Bachelor course, which will be followed in October 2010 by a newly designed Master course. Both courses will follow strictly the rules determined by the Bologna process. The Diploma will no longer be awarded.

## II. THE NEW STUDY COURSES

### A. Bachelor Course

The Bachelor course gives the possibility to the students, to prepare for the job and to leave university after 3 years, on the other hand they can qualify for a broad scientific career.

The Bachelor course can be characterized as follows:

- Preparation for the professional life and further scientific education
- Teaching of fundamentals in the technical and scientific area
- Learning, how to use the existent know-how.

The regular number to complete the course comprises 6 terms (180 ECTS). After completion the course is awarded by the Bachelor of Science (B. Sc.) degree in Electrical Engineering and Information Technology.

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The structure of the newly designed course is given in Fig. 1. In the first 4 terms the basics of electrical engineering are taught, with special emphasis on the methodology. The topics covered are physics, mathematics, information technology and electrical engineering, which should give a base for further studies.

In the two following terms the students can strengthen their knowledge in one of the given specialisations according to their interests. The branches of study comprise

- Power engineering
- Information technology
- Communications
- Electronics
- Automation and control
- Mechatronics
- Nanoelectronics
- Life-Science-Electronic
- and much more....

What has to be mentioned is that the student can freely choose 30 credits of his specialization courses out of a variety of more than 80 courses. He can dig deeply into a subject or can earn a broad knowledge in several fields of interests. Of course the student will be supported in his choice by an offering of several predefined course combinations, which will give a good overview in every field. However, the students are also free to combine any courses they are interested in. Further help will be offered in the choice of the courses by our dedicated study consultant and our study dean.

Additionally 6 credits have to be taken from a catalogue offering courses in different soft skills like communications, gender studies, project planning etc.

In order to support the skills in practical oriented work and projects each student has to undertake an engineering practice. This engineering practice can be done in industry, in conjunction with an industry related project at the university or it can be a research project at one of our institutes. In any case it will be supervised by one of our professors, who will give guidance throughout the project. At the end of the project a report has to be written and the work has to be explained in a presentation.

The course will be finished with the completion of the bachelor thesis, valid 12 credits or 9 week full-time workload.

After completion of the Bachelor degree the student can leave university, as he is fully qualified for a job, or he can continue his studies for a Masters degree. Elective courses of the Master can already be taken during the Bachelor studies (fast track).

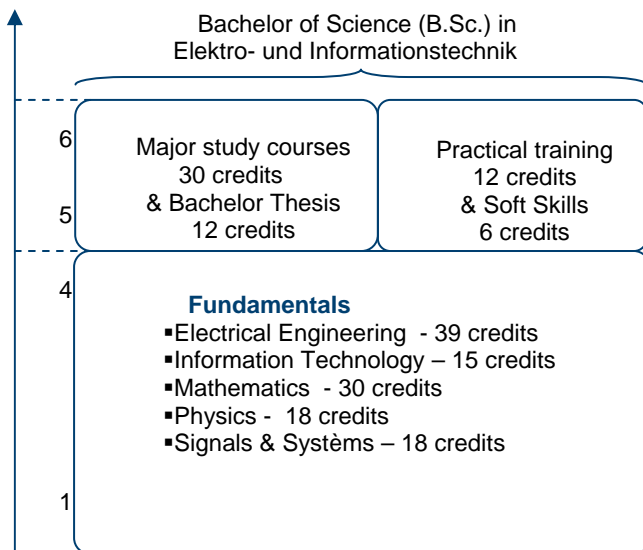


Fig. 1 : Structure of the Bachelor Course

### B. Master Course

The Master Degree is the usual degree at TU Munich, comparable to the former diploma. The degree can be obtained in a 4 term course, following the Bachelor. The Master course is more scientific and research oriented, with a good Masters degree students are entitled to pursue a PhD.

To enter the master course students have to qualify, the detailed specifications are not yet given.

The Master course is structured in the following way (see Fig. 2).

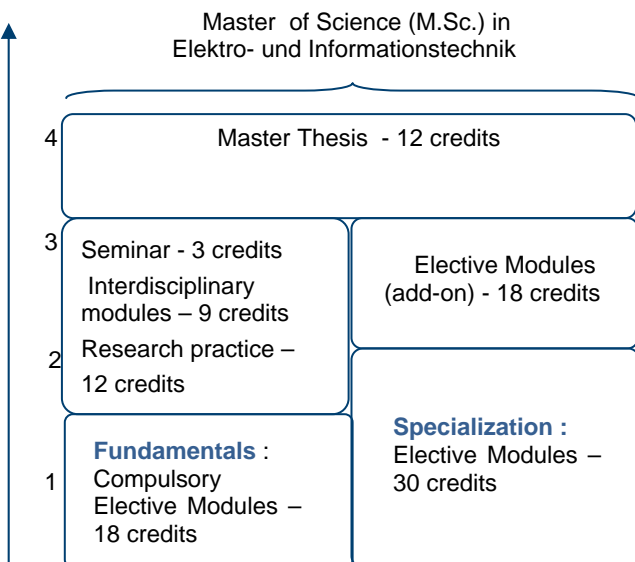


Fig. 2 : Structure of the Master Course

In the first two terms the students have to choose 18 credits (3 modules) from a catalogue with 8 modules, giving the fundamentals for a master in electrical engineering. These

courses present high-level theoretical knowledge as well as methodological skills. The student can take modules according to the chosen major during the bachelor or according to his interests. 30 credits have to be taken from a core catalogue with modules which form the major subject of his studies. The student is free to choose any module, however, recommendations for a coordinated contents are given and the examinations for those packages are without collisions.

In addition 18 credits of further elective modules have to be chosen, as well as a seminar and 9 credits in soft skills.

The Master is completed by a research practice (12 credits) and a master thesis (30 credits). For both the student has to work on a research oriented topic, either in industry or at one of our institutes. He will be supervised by one of our professors and has to deliver a presentation about his work and a written thesis or report.

### III. GENERAL ASPECTS

In both courses we have compulsory modules in the beginning of the course, which the student has to take during the first two terms. They can be repeated only once, if the student fails in the first attempt. In this way students who do not qualify in one of the courses know this at an early stage and can look for other options. For the electives the number of repetitions is not limited, but students have to earn a minimum of 15 credits each term, this will be checked every term. If they fail to earn the required number of credits, they first will be invited to a discussion with our study dean, if the fail further on, they have to be expelled.

Modules from other universities will be acknowledged, when they correspond to a module offered at TUM according to the level of contents. Students are encouraged to leave our university for one term in order to gain experiences and to gain credits at foreign universities. In addition various double master programs exist with universities in France, China, USA etc., where students can be awarded degrees from both universities at the same time.

### IV. CONCLUSION

TU Munich has introduced a new Bachelor and Master course according to the European rules of Bologna. Both courses can be taken as a consecutive unit, which will replace the old diploma degree. Practical skills as well as high-level research oriented modules are offered. The students have free choices to take courses according to their needs and interests, but guidance and orientation is provided. A good balance between fundamental knowledge, specialized courses and modules, where students are learning soft skills, languages, economical topics etc. as well as practical work, carried out in engineering and research practice as well as bachelor and master thesis, is achieved.

For an enrolment as regular student German language skills have to be provided, however, a high number of lectures and courses are taught in English, making it also attractive for foreign exchange students to come to Munich.