

Unofficial Translation

Excerpt from the

Examination Regulations for the Degree Program Master of Science (M.S.)

Appendix B. Program-specific provisions for the Examination Regulations for the Master of Science (M.S.)

Embedded Systems Engineering

§ 1 Program profile

- (1) The Master degree program in Embedded Systems Engineering is research-oriented and consecutive.
- (2) The Master degree program in Embedded Systems Engineering provides in-depth knowledge in the design, development, and application of embedded systems. In particular, this includes knowledge of the design of microelectronic, micromechanical, and software-based components, as well as their integration into an overall system, which meets optimization goals such as speed, costs, energy efficiency, and reliability. Depending on their individual focus area, students can acquire specialist knowledge in the areas of circuits and systems, design and simulation, sensors and actuators, reliable embedded systems, distributed systems, and robotics and computer vision. One of the main goals of the Master degree program in Embedded Systems Engineering is to train students to undertake independent research work in these areas.

§ 2 Program start and program scope

- (1) Students may start the Master degree program in Embedded Systems Engineering at the beginning of either the winter or the summer semester.
- 2) The Master degree program in Embedded Systems Engineering comprises coursework equivalent to 120 ECTS credits.

§ 3 Language

- (1) Courses and examinations in the Master degree program in Embedded Systems Engineering are held in German or English. It is ensured that the study program can be studied completely in English.
- (2) Assessments pertaining to courses that are held in German can be completed in English upon request.

§ 4 Mentors

At their own request or at the request of a member of the Board of Examiners, students may be assigned a mentor who is either a tenured lecturer, an external lecturer, or an experienced member of the academic staff at the Faculty of Engineering of the University of Freiburg.

§ 5 Program curriculum

- 1) The Master degree program in Embedded Systems Engineering is divided into a compulsory area and a (compulsory) elective area. The courses available in the individual modules and the applicable admissions requirements are specified in the current module handbook and are announced to students at the proper time.
- (2) In the compulsory area, all modules listed in the following table must be completed.

Compulsory area (69 ECTS credits)

Module	Type	SWS	ECTS credits	Semester	Form of assessment
Cyber-Physical Systems – Discrete Models	L+ Ex	4	6	1 or 2	PL: written/oral
Sensors/Actuators	L + LC	3	5	1 or 2	PL: written/oral
Assembly and Packaging Technology	L+ Ex	3	5	1 or 2	PL: written/oral
Microelectronics	L+ Ex	3	5	1 or 2	PL: written/oral
Modeling and System Identification	L+ Ex	4	6	1 or 2	PL: written/oral
Computer Science key course	L+ Ex	4	6	1 or 2	PL: written/oral
Computer Science key course or specialization course	L+ Ex	4	6	1 or 2	PL: written/oral
Master's module					
Master's thesis	–	–	27	4	PL: written
Colloquium	–	–	3	4	SL: oral

Abbreviations used in the table:

Type = type of course; SWS = contact hours per week; Semester = recommended program semester; L = lecture; Ex = exercise; LC = lab course; PL = graded assessment (Prüfungsleistung); SL = pass/fail assessment (Studienleistung)

(3) In the compulsory elective area, which is divided into Concentration areas and Personal Profile, students must pass compulsory elective modules with coursework equivalent to at least 51 ECTS credits. The compulsory elective modules offered are specified in the module handbook. Each compulsory elective module should be equivalent to at least 5 ECTS credits and concludes with a written or oral assessment. No more than two compulsory elective modules that consist of only a seminar may be taken.

(4) In the Concentration areas, students must select one area from Circuits and Systems, Design and Simulation, and Sensors and Actuators plus one area from Reliable Embedded Systems, Distributed Systems, and Robotics and Computer Vision. In the two areas chosen, students must pass modules equivalent to at least 15 ECTS credits in total.

(5) In the Personal Profile area, students must pass modules equivalent to at least 15 ECTS credits in total. The modules taken may be selected from those offered by the master degree programs in the Faculty of Engineering in the subjects of Computer Science and Microsystems Engineering.

§ 6 Coursework (Studienleistungen)

Coursework may for example consist of a regular attendance in class, written exams, reports or papers. The type and scope of coursework are defined in the current module handbook and are announced to the students at the beginning of each course in the particular module.

§ 7 Course-based graded assessments (Prüfungsleistungen)

(1) Written course-based graded assessments usually take the form of supervised written exams, tests, research papers, or reports. Types of oral assessment are presentations and oral exams (exam interviews). The type and scope of course-based graded assessments are defined in the current module handbook and are announced to the students at the beginning of each course in the particular module.

(2) Written exams have a maximum duration of 30 minutes per ECTS credit.

(3) Oral exams have a maximum duration of 10 minutes per ECTS credit.

§ 8 Repeating course-based graded assessments

(1) Course-based graded assessments that have been graded "non-sufficient" (5.0) or considered failed may be repeated once. In addition, a total of three failed graded assessments in the compulsory or elective modules may be repeated a second time; this does not include lab courses and seminars or the master thesis.

(2) Up to two assessments that have been successfully completed no later than the semester scheduled in the curriculum may be retaken once each in order to improve the grade. This excludes presentations, research papers, reports and the master thesis. The assessment must be retaken during the next regular examination session. The higher grade earned on the assessment will always be used.

§ 9 (removed)

§ 10 Admission to prepare the master thesis

Admission to prepare the master thesis is open only to students who have successfully completed modules worth a total of at least 75 ECTS credits in the Master degree program in Embedded Systems Engineering. Students who have been admitted to the Master degree program in Embedded Systems Engineering on the condition that they complete additional courses (conditional courses) must also provide evidence that they have completed these courses.

§ 11 Master thesis

- (1) The master thesis must be completed within a period of six months and is worth 27 ECTS credits.
- (2) At least one of the two examiners of the master thesis must be a full-time faculty member of the Faculty of Engineering at the University of Freiburg.
- (3) The master thesis must be written either in German or in English.
- (4) The master thesis must be submitted to the Examination Office in three bound hardcopies as well as in electronic form on a common data storage system (such as CD or DVD).
- (5) The master thesis is supplemented by a final colloquium worth 3 ECTS credits. Candidates are admitted to the final colloquium only upon submission of the master thesis. The final colloquium is held in the presence of one of the thesis examiners and is generally open to university members.

§ 12 Determination of module grades

If a module includes several partial module examinations, the module grade is calculated from the weighted arithmetic average of the grades awarded in the partial module exams; weightings are based on the relative number of ECTS credits per exam.

§ 13 Determination of the overall grade

- (1) The overall grade is calculated from the weighted arithmetic average of the module grades; weightings are based on the relative number of ECTS credits per module.
- (2) Students who receive the grade "very good" – 1.3 or better – on all assessments or the overall grade 1.0 are awarded the distinction "with honors."

Publication of the text of the statute in German:

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Only statutes published in the *Amtliche Bekanntmachungen der Albert-Ludwigs-Universität Freiburg in Breisgau* are legally binding.