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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 August 19, 2005 (Official Bulletins, Volume 36, No. 46, pp. 269-293) and adapted on December 17, 2018 (Official Bulletins, Volume 49, No. 64, pp. 489-516) – with amendments (on June 8, 2020).

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<https://www.inatech.uni-freiburg.de/en/studies/master-of-science-sustainable-systems-engineering-sse/forms-downloads>

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 particularly at graduates of bachelor's programs in engineering and natural sciences. It provides in-depth knowledge in fields of sustainable materials, energy systems and engineering resilience. Depending on the individual focus, students can acquire and deepen special knowledge in these areas. Students are enabled to consider and actively integrate aspects of sustainable development in their future engineering activities – for example in the areas of conventional and renewable energies, communication and semiconductor technologies or materials development and testing. The successful completion of the master's program qualifies students for an academic career in research and development as well as for an engineering career in industry, in particular with infrastructure operators for supply, mobility and energy, with engineering offices for urban and infrastructure planning or with 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

Courses and examinations in the master's program *Sustainable Systems Engineering* are generally held in English. Individual modules and courses, which are freely selectable, and their associated examinations can also be held entirely or partly in German.

§ 4 Content of the program

(1) Modules in the master's program *Sustainable Systems Engineering* must be completed in the fields listed in the following table in accordance with the regulations under section 2

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to 5. The available modules within these fields and the associated courses are listed and described in detail in the respective module handbook.

Area Module	Format	SWS	ECTS Credits	Type of Module	Semester	Assessment Type: Studienleistung (SL)/ Prüfungsleistung (PL)
Energy Systems Engineering (18–42 ECTS credits)						
Energy Efficient Power Electronics	L + Ex	4	6	ME	1 or 2	PL: written exam
Energy Storage	L + Ex	4	6	ME	1 or 2	PL: written exam
Energy System Operations	L + Ex	4	6	ME	1 or 2	PL: written exam
Solar Energy	L + Ex	4	6	ME	1 or 2	SL PL: written exam
Resilience Engineering (18–42 ECTS credits)						
Design and Monitoring of Large Infrastructures	L + Ex	4	6	ME	1 or 2	PL: written exam
Dynamics of Materials: Material Characterization	L + Ex	4	6	ME	1 or 2	PL: written exam
Fundamentals of Resilience	L + Ex	4	6	ME	1 or 2	PL: written exam
Sustainable Materials Engineering (18–42 ECTS credits)						
Computational Materials' Engineering	L + Ex	4	6	ME	1 or 2	SL PL: written exam
Material Life Cycles	L + Ex	4	6	ME	1 or 2	PL: written exam
Materials Selection for Sustainable Engineering	L + Ex	4	6	ME	1 or 2	PL: written exam
Interdisciplinary Profile (6–24 ECTS credits)						
Module outside the Subject Area	variable	variable	6	ME	3	SL
Master's Section (36 ECTS credits)						
Master's Project	Pr		6	M	3	SL
Master's Module			27 3	M	4	PL: master's thesis PL: oral presentation

Abbreviations used in the table:

Format = Format of Course; SWS = *Semesterwochenstunden* = hours per week per semester;
M = mandatory module (*Pflichtmodul*); ME = mandatory elective module (*Wahlpflichtmodul*); Semester = recommended subject semester (*Fachsemester*); L = Lecture (*Vorlesung*); Ex = Exercise (*Übung*); Pr = Project (*Projekt*);
PL = *Prüfungsleistung*/graded assessment; SL = *Studienleistung*/pass/fail assessment

(2) In the areas *Energy Systems Engineering*, *Resilience Engineering* and *Sustainable Materials Engineering* at least 18 and at most 42 ECTS credits each must be earned and in the *Interdisciplinary Profile* at least 6 and at most 24 ECTS credits. In all four areas together

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84 ECTS credits must be earned. Only as many modules that are necessary to achieve the proportion of the total 84 ECTS credits may be completed in each area, depending on the individual focus.

(3) In the areas *Energy Systems Engineering*, *Resilience Engineering* and *Sustainable Materials Engineering*, at least two of the modules listed in the table under section 1 must be completed at one's own choice. In addition, at least 6 ECTS credits must be earned in each of the three areas by taking modules which can be selected from the course offerings for the respective areas provided in the module handbook. Each module has a scope of 3, 6 or 9 ECTS credits and must be concluded with a graded assessment (*Prüfungsleistung*); depending on the structure of the associated courses, the modules offered may also require additional pass/fail assessments (*Studienleistungen*). It is guaranteed that the students can choose between different types of graded assessments.

(4) In the area *Interdisciplinary Profile*, at least 6 ECTS credits must be earned by completing modules from the course offerings provided for this purpose in the module handbook. Up to 6 ECTS credits can be earned in the elective *Module outside the Subject Area*. Suitable courses or modules from the offerings in other study programs at the University of Freiburg can be taken as part of the elective *Module outside the Subject Area*; the board of examiners decides on the suitability in consultation with the respective subject. Language courses are not considered suitable courses within the meaning of sentence 3. In the modules of the area *Interdisciplinary Profile*, only pass/fail assessments are required.

(5) In the area *Master's Section*, a scientific project must be independently conceptualized and carried out in the module *Master's Project*. The choice of topic and supervisor of the project requires the consent of the person responsible for the module. The necessary pass/fail assessment consists of the creation of a scientific poster and a presentation on the results of the project. The content of the *Master's Module* is further regulated in § 9.

§ 5 Pass/fail assessments (*Studienleistungen*)

Pass/fail assessments can, for example, consist of written examinations, presentations or posters, the processing of exercise sheets and project tasks or the performance of experiments.

§ 6 Graded assessments (*Studienbegleitende Prüfungsleistungen*)

Written graded assessments are examinations (written supervised work) and written elaborations. Oral graded assessments are oral examinations (examination discussions) and oral presentations. Practical graded assessments consist of the performance of experiments and the creation and demonstration of software or demonstrators.

§ 7 Repeat of graded assessments

(1) Assessments graded "not adequate" (5.0) or considered as failed, can be repeated once. In addition, a maximum of two failed graded assessments, which consist of a written or oral examination, can be repeated a second time.

(2) If a student fails a graded assessment in a module in one of the areas of *Energy Systems Engineering*, *Resilience Engineering* and *Sustainable Materials Engineering*, he/she may, instead of retaking this graded assessment, also take another suitable module once and take the graded assessment during that course. The failed examination attempt in the

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originally selected module must not be considered as one of the failed attempts in the newly selected module.

(3) No more than one successfully completed graded assessment in the form of a written or oral examination may be retaken once for the purpose of improving the grade. The repeat examination is to be retaken on the next regular examination date and at the latest in the third semester. The graded assessment with the better grade will be considered.

§ 8 Admission to the Master's Thesis

Only those who are enrolled in the master's program *Sustainable Systems Engineering* and have successfully completed modules with a minimum of 72 ECTS credits can be admitted to the master's thesis.

§ 9 Master's Thesis

(1) The master's thesis must be completed within a period of six months and is worth 27 ECTS credits.

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

(3) The master's thesis must be submitted to the board of examiners (*Fachprüfungsausschuss*) in bound form in triplicate as well as electronically on the specified data carrier system in the specified file format. In case of a data- or software-related thesis, additionally it may be requested to hand-in the used program codes and data.

(4) At least one of the two assessors of the master's thesis must be employed full-time at the Department of Sustainable Systems Engineering (INATECH) at the Faculty of Engineering of the University of Freiburg.

(5) The master's thesis is supplemented by an approximate 60-minute master's thesis colloquium (i.e. thesis defense), which is held in English or German depending on the student's choice. The master's thesis colloquium is usually led and evaluated by the supervisor of the master's thesis and consists of a 20-minute presentation by the student on the results of the master's thesis and a subsequent discussion. Admission to the master's thesis colloquium will only be granted if the master's thesis has been submitted. The master's thesis colloquium is worth 3 ECTS credits and is usually open to members of the university.

§ 10 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 grades with regard to the allocation of ECTS credits.

(2) If all the module grades 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.

Transitional regulation § 31 of the General Examination Regulations

(#) Students already enrolled in the Master of Science program *Sustainable Systems Engineering* at University of Freiburg prior to October 1, 2021, may complete their studies according to the corresponding Subject-specific Regulations of these Examination Regulations of August 19, 2005 (Official Bulletins, Volume 36, No. 46, pp. 269-293) as amended by the Thirty-Ninth Amendment Statute of December 17, 2018 (Official Bulletins, Volume 49, No. 69, pp. 489-516) until September 30, 2023 (cut-off date) at the latest. In this

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case, the student must declare in writing to the Examinations Office by October 31, 2021 at the latest that he/she wishes to continue his/her studies in accordance with the Subject-specific Regulations for *Sustainable Systems Engineering* of these Examination Regulations as amended by the Thirty-Ninth Amendment Statute of December 17, 2018. This declaration is irrevocable.