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This is a translation of the Examination Regulations of the master's program *Sustainable Systems Engineering* that were passed (in German) by the University of Freiburg Senate in its meeting on the 19th of August 2005 (Official Bulletins, Volume 36, No. 46, pp. 269-293) and adapted on the 30th of June 2016 (Official Bulletins, Volume 47, No. 41, pp. 239-252).

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

Appendix B. Subject specific requirements for the Master of Science (M. Sc.) Examination Regulations

Sustainable Systems Engineering

§ 1 Program profile

(1) The master's program *Sustainable Systems Engineering* is research-oriented and consecutive (following a bachelor's degree).

(2) The English-taught master's program *Sustainable Systems Engineering* is aimed at graduates with bachelor's degrees in engineering and natural sciences. It provides in-depth knowledge in fields of sustainable materials, energy systems – in particular renewable energy – resilience, natural resources, sustainable economics as well as technology and society. Depending on individual emphasis, students can gain and deepen specialist knowledge in these fields. Furthermore, a main objective of the master's program *Sustainable Systems Engineering* is to teach students independent academic work. Graduates of the master's program are qualified for an academic career in research as well as for leadership positions in conventional and renewable energy industries, in supply or maintenance businesses and infrastructure operators for supply, mobility or energy, in planning offices for networks, city planning and infrastructure planning as well as state authorities.

§ 2 Program entry and scope

(1) The master's program *Sustainable Systems Engineering* can only be entered at the beginning of the winter semester.

(2) The master's program consists of coursework equivalent to 120 ECTS credits.

§ 3 Language

The courses and examinations in the master's program *Sustainable Systems Engineering* will usually be conducted in English. Individual modules and courses of the elective section and their associated examinations might be given, entirely or partly, in German.

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§ 4 Mentors

At the start of the program, each student will be allocated a university professor, a tutor or experienced academic employee at the Faculty of Engineering of the University of Freiburg as a mentor.

§ 5 Content of the course

(1) The master's program *Sustainable Systems Engineering* is organized in a compulsory section with coursework equivalent to 65 ECTS credits as well as an elective section with coursework equivalent to 55 ECTS credits. The available modules within these sections and the associated courses as well as their admission requirements are listed and described in detail in the respective module handbook.

(2) For the compulsory section all modules listed in *Table 1* must be completed. Course-based assessments are required in four of the modules, which are intended for the first semester, and coursework in the other two. Students will choose bindingly whether to complete a module as "course-based assessment" (graded, relevant for the final overall grade) or "coursework" (pass/fail assessment, not graded) in the respective module during the registration for these six modules.

Table 1: Compulsory modules (65 ECTS credits)

Module	Type	SHW	ECTS credits	Semester	Assessment
Energy Storage	L + Ex	4	5	1	PL/SL: written and/or oral
Fundamentals of Resilience	L + Ex	4	5	1	PL/SL: written and/or oral
Material Life Cycles	L + Ex	4	5	1	PL/SL: written and/or oral
Grid Integration and Control	L + Ex	4	5	1	PL/SL: written and/or oral
Computational Materials Engineering	L + Ex	4	5	1	PL/SL: written and/or oral
Solar Energy	L + Ex	4	5	1	PL/SL: written and/or oral
Master's Project	Pr		5	3	SL: project report
Master's Module			30	4	PL: master's thesis

Abbreviations used in the tables:

Type = Type of course; SHW = anticipated semester hours per week; Semester = recommended subject semester; Pr = Project; Ex = Exercise; L = Lecture; PL = graded assessment (Prüfungsleistung); SL = pass/fail assessment (Studienleistung)

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(3) In the compulsory elective section two of the three modules listed in *Table 2* with a total of 10 ECTS credits must be completed. However, it is not possible to choose more than two modules and reach more than 10 ECTS credits in this section.

Table 2: Compulsory elective modules (Wahlpflichtmodule) (10 ECTS credits)

Module	Type	SHW	ECTS credits	Semester	Assessment
Power Electronic Circuits and Devices	L + Ex	4	5	2	PL: written and/or oral
Design and Monitoring of Large Infrastructures	L + Ex	4	5	2	PL: written and/or oral
Security and Privacy in Resilient Systems	L + Ex	4	5	2	PL: written and/or oral

(4) In addition to these compulsory elective modules, modules of one's own choice with a scope of at least 20 ECTS credits in the section *Technical Specialization* and modules with a scope of at least 10 ECTS credits in the section *Interdisciplinary Profile* must be completed from the second semester onwards. In the section *Technical Specialization* at least 10 ECTS credits must be acquired in at least two of the following areas:

- Energy Systems
- Information Processing Technologies
- Sustainable Materials
- Resilience Engineering

The available modules of the *Technical Specialization* section are listed in the respective module handbook; in each module a written or oral graded assessment must be completed. In the *Interdisciplinary Profile* section, suitable modules or courses in ecology, ethics, law, economics and management can be selected from the curriculum of the entire university; the suitability of the modules or courses is determined by the examination committee (Fachprüfungsausschuss). Only coursework must be completed. In both sections, *Technical Specialization* and *Interdisciplinary Profile*, only so many modules can be completed, which are required to achieve 45 ECTS credits.

§ 6 Coursework (Studienleistungen)

In each module coursework can be required whose successful completion is a requirement for the admission to the module examination. Coursework can consist in, for example, regular attendance in courses, written examinations, reports or presentations. The type and scope of the coursework are specified in the applicable module handbook and are announced at the beginning of each course.

§ 7 Course-based assessments (Prüfungsleistungen)

(1) Written course-based assessments are usually written examinations (written supervised work), exercise sheets, papers (Hausarbeiten) or reports. Oral course-based

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assessments are presentations or oral examinations. The type and scope of course-based assessments are specified in the applicable module handbook and are announced at the beginning of each course.

(2) Written examinations have a maximum duration of 30 minutes per ECTS credit. They can consist entirely or partly of multiple choice exercises; for those the regulations in § 17a of the general part of the Examination Regulations apply.

(3) Oral examinations have a maximum length of 10 minutes per ECTS credit.

§ 8 Repeat of course-based assessments

(1) Course-based assessments marked “not adequate” (5.0) or considered failed can be repeated once. Beyond that a maximum of three failed assessments of the compulsory or elective sections can each be repeated for a second time; this does not apply to projects and seminars as well as the master’s thesis.

(2) The second repeat examination must be taken at the next possible examination date after the first repeat. Respectively § 24 section 3 and 4 of the general part of the Examination Regulations applies.

(3) Up to three passed course-based assessments, which have been successfully completed at the latest in the semester intended according to the study plan, can each be re-taken once for the purpose of improving the mark. This does not apply to presentations, papers (Hausarbeiten) and reports as well as the master’s thesis. Repeat examinations must be taken at the next regular exam date. The course-based assessment with the better mark will be counted.

§ 9 Admission to the master’s thesis

Admission to the master’s thesis will only be granted to those who are registered in the master’s program *Sustainable Systems Engineering* and who have successfully completed modules with a minimum of 70 ECTS credits.

§ 10 Master’s thesis

(1) The master’s thesis must be completed within a timescale of six months and for successful completion 27 ECTS credits are awarded.

(2) The master’s thesis must be written in English or German.

(3) The master’s thesis must be submitted to the Examination Office in a bound hard copy in triplicate.

(4) In concretization of the regulation in § 20 section 9 sentence 1 of the general part of the Examination Regulations it is determined that one of the two assessors of the master’s thesis must be employed full-time at the Faculty of Engineering of the University of Freiburg.

(5) The master’s thesis is supplemented by a master’s colloquium. Admission to the master’s colloquium will only be granted if the master’s thesis is submitted. The master’s colloquium takes place in front of at least one of the two assessors of the master’s thesis and is usually open to members of the university. The master’s colloquium is assessed as coursework (pass/fail assessment) and corresponds to 3 ECTS credits.

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§ 11 Calculation of the final overall grade

- (1) The final overall grade for the master's examination is calculated according to the arithmetic mean of module marks with regard to the allocation of ECTS credits.
- (2) If all the module marks are "very good" – 1.3 or better – or the average grade for the master's examination is 1.0, the honors "with distinction" will be awarded.