



**No. 1063**

Departments 1, 3, 4, 5 (5 copies  
each) Institutes of Departments 1,  
3, 4, 5  
GB 1 (20 copies)

Published by the Presi-  
dent of TU Braun-  
schweig

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Date: 27 July 2015

**Note: The English translation (translated by a professional translator and interpreter) is a service. If any doubts occur, the German proclamation is binding.**

**Amendment to the Examination Regulations for the degree course in Computational Sciences in Engineering (CSE) at TU Braunschweig leading to a Master of Science degree**

This Amendment to the Examination Regulations for the degree course in Computational Sciences in Engineering (CSE) at TU Braunschweig leading to a Master of Science degree was agreed by the Joint Committee that has been assigned responsibility for departmental tasks by Carl-Friedrich-Gauß Department, the Department of Architecture, Civil Engineering and Environmental Sciences, the Department of Mechanical Engineering, and the Department of Electrical Engineering, Information Technology and Physics on 6 June 2015; was approved by the President on 21 July 2015; and is hereby published in the university.

The Amendment to the Regulations shall enter into force on 28 July 2015.

**Amendment to the Examination Regulations for the  
degree course in  
Computational Sciences in Engineering (CSE) at TU Braunschweig leading to a Master  
of Science degree**

On 8 June 2015, the Joint Committee that has been assigned responsibility for departmental tasks related to the joint Master's programme Computational Sciences in Engineering (CSE) by the Department of Architecture, Civil Engineering and Environmental Sciences, the Department of Mechanical Engineering, the Department of Electrical Engineering, Information Technology, Physics, and the Department Carl-Friedrich-Gauß-Fakultät, agreed the following Amendment to the Additional Examination Regulations for the joint Master's programme in Computational Sciences in Engineering (CSE) leading to a Master of Science degree, which was published in the university on 30 September 2013 (TU Gazette no. 917).

I.

1. Section 2 shall be amended as follows:
  - a. Subsection 4 Item c shall be amended by adding a comma at the end, followed by the words "with 15 credits each".
  - b. Subsection 6 shall be amended as follows:
    - aa. After Clause 2, the following shall be added as Clause 3:

Requests shall be approved where course units are directly related to a student's chosen specialisation.
    - bb. The existing Clause 3 shall now be Clause 4.
2. Section 4 shall be amended as follows:
  - a. Subsection 3 shall be removed.
  - b. The existing Subsection 4 shall now be Subsection 3 and contain a second Clause:

The examination topics shall reflect the learning objectives listed in Appendix 5.
  - c. The existing Subsection 5 shall be Subsection 4.
3. Section 5 with the title "Free attempts, examination retakes and replacing examinations" shall be replaced with the following:
  - (1) At the different stages of the degree programme, students shall study only elective or compulsory elective modules. In addition to the provisions of Section 13 Subs. 3 of the General Examination Regulations, students may substitute an examination subject from these modules only in accordance with Subsections 2 and 4. This shall not affect the remaining provisions relating to free attempts, in particular Section 13 Subs. 1 and 2 of the General Examination Regulations.
  - (2) Throughout their studies, students may apply to the board of examiners for waiver of the requirement to repeat electives or compulsory electives worth up to a total of 15 credits (no more than three examinations) following the first unsuccessful attempt, and for permission to replace each of them instead with another module in the same field of study, for which they have not yet taken an examination. This shall apply in addition to the provisions of Section 13 Subs. 3 of the General Examination Regulations.

The attempt shall count as one of the maximum number of examination attempts permitted for the new module.

- (3) Alternatively and in addition to the provisions of Section 19 Subs. 1 Clause 5 of the General Examination Regulations, students may replace electives or compulsory electives that they have passed, worth up to a total of 15 credits (no more than three examinations), with additional examinations that they have passed in the same field of study.
  - (4) A combination of the replacement options specified in Subsections 2 and 3 above is possible, however, only up to a maximum total of 15 credits (no more than three examinations).
4. Section 6 shall be amended as follows:
    - a. Subsection 2 Clause 2 shall be amended by adding, after the words "examination work", the text "for reasons beyond their control, but who can be expected to complete the missing work within the semester that follows".
    - b. Subsection 4 Clause 2 shall be removed.
  5. Section 7 shall be amended as follows:
    - a. Subsection 1 shall be replaced with the following:
      - (1) At the start of their studies, students shall choose a mentor from the group of lecturers teaching on the degree programme. Where a student has not chosen a mentor by the end of semester 1, the board of examiners shall appoint a mentor. Both the student and the mentor may request a change of mentor. On request, the board of examiners may also appoint academic staff with teaching experience who have completed a doctorate as mentor.
    - b. Section 7 shall be amended by adding the following Subsection 4:
      - (4) Students who have not accumulated at least 60 credits by the end of semester 4 shall be obliged to attend another consultation. To be permitted to complete further coursework or examinations, candidates need to give proof that they have attended the consultation.
  6. Appendix 4 "Study plan – overview" shall be replaced with the following:

Appendix 4: Study plan – overview

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Studienabschnitt	Fach/ Prüfungsgebiet	1. Sem.	2. Sem.	3. Sem.	4. Sem.
BCC-ENG erweiterter ingenieur- wissenschaftlicher Grundlagenbereich	Solid Mechanics	10	5		
	Fluid Mechanics				
	Fundamentals of Electromagnetic Fields				
	Analog & Digital Design				
	Semiconductor Technology				
	General Continuum Physics				
	Systemics				
BCC-MCS erweiterter mathematisch- informationstechnischer Grundlagenbereich	Thermodynamics	10	5		
	Introduction to PDEs				
	10				
	5				
	Tensor Calculus				
	Introduction to Scientific Computing				
	Algorithms and Data Structures				
BCC-ENG fachlich-methodischer Bereich der rechnergestützten Ingenieurwissenschaften	Intermediate Programming lab	5	10		
	Modeling of Solids:				
	Continuum Mechanics				
	Modeling of Solid Dynamics Material Modeling				
	Modeling of Beam Structures				
	Modeling of 2D Structures				
	Modeling of Solid Dynamics				
	Material Modeling				
	Information Technology:				
	Advanced Electromagnetic Fields				
	Fund. of VLSI Design & Digital Circuits				
	Num. Simulation of Electronic Devices				
	Digital Data Processing				
	Fund. of Computer System Design				
	Cryptology				
	Telecommunication				
	5				
	10				
	Fundamentals of Robotics				
	Computational Methods:				
	Fund. of Computational Solid Mechanics				
	Advanced Comp. Solid Mechanics				
	Fund. of Computational Aerodynamics				
	Advanced Computational Aerodynamics				
	Computational Fluid Dynamics				
	Fundamentals of Aeroacoustics				
	Advanced Aeroacoustics				
Computational Aeroacoustics					
Computational Acoustics					
Computational Multifield Problems					
Imported BCC-ENG					
ECC-MCS fachlich-methodischer Bereich der angewandten  Mathematik und Informatik	Mathematical Methods:	15	10		
	Advanced Methods for ODEs & DAEs				
	Numerical Methods for PDEs				
	Functional Analysis				
	Introduction to Optimization				
	Numerical Linear Algebra – Part I				
	Numerical Linear Algebra – Part II				
	Software / Programming:				
	Fundamentals of Parallel Computing				
	Scientific Visualization				
	Advanced Programming				
	Software Engineering				
	Distributed Systems				
	Imported BCC-MCS				
IDC-LEC / IDC-PRO	Vertiefungsfach aus der gewählten Studienrichtung			15	
Spezialisierungs-Bereich	Spezialisierungsprojekt			15	
IDC-MTH	Masterarbeit				30
Summe LP		30	30	30	30

Structure of studies	Module	Sem. 1	Sem. 2	Sem. 3	Sem. 4
BCC-ENG Foundations of Natural and Engineering Sciences	Solid Mechanics	10	5		
	Fluid Mechanics				
	Fundamentals of Electromagnetic Fields				
	Analog & Digital Design				
	Semiconductor Technology				
	General Continuum Physics				
	Systemics				
BCC-MCS Foundations of Mathematics and Computer Science	Thermodynamics	10	5		
	Introduction to PDEs				
	10				
	5				
	Tensor Calculus				
	Introduction to Scientific Computing				
	Algorithms and Data Structures				
BCC-ENG Modeling and Computational Methods in Engineering Sciences	Intermediate Programming lab	5	10		
	Modeling of Solids:				
	Continuum Mechanics				
	Modeling of Solid Dynamics Material Modeling				
	Modeling of Beam Structures				
	Modeling of 2D Structures				
	Modeling of Solid Dynamics				
	Material Modeling				
	Information Technology:				
	Advanced Electromagnetic Fields				
	Fund. of VLSI Design & Digital Circuits				
	Num. Simulation of Electronic Devices				
	Digital Data Processing				
	Fund. of Computer System Design				
	Cryptology				
	Telecommunication				
	5				
	10				
	Fundamentals of Robotics				
	Computational Methods:				
	Fund. of Computational Solid Mechanics				
	Advanced Comp. Solid Mechanics				
	Fund. of Computational Aerodynamics				
	Advanced Computational Aerodynamics				
	Computational Fluid Dynamics				
	Fundamentals of Aeroacoustics				
	Advanced Aeroacoustics				
Computational Aeroacoustics					
Computational Acoustics					
Computational Multifield Problems					
Imported BCC-ENG					
ECC-MCS Applied Mathematics and Computer Science  Mathematics und Informatics	Mathematical Methods:	15	10		
	Advanced Methods for ODEs & DAEs				
	Numerical Methods for PDEs				
	Functional Analysis				
	Introduction to Optimization				
	Numerical Linear Algebra – Part I				
	Numerical Linear Algebra – Part II				
	Software / Programming:				
	Fundamentals of Parallel Computing				
	Scientific Visualization				
	Advanced Programming				
	Software Engineering				
	Distributed Systems				
Imported BCC-MCS					
IDC-LEC / IDC-PRO	Specialization from the chosen direction of studies			15	
Specialization courses	Specialization project			15	
IDC-MTH	Master's thesis				30
Scientific/Research work					
Σ LP		30	30	30	30

7. Appendix 5 "Modules in the Master's programme in Computational Sciences in Engineering (CSE)" shall be replaced with the version appended here.

## **II. Entry into force**

This Amendment to the Examination Regulations shall become effective on the day following publication in the university

**No. 917**

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Institutes of Departments 1, 3, 4, 5  
GB 1 (20 copies)

Published by the  
President of TU  
Braunschweig

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Date: 30 September  
2013

**Note: The English translation (translated by a professional translator and interpreter) is a service. If any doubts occur, the German proclamation is binding.**

### **Examination Regulations for the degree course in Computational Sciences in Engineering (CSE) at TU Braunschweig leading to a Master of Science degree**

These Examination Regulations for the degree programme in Computational Sciences in Engineering (CSE) at TU Braunschweig leading to a Master of Science degree were agreed on 6 June 2013 by the Joint Committee that has been assigned responsibility for departmental tasks by Carl-Friedrich-Gauß Department, the Department of Architecture, Civil Engineering and Environmental Sciences, the Department of Mechanical Engineering, and the Department of Electrical Engineering, Information Technology and Physics, approved by the President on 24 September 2013, and are hereby published in the university.

These regulations shall enter into force on 1 October 2013.

**Examination Regulations for the degree programme in  
Computational Sciences in Engineering (CSE) at TU Braunschweig  
leading to a Master of Science degree**

The examination regulations for the Master's degree in Computational Sciences in Engineering comprise General Examination Regulations and an Additional Part. The General Examination Regulations, Official journal of the university no. 908 dated 12 September 2013, consist of the rules and regulations applicable to all Bachelor's, Master's, Diplom and Magister degree programmes at TU Braunschweig. In accordance with Section 1 Subs. 2 of the General Examination Regulations (APO), the Additional Part of the Examination Regulations for the Master's degree programme in Computational Sciences in Engineering leading to a Master of Science degree was agreed on 6 June 2013 by the Joint Committee that has been assigned responsibility for the department councils' tasks related to the joint degree programme MSc. in Computational Sciences in Engineering (CSE) by the Department of Architecture, Civil Engineering and Environmental Sciences, the Department of Mechanical Engineering, the Department of Electrical Engineering, Information Technology, Physics, and the Department Carl-Friedrich-Gauß-Fakultät.

**Section 1 Degree awarded and transcripts**

(1) TU Braunschweig shall award the academic degree Master of Science (MSc.) in Computational Sciences in Engineering to students who have successfully completed all required work. The university shall confirm this by issuing a transcript of records and a degree certificate with the same date as the transcript.

(2) Under Section 18 Subs. 1 of the General Examination Regulations, the degree certificate and the accompanying transcript and diploma supplement (see Appendices 1 to 3) shall be issued in German and English.

(3) The transcript shall specify the overall grade as well as listing the grades for the individual modules including the credits awarded.

(4) For overall grades of 1.3 or better, the grade "*mit Auszeichnung bestanden*" (pass with distinction) shall be awarded.

(5) The degree certificate and transcript shall be issued by the department representing the direction of studies to be selected under Section 2 Subs. 2.

**Section 2 Standard period of study and course structure**

(1) The standard period of study (*Regelstudienzeit*) for the degree programme is four semesters; this includes the time for completion of the Master's thesis.

(2) The CSE Master's programme comprises several levels: In the Basic Core Courses, students acquire a fundamental knowledge of engineering science, mathematics and computer science for this scientific Master's programme. The Elective Core Courses teach technical and methodological knowledge of computer-based engineering sciences, applied mathematics and computer science. At the specialization stage, students choose so-called In-depth Courses, in which they acquire more advanced knowledge and skills in a specialist area as well as completing a project assignment. Students shall present their project assignment in a oral presentation, with the oral presentation carrying 10 percent of the grade for the assignment. With their Master's thesis, which must be completed within a period of six months, students show that they are able to independently treat a complex research-based specialist subject applying scientific methods, and to present their findings in a concise written form. Students shall also present their Master's thesis in a oral presentation, with the oral presentation carrying 10 percent of the grade for the dissertation.

(3) By the end of semester 1, students shall choose one of the following specialization: a)



Civil Engineering (CSE-CE), b) Mechanical Engineering (CSE-ME), c) Electrical Engineering (CSE-EE), or d) Mathematics and Computer Science (CSE-MC) and notify the board of examiners of their choice. The choice of specialization shall be recorded.

(4) To successfully complete the degree programme, students shall provide evidence of having accumulated a total of 120 credits as shown here (see Appendix 4):

- a) 30 credits in modules from the Basic Core Courses (BCC), with 15 credits each from the course blocks "Foundations of Natural and Engineering Sciences" and "Foundations of Mathematics and Computer Science".
- b) 30 credits in modules from the Elective Core Courses (ECC), with 15 credits each from the course blocks "Computational Methods in Engineering Sciences" and "Applied Mathematics and Computer Science".
- c) 30 credits in modules from the specialization-related In-depth Courses (IDC), with the course blocks "Specialization Courses" and "Specialization Project".
- d) 30 credits for the Master's thesis.

(5) In the Elective Core Courses (ECC), students may choose a BCC-ENG module as one of their ECC-ENG courses, and a BCC-MCS module as one of their ECC-MCS courses.

(6) In the In-depth Courses, students may choose course units from the Master's programmes offered by the participating departments, provided they are included in the list of available courses agreed by the CSE board of examiners and the student's mentor supports this choice. Students may also choose course units from these Master's programmes if they submit a request to the board of examiners and the board approves their choice. ECC modules may be included as In-depth Courses, provided they do not count for the ECC modules.

(7) To successfully complete a module, a student must pass the course units in the module by passing the appropriate examinations and coursework.

### **Section 3 Board of examiners**

(1) A board of examiners shall be appointed for organising the examinations and for performing the tasks defined in this Additional Part of the Examination Regulations. The board shall comprise academic staff from all departments participating in the degree programme. The board shall have seven members: four representatives for the professors; two full-time lecturers representing the members of academic staff; and one student. The members of the board of examiners and their permanent deputies shall be appointed by the Joint Committee. The chair and deputy chair to be elected by the members of the board shall be professors.

(2) The board of examiners shall be responsible for the proper running of the examinations. The board shall ensure that the provisions of the Lower Saxony University Act (Niedersächsisches Hochschulgesetz, NHG) and of these Examination Regulations are observed. The board shall regularly report to the Joint Committee on the development of examinations and study times and on the distribution of grades. The board of examiners or another authorised body shall be responsible for keeping the examination records.

### **Section 4 Examinations and coursework**

(1) Students shall be assessed throughout their Master's studies. Assessments shall be comprised of the module examinations and the Master's thesis

(2) Section 9 of the General Examination Regulations for Bachelor's, Master's, Diplom and Magister degree programmes at TU Braunschweig lists the possible examination types.

(3) Additional examination types may be approved by the board of examiners on request.

(4) The modules, order of course units, learning outcomes, as well as the type and scope of

the associated examinations and coursework and the associated number of credits are set out in Appendix 5.

(5) Where all examinations required for a module have been assessed as "sufficient" or higher, the module shall be considered complete.

### **Section 5 Free attempts, examination retakes and replacing examinations**

(1) At the different stages of the degree programme, students shall study only elective or compulsory elective modules. In addition to the provisions of Section 13 Subs. 3 of the General Examination Regulations, students may substitute an examination subject from these modules only in accordance with Subsection 2. This does not affect the provisions relating to free attempts, in particular Section 13 Subs. 1 and 2 of the General Examination Regulations.

(2) Students may apply to the board of examiners once during their studies to request the following:

- a) Either that, in addition to Section 13 Subs. 3 of the General Examination Regulations, they need not repeat electives or compulsory electives worth up to 15 credits (no more than three examinations) following the first unsuccessful attempt, but may instead replace them with another successfully completed module from the same field of study.
- a) Or that, in addition to Section 19 Subs. 1 Clause 5 of the General Examination Regulations, they may replace electives or compulsory electives worth up to 15 credits (no more than three examinations) that have been passed with additional examinations.

### **Section 6 Master's thesis**

(1) Only students who meet all entry requirements for the CSE Master's programme, particularly proof of language proficiency, shall be permitted to complete their Master's thesis.

(2) Students who meet the requirements under Section 14 of the General Examination Regulations and have successfully completed all modules in their personal study plan shall be permitted to complete their Master's thesis. On request and with reasons given, the board of examiners may also permit students who have not yet completed all required examination work to complete their Master's thesis. The missing examinations shall be taken at the next examination date.

(3) The Master's thesis carries 30 credits and has to be completed within six months. In their Master's thesis, students shall treat a topic within their chosen specialization that is noticeably different from the subject of the specialization project in terms of method and content.

(4) Candidates wishing to change their topic may do so only once and only within six weeks of being assigned the topic. In exceptional cases and with reasons given, the board of examiners may on request extend the deadline to a total of eight months.

(5) Students are free to choose whether to write their Master's thesis in German or English. Before the thesis is assessed, the student shall present his or her Master's thesis in an oral presentation, with the oral presentation carrying 10 percent of the grade for the Master's dissertation.

### **Section 7 Mentors and consultations**

(1) At the start of their studies, students shall choose a mentor from the group of lecturers

teaching of the degree programme. Where a student has not chosen a mentor by the end of semester 1, the board of examiners shall appoint a mentor. Both the student and the mentor may request a change of mentor.

(2) In each semester, students should attend at least one consultation with their mentor; topics shall include structuring their studies and study progress. In each case, this shall be confirmed by the mentor's signature.

(3) Based on the student's specialist background and interests, the student and his or her mentor shall draw up a personal study plan for the CSE programme together. This shall include details of the student's specialization, the available examination subjects and the student's project work, as well as specifying a schedule. Where a student and his or her mentor are unable to agree on this, the CSE board of examiners shall make a decision after hearing both the student and the mentor.

### **Section 8 Entry into force, transitional provisions**

(1) These examination regulations shall become effective on the day following their publication in the university.

(2) Students who are enrolled in semester 2 or a higher semester at the time when these regulations become effective shall be examined based on the previously valid examination regulations, unless they request a transfer to the new examination regulations.

5 appendices:

1a) Master's degree certificate in German

1b) Master's degree certificate in English

2a) Master's transcript in German

2b) Master's transcript in English

3) Diploma supplement

4) Study plan – overview

5) Appendix to the Examination Regulations, modules in the Master's programme in Computational Sciences in Engineering (CSE) (2013 Examination Regulations)

#### Appendix 1a: Master's degree certificate in German

The degree certificate template included in the General Examination Regulations (APO) for Bachelor's, Master's, Diplom and Magister degree programmes at TU Braunschweig shall apply.

#### Appendix 1b: Master's degree certificate in English

The degree certificate template included in the General Examination Regulations (APO) for Bachelor's, Master's, Diplom and Magister degree programmes at TU Braunschweig shall apply.

#### Appendix 2a: Master's transcript in German

The template included in the General Examination Regulations (APO) for Bachelor's, Master's, Diplom and Magister degree programmes at TU Braunschweig shall apply.

#### Appendix 2b: Master's transcript in English

The template included in the General Examination Regulations (APO) for Bachelor's, Master's, Diplom and Magister degree programmes at TU Braunschweig shall apply.

#### Appendix 3: Diploma supplement

The diploma supplement has two parts. Part 1 (I. Diploma Supplement) is specific to the CSE degree programme, see below; part 2 (II. Diploma Supplement) is arranged as specified in the General Examination Regulations (APO).

This applies to both the German and English language versions.