



Study and Examination Regulations

Master of Science

**Process Energy and Environmental System
Engineering/Prozess-, Energie- und Umwelttechnik
(PEESE)**



Official Gazette

Study and Examination Regulations

05/2023

Application and Admission Regulations

04/2023

Original source: Official Gazette of Technische Universität Berlin (AMBI), <https://www.tu.berlin/go871>

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Study and Examination Regulations for the International Master's Program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik (PEESE) at Faculty III - Process Sciences at Technische Universität Berlin

of 4 May 2022

On 4 May 2022, the Faculty Board of Faculty III – Process Sciences of Technische Universität Berlin, pursuant to Section 18 (1) no. 1 of the Constitution of Technische Universität Berlin, Section 71 (1) no. 1 of the Berlin State Higher Education Act (*Berliner Hochschulgesetz* - BerlHG) in the version of 26 July 2011 (Gazette of Laws and Ordinances p. 378), last amended by Article 1 of the Act of 14 September 2021 (Gazette of Laws and Ordinances, p. 103) adopted the following study and examination regulations for international master's program Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik (PEESE).*

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I. General regulations

Section 1 - Scope of application

These study and examination regulations govern both the objectives and organization of studies, and the requirements and conducting of examinations in the international master's program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik. The program-specific provisions included herein supplement the General Study and Examination Regulations of Technische Universität Berlin (*Ordnung zur Regelung des allgemeinen Studien- und Prüfungsverfahrens* - AllgStuPO).

Section 2 – Entry into force/expiration

(1) These regulations enter into force on 1 October 2023 and apply to students enrolled beginning winter semester 2023/2024.

(2) Students who enrolled in the international master's program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik at Technische Universität Berlin prior to the entry into force of these Study and Examination Regulations are to inform the office responsible for examinations at TU Berlin by 30 September 2026 which regulations they wish to continue their studies under. This decision is irrevocable and to be recorded on file at the department in the Central University Administration responsible for such documentation.

(3) The Study and Examination Regulations for the master's program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik of 22 July 2015 (TU Official Gazette 09/2016 p. 55 and 106 et seqq.), last amended on 25 January 2017 (TU Official Gazette 19/2017, p. 289), cease to be effective on 30 September 2026.

Students who have not completed their studies at the time of expiration in accordance with Sentence 1 shall continue their studies in line with the present regulations.

II. Program objectives and structure

Section 3 – Learning outcomes, program content, and professional fields

(1) The general study objectives meet the requirements of a university engineering education that is focused on research. Graduates of the master's program deepen and expand the knowledge, skills and competencies they acquired in their previous bachelor's program and are able to apply them to complex issues and further develop them. On this basis, they acquire the ability to recognize new scientific and social developments, to critically consider these in their work, and to contribute to shaping future developments. They are able to carry out scientific work in an independent and self-reliant manner. Their scientific and social skills will enable them to take on leadership responsibilities.

Graduates of this master's program

- have in-depth specialist knowledge as well as the ability to apply a wide range of methods,
- are able to independently analyze and solve complex problems in a scientific manner,
- are able to critically assess information and new developments against the background of the latest findings in their discipline and draw appropriate conclusions for their own work;
- will have acquired comprehensive teamwork and communication skills in addition to distinctive scientific and analytical competencies, which enable them to assume leadership responsibilities.

(2) The aim of the international master's program PEESE is to train interdisciplinary and flexible graduates with both scientific and technical as well as economic expertise to reflect the increasing demand in business and society. Through the master's program, students will acquire necessary knowledge and skills, becoming familiar with the general and subject-specific methods for addressing and solving challenges in sustainable process and systems engineering to enable them to transition to professional practice or provide the basis for further academic training (doctorate).

(3) Graduates of the international master's degree program PEESE:

- are familiar with the individual steps required for planning and operating energy engineering, environmental engineering, and process engineering processes and possess a command of the methods for taking these steps,
- are able to identify potential energy and cost savings as well as ways to reduce environmental burdens at an early stage and integrate them into systems using process engineering measures,
- have learned how to use commercial simulation tools and are able to assess their strengths and weaknesses,
- understand energy engineering, bioprocess engineering, food process engineering, material science, and process engineering processes as a whole and work out optimization potentials,
- can analyze and classify dynamic processes,
- are able to select the appropriate tool for optimization tasks and recognize its limitations and issues during optimization,
- have learned the German language (in the case of international students, by attending language courses and courses in German), are able to complete courses in German, and have acquired the ability to present and discuss issues in a scientific manner in German,
- have acquired international, intercultural, and interdisciplinary skills.

(4) Integrated courses, seminars, and internships in the various subject areas, and increased involvement in research work enable graduates to

- independently plan, organize, guide, and, if necessary, carry out practical or experimental work on their own,
- conduct problem analysis and abstraction independently,
- work out appropriate solutions,
- select, apply, develop or further develop the optimal analysis, modeling, simulation, and optimization methods.

(5) Due to their professional, methodical, and interdisciplinary skills, graduates are able to work independently and flexibly in different professional fields, advising, planning, developing, researching, supervising in business, government agencies, and other institutions and to take on management responsibilities in Germany and abroad, but especially in the German labor market of the process industry.

For graduates of the international master's program PEESE, a wide variety of tasks and job opportunities arise in such areas that require a sound basic understanding of engineering and knowledge of the requisite methods, and in which independent solutions and/or scientific approaches are required. Examples may include:

- In **process engineering**: in the field of process development, process simulation, process validation, operation, reengineering of plants, optimization of processes and sequences, or control engineering.

- In **energy technology/energy engineering** careers in the design, analysis and optimization of plants for energy conversion, use of alternative energies, control of regional and national energy supply systems, or safety engineering.
- In **environmental technology and management/environmental engineering and management**: in industrial production - disposal technology, air pollution control, preventive and end-of-pipe environmental protection concepts, production-integrated environmental protection as well as in government agencies and industrial companies in plant construction.
- In **bioprocess engineering**: in the field of bioprocess development, bioprocess simulation, process validation, operation of plants in biotechnological and biopharmaceutical production, optimization of bioprocesses and sequences, or process analytical technologies.
- In **research and development**: natural scientific, engineering, and interdisciplinary basic research and development, strategies, methods and processes in energy, environmental, process and bioprocess engineering.

Section 4 – Program start date, standard period of study, and required coursework, language of instruction and examination

- (1) The program starts in the winter semester.
- (2) The standard period of study encompasses four semesters including completion of the master's thesis.
- (3) The program encompasses 120 credit points.
- (4) The teaching curriculum and examination procedures are structured and organized to enable students to complete the program within the standard period of study.
- (5) The language of instruction and examination is English. Within the compulsory elective and elective modules, there is also the possibility to complete modules in German. International students with a foreign degree are strongly advised to acquire German language skills at B2 level by the end of the second semester.

Section 5 – Program structure

- (1) Students can structure their studies individually. They are, however, obliged to comply with the provisions laid out in these Study and Examination Regulations. Students are recommended to follow the chronology of modules set down in the proposed course schedule in Annex 2 to these Regulations; any possible constraints resulting from subject-specific admission requirements for modules must be observed.
- (2) Students earn a total of 120 credits (CP), of which 90 are awarded for taught modules and 30 for the master's thesis.
- (3) A total of 12 credits must be earned in compulsory modules. The modules assigned to this component can be found in the module catalog (Annex 1).
- (4) Compulsory elective modules are worth 60 credit points and are structured as follows:

1: Process Systems Engineering	(12 - 24 CP)
2: Energy Technologies	(12 - 24 CP)
3: Environmental Engineering and Sustainability	(12 - 24 CP)
4: Management, transdisciplinary and intercultural skills	(12 CP)

- In compulsory elective components 1-3, a total of at least 12 CP must be earned; a further 12 CP can be freely chosen from these three lists.
- The modules assigned to each component can be found in the module list (Annex 1).

(5) Students have the option of completing an internship and receiving 6 CP. The internship can be allocated to compulsory elective components 1, 2, or 3. Further details are laid out in the Internship Regulations.

(6) A total of 18 credit points must be earned in elective modules. These modules allow students to acquire additional subject-specific and generic skills as well as expertise that qualifies them for a profession and can be selected from the full range of subjects offered by Technische Universität Berlin, other universities or higher education institutions with equal status within the jurisdiction of the Framework Act for Higher Education as well as at universities and higher education institutions abroad recognized as equivalent. They can also choose modules for learning foreign languages.

(7) As a rule, it is possible for students to complete a stay at another university (mobility window); it is recommended students do so between the start of the second and the end of the fourth semester. The program can be completed part-time. The respective advisory services can assist with drawing up an individual degree schedule.

III. Examination requirements and conducting examinations

Section 6 – Aim of the master’s examination

The master’s examination determines whether a candidate has achieved the learning outcomes according to Section 3 of these Regulations.

Section 7 – Master’s degree

On behalf of Faculty III, Technische Universität Berlin awards the academic degree “Master of Science” (M.Sc.) to students who have passed the master’s examination.

Section 8 – Scope of the master’s examination, calculation of the overall grade

(1) The master’s examination comprises the module examinations listed in the module list (Annex 1) and the master’s thesis according to Section 9.

(2) The overall grade is determined in accordance with the principles outlined in Section 47 of the General Study and Examination Regulations (*Allgemeine Studien- und Prüfungsordnung* - AllgStuPO).

(3) It is based on module grades, including the master’s thesis, amounting to 90 credit points; ungraded modules and modules with the lowest grades amounting to a maximum of 30 credit points are not included.

In the event that a student receives the same grade in different modules worth the same number of credit points, the most recently completed module exam is not counted. To achieve the designated number of credit points, only complete modules are counted, i.e. the total number of credit points disregarded may be below the allowed number, if including the next module would mean exceeding the permitted total number of credit points to be disregarded.

Grades excluded from the calculation of the overall grade are identified accordingly on the final certificate. The grades of all modules are listed on the final certificate.

Section 9 - Master’s thesis

(1) As a rule, the master’s thesis is completed in the fourth degree semester. It equals 30 credits. The completion period for the written composition is 30 weeks. If there are significant reasons beyond the student's control preventing them from completing the thesis within this time frame, the examination board shall grant an extension of the deadline for so long as the reasons in question continue to exist. The total possible extension may not exceed 4 weeks. In the event that combined extensions exceed the stipulated maximum period of extension, the student may withdraw from the examination.

(2) To apply for admission to the master’s thesis, students must present proof of successfully completed module examinations worth at least 60 credit points to the office responsible for examinations within the Central University Administration.

(3) Pursuant to Section 60 (6) AllgStuPO, the topic of the master’s thesis may be rejected once only and within the first four weeks of being assigned by the office responsible for examinations within the Central University Administration.

(4) The procedures for applying for admission to and assessment of a final thesis are regulated in the current version of the General Study and Examination Regulations (AllgStuPO) as amended.

Section 10 – Types of examination and registration for examinations

(1) The different types of assessments and the procedure for registering for module examinations are established in the AllgStuPO as amended.

(2) For elective modules studied at other faculties or institutions of higher education, the types of examination specified in the module descriptions shall apply.

IV. Annexes

Annex 1: Module list

Annex 2: Proposed course schedule

*) Approved by the TU Berlin Executive Board on 1 July 2022.

IV. Annexes

Annex 1: Module list

Module/module list	CP	Type of examination	Weighting
Pflichtmodule	12		
Energy Engineering I	6	PP	1
Process and Plant Dynamics	6	mP	1
Masterarbeit	30		1
Process Systems Engineering	12-24		
Bioprocess development from high throughput screening to production	9	mP	1
Bioverfahrenstechnik I	6	PP	1
Bioverfahrenstechnik II Vorlesung	3	PP	1
Combustion Kinetics	6	mP	1
Computational Fluid Dynamics (CFD) in der Verfahrenstechnik	4	PP	1
Computergestützte Anlagenplanung	6	PP	1
Design of Biotechnological Processes	9	PP	1
Engineering Physical Chemistry	6	PP	1
Grundlagen der Lebensmitteltechnologie	9	sP	1
Industrielle Bioprozesse	6	sP	1
inter PAT	6	PP	1
Mass transfer in porous media	6	mP	1
Mechanische Verfahrenstechnik II (Trennprozesse)	6	mP	1
Optimization in Process Sciences	6	sP	1
Process Simulation	6	PP	1
Process Systems Engineering	3	PP	1
Projekt Prozess- und Anlagendynamik	6	PP	1
Verbrennungstechnisches Projekt	6	PP	1
Verfahrenstechnik II (Mehrphasensysteme und apparative Umsetzungen)	8	mP	1
Industriepraktikum (PEESE)	6	No examination	0
Energy Technologies	12-24		
Energy Economics	6	sP	1
Energy Engineering II	6	PP	1
Design, Analysis, and Optimization of Energy Conversion Plants	9	PP	1
Kraftwerkstechnik	6	mP	1
Modern Power Plant Engineering	6	mP	1
Refrigeration Installations	6	PP	1
Thermal design of compression refrigeration machines	6	PP	1
Thermally driven cooling systems	3	PP	1
Vertiefendes Rechnerpraktikum zur Energietechnik	3	PP	1
Industriepraktikum (PEESE)	6	No examination	0

Modul / Modulliste	LP	Prüfungsform	Gewichtung
Environmental Engineering and Sustainability	12-24		
Abwasserverfahrenstechnik I	6	PP	1
Aufbereitung nachwachsender Rohstoffe	6	mP	1
Biological processes and landfill technology	6	mP	1
Grundlagen der Sicherheitstechnik	6	mP	1
Strategies for Sustainable Development in Politics and Economy - Management of Sustainable Development	6	mP	1
Sustainable energy supply in on- and off-grid systems	6	PP	1
Umweltmanagement	6	mP	1
Umweltverfahrenstechnik	6	PP	1
Waste-to-energy processes	6	mP	1
Industriepraktikum (PEESE)	6	No examination	0
Management, transdisciplinary and intercultural skills	12		
Data Science in Engineering	3	PP	0
Energy Systems	9	sP	0
Fundamentals of Project Management	6	PP	0
Informationsmanagement	6	mP	0
Interkulturelle Kompetenz I	6	mP	0
Neue Entwicklungen auf den Energiemärkten	3	sP	0
Projektmanagement und Veränderungsmanagement	6	PP	0
Regelungstechnik - Grundlagen	9	sP	0
Schutz von Erfindungen: Patent- und Lizenzrecht	3	PP	0
Technikgeschichte I (MA-GKWT FW 14)	6	mP	0
Technisches Deutsch für Ingenieure I	6	sP	0
Technisches Deutsch für Ingenieure II	6	sP	0
<i>Fremdsprache bei der ZEMS A</i>	6		0
<i>Fremdsprache bei der ZEMS B</i>	6		0
Freie Wahl	18		0

PP = Portfolio-Prüfung = Portfolio assessment

sP= schriftliche Prüfung = Written exam

mP = mündliche Prüfung = Oral exam

Annex 2: Proposed course schedule

	Winter semester	Summer semester	Winter semester	Summer semester
CP/semester	1st semester	2nd semester ^a	3rd semester ^a	4th semester ^a
1	Compulsory elective list 1: Process Systems Engineering	Compulsory elective list 1: Process Systems Engineering	[Compulsory module] Process and Plant Dynamics	Master's thesis (30 CP)
2				
3				
4				
5				
6				
7	[Compulsory module] Energy Engineering I	Compulsory elective list 2: Energy Technologies	Compulsory elective list 2: Energy Technologies	
8				
9				
10				
11				
12				
13	Compulsory elective list 3: Environmental Engineering and Sustainability	Compulsory elective list 3: Environmental Engineering and Sustainability	Cross-curricular subject- specific compulsory electives from Lists 1-3	
14				
15				
16				
17				
18				
19	Compulsory elective list 4: Management, transdisciplinary and intercultural skills	Compulsory elective list 4: Management, transdisciplinary and intercultural skills		
20				
21				
22				
23				
24				
25	Elective modules	Elective modules	Elective modules	
26				
27				
28				
29				
30				

^a Mobility window: These semesters are particularly suited for a semester abroad.

The program can be completed as part-time studies. The respective advisory services can assist with drawing up individual degree schedules.

I. Legal and Administrative Provisions

Faculties

Application and Admission Regulations for the International Master's Program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik (PEESE) at Faculty III - Process Sciences at Technische Universität Berlin

of 4 May 2022

On 4 May 2022, the Faculty Board of Faculty III - Process Sciences of Technische Universität Berlin adopted the following Application and Admission Regulations for the International Master's Program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik in accordance with Section 18 (1) no. 1 of the Constitution of Technische Universität Berlin and Section 71 (1) no. 1 of the Berlin State Higher Education Act (*Berliner Hochschulgesetz* – BerlHG) in the version of 26 July 2011 (Berlin Gazette of Laws and Ordinances [GVBl.], p. 378) in conjunction with Section 10 of the Act on the Admission to Higher Education Institutions in the State of Berlin to Degree Programs with Restricted Admission (*Berliner Hochschulzulassungsgesetz* – BerlHZG) in the version of 18 June 2005 (Berlin Gazette of Laws and Ordinances, p. 393), last amended by Article I of the same Act introducing a quota for applicants with a suitable sport profile to the allocation procedure of study placements of 26 June 2013 (Berlin Gazette of Laws and Ordinances, p. 198):*)

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I. General regulations

Section 1 - Scope of application

These application and admission regulations – in conjunction with the Statutes of Technische Universität Berlin Governing University Selection Procedures (*Auswahlsatzung* - AuswahlSa), as amended from time to time, govern the application, admission and selection modalities for the international master's program in Process, Energy, and Environmental Systems Engineering/Prozess-, Energie- und Umweltsystemtechnik (PEESE).

Section 2 – Entry into force/expiration

(1) These application and admission regulations enter into force on the day after their publication in the Official Gazette of Technische Universität Berlin. They apply to all application procedures for enrollment starting with winter semester 2023/24.

(2) Procedures which apply to summer semester 2023 or earlier semesters will be completed pursuant to the Application and Admission Regulations for the International Master's Program in Process, Energy, and Environmental Systems/Prozess-, Energie- und Umweltsystemtechnik at Faculty III - Process Sciences at Technische Universität Berlin of 22 July 2015 (TU Official Gazette 09/2016).

If the final procedure for this time frame is completed, the application and admission regulations of 22 July 2015 cease to be effective.

II. Application

Section 3 - Admission requirements

In addition to the general admission requirements set out in Sections 10 to 13 BerlHG, applicants must have:

1. a bachelor's or equivalent university degree in chemical engineering, energy engineering, mechanical engineering, environmental engineering, material science/engineering, or a related degree program. The relevant examination committee shall decide on whether the technical and content-related requirements have been fulfilled.
2. Applicants are also required to provide proof of English skills at level B2 of the Common European Framework of Reference for Languages. The relevant examination committee decides on the equivalence as well as on the recognition of proof of English skills.
3. Applicants with no or only very minimal knowledge of German are strongly advised to acquire German language skills at B2 level by the end of the second semester.

III. Admission

Section 4 – Application for admission

The application for admission must be sent to the relevant office of the Central University Administration of Technische Universität Berlin. Applicants must include the following documents:

1. The documents specified in the application form - either originals or officially certified copies, as determined by the relevant office of the Central University Administration,
2. A certified copy of the transcript of records that shows a history of all courses and work completed at officially recognized institutions of higher education, including credits attained for each module (for non-modular curricula, another appropriate form may be used, e.g. detailing hours of work per week), and
3. Proof of English language skills according to Section 3, item 2.

Section 5 – Selection criteria

Applicants are selected on the basis of the following criteria:

1. Overall grade from the preceding program (with a weighting of 55/100) and
2. Subject of the preceding program (with a weighting of 35/100) and
3. Additional qualifications obtained outside of university studies (with a weighting of 10/100).

Section 6 – Selection procedure

(1) The number of applicants participating in the selection procedure can be limited by the applicants' qualification level. The selection committee decides on any restriction at the beginning of the selection process.

(2) In the selection procedure, up to 100 points are awarded for the criterion indicated in Section 5 (1), item 1 in accordance with the following table:

Grade	Points	Grade	Points
1.0	100	2.6	52
1.1	97	2.7	49
1.2	94	2.8	46
1.3	91	2.9	43
1.4	88	3.0	40
1.5	85	3.1	37
1.6	82	3.2	34
1.7	79	3.3	31
1.8	76	3.4	28
1.9	73	3.5	25
2.0	70	3.6	22
2.1	67	3.7	19
2.2	64	3.8	16
2.3	61	3.9	13
2.4	58	4.0	10
2.5	55		

(3) The subject of the previous degree provides information about the student's subject-specific eligibility. Up to 100 points are awarded for the criterion set out in Section 5, item 2 as follows:

1. for the subjects Energy Engineering and Chemical Engineering 100 points,
2. for the subjects Mechanical Engineering, Environmental Engineering, and Material Science/Engineering 85 points,
3. 25 points for all other subjects.

(4) For the criterion set out in Section 5 (1), item 3, relevant practical professional experience will be considered, in each case only if this relates to the teaching content and academic objectives of the international master's program in PESE. The Selection Committee allocates up to 100 points for these according to the following system: 100 points for practical professional experience of more than 12 months, 50 points for practical professional experience of at least 6 to 12 months.

(5) The Selection Committee ranks the applicants based on the weighted points achieved with the selection criteria, giving reasons. In a first step, the points achieved are weighted individually for each applicant and criterion in accordance with Section 5. The figures obtained for each of the criteria are then added together.

Section 7 – Letter of acceptance

(1) The decision on acceptance is made by the relevant office of the Central University Administration after the selection process has been completed, based on the results achieved in the selection process and the resulting ranking list.

(2) Selected applicants receive a letter of acceptance promptly along with a deadline for providing written acceptance of the place in the program and for enrollment. If the applicant does not accept the place within the deadline, it is offered to the next candidate on the list in a clearing procedure according to Section 6 (5).

(3) Applicants who are not admitted to the program receive notification, with reasons provided.

*) Approved by the Executive Board of Technische Universität Berlin on 1 July 2022 and by the Senate Administration for Education, Youth and Science on 6 January 2023