

Subject-Related Examination and Study Regulations for the Master's Programme Transfers-Fluids-Materials in Aeronautical and Space Applications of 21 August 2019

English translation, not legally binding!

In accordance with the Brandenburg University Act (BbgHG) dated 28 April 2014 (GVBl. (Law Gazette of the German federal state of Brandenburg) I/14 No. 18), last amended by way of Article 2 of the Act dated 30 April 2019 (GVBl. I/19 No. 14), in accordance with Section 5 Paragraph 1 Sentence 2, Section 9 Paragraph 5 Sentence 2, in combination with Section 19 Paragraph 2 Sentence 1, Section 22 Paragraph 2 Sentence 1, Section 72 Paragraph 2 Sentence 1 and Section 1 of the General Examination and Study Regulations for the Master's Programmes at BTU Cottbus–Senftenberg dated 12 September 2016 (Official Gazette 14/2016), the Brandenburg University of Technology Cottbus–Senftenberg (BTU) issues the following statutes:

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§ 1 Scope of Validity

¹These statutes provide for the subject-related special features of the master's programme Transfers-Fluids-Materials in Aeronautical and Space Applications (TFM-ASA). ²They supplement the General Examination and Study Regulations (RahmenO-MA) for BTU Master's Programmes dated 12 September 2016 (Official Gazette 14/2016). ³In the event of doubt, the provisions of RahmenO-MA shall have preference.

§ 2 Profile of the Study Programme, Goals of the Programme

(1) ¹The international research-oriented master's programme Transfers-Fluids-Materials in Aeronautical and Space Applications is jointly offered by three partner universities Université de Bordeaux (UBx) in France, Université catholique de Louvain (UCL) in Belgium and Brandenburg University of Technology Cottbus-Senftenberg (BTU) in Germany.

(2) ¹The master's programme is geared toward imparting knowledge and skills in aeronautics and astronautics which includes the academic areas aerodynamics, fluid mechanics, aviation engineering, materials science and aviation. ²As a result of the variety of these topics, the graduates acquire multi-disciplinary skills for the aeronautics industry as well as the qualification for a scientific career. ³Aircraft manufacturers, aeronautical engineering, the automotive industry, material development, quality assurance and technical project management are potential areas in which graduates could apply their acquired skills.

§ 3 Graduation, Degree

(1) ¹In the case of successfully completing the master's programme, the Brandenburg University of Technology Cottbus-Senftenberg and Université de Bordeaux shall jointly award the academic degree "Master of Science" (M. Sc.) in Transfers-Fluids-Materials in Aeronautical and Space Applications, mention "mécanique", parcours international master degree in "Transfers-Fluids-Materials in Aeronautical and Space Applications" (Joint Degree). ²If the preconditions are met in accordance with Belgian law, the students shall additionally receive from Université catholique de Louvain the academic degree "Master « ingénieur civil mécanicien, à finalité spécialisée »".

(2) Master Certificate, Transcript of Records and Diploma Supplement as part of the Joint Degree shall be issued by the Université de Bordeaux for all students in the name of the partner universities.

§ 4 Specific Admission and Enrolment Requirements

(1) Applicants must demonstrate an undergraduate degree (at least Bachelor Degree) in mechanical engineering, aeronautics and astronautics technology or process engineering or hold similar qualifications.

(2) ¹The international *Steering Committee* established by the partner universities shall decide on the equivalence of the qualification for the students to be jointly selected by the BTU Cottbus-Senftenberg and Université de Bordeaux on the basis of the application documents submitted by

the applicants in consultation with the examination boards of the partner universities. ²For the students to be selected by the Université catholique de Louvain, this decision shall be made in accordance with the procedure applicable there, with confirmation by the international *Steering Committee*.

(3) ¹Applicants must furnish proof of language skills in English as the teaching and examination language in accordance with Article 4(B) of the Cooperation Agreement for the Establishment of the International Master's Programme in Transfers-Fluids-Materials in Aeronautical and Space Applications. ²The requirements in accordance with Section 3(3), Sentences 1 and 2, of the BTU Enrolment Regulations dated 11 July 2018 (Official Gazette 12/2018) are met.

(4) ¹The admission and selection of students shall be performed by the international *Steering Committee* for the students to be jointly selected by the BTU Cottbus-Senftenberg and Université de Bordeaux. ²For the students to be selected by the Université catholique de Louvain, the selection shall be made by that university with confirmation by the international *Steering Committee*.

§ 5 Regular Duration of the Programme, Credits for the Programme

(1) ¹The regular duration of the standard programme is four semesters (two study years). ²Students must acquire 120 credit points (CP) in accordance with ECTS.

(2) The master's programme TFM-ASA is not suitable for part-time studies.

§ 6 Programme Structure and Form

(1) ¹The master's programme TFM-ASA includes

- the mandatory and compulsory elective modules to an extent of 90 credit points (30 credit points each at each partner university) in accordance with ECTS (see Annexes 1 to 3) and
- the Master Thesis, including the thesis defence to an extent of 30 credit points in accordance with ECTS.

²An industrial or research internship that lasts four weeks can be staged as part of the Master Thesis.

(2) The module objectives and content are set out in written form in the module descriptions.

(3) The language of teaching and examinations is English.

(4) Enrolment takes place in the winter semester.

(5) ¹The programme includes a mandatory mobility phase at the partner universities, which spans at least two semesters in accordance with the following scheme:

- 1st semester: at Université de Bordeaux (UBx);
- 2nd semester: at Université catholique de Louvain (UCL);
- 3rd semester: at BTU Cottbus-Senftenberg (BTU);
- 4th semester (Master Thesis): at one of the partner universities.

²The university at which the Master Thesis is written shall be chosen by the students themselves following consultation with the mentor.

§ 7 Special Regulations for the Organisation of Examinations

(1) ¹The examinations (including repeat examinations) in the first three semesters shall be held in accordance with the regulations of the respective partner university. ²The transfer of grades between the partner universities shall apply in accordance with the equivalence table in Annex 4.

(2) ¹Academic counselling shall be offered via a mentoring system. ²Each student shall be assigned a personal mentor. ³All teaching staff who are members of one of the partner universities may act as mentors.

§ 8 Master Thesis

(1) ¹The Master Thesis is made up of the written thesis and thesis defence. ²The Master Thesis, to be written in English, is part of the examination procedure and concludes the academic education within the degree programme. ³The Master Thesis should demonstrate that the student can independently and critically deal with a problem of theoretical or practical aeronautics or astronautics within a set time limit and contribute to scientifically sound solutions in that respect.

(2) ¹A four-week industrial or research internship may be part of the Master Thesis. ²The internship is selected following consultation with the mentor and the Examination Board.

(3) Registration for the Master Thesis at the BTU is only possible following acquisition of 70 credit points.

(4) ¹If the Master Thesis is written at the BTU, Section 25(1) of RahmenO-MA, dated 12 September 2016 (Official Gazette 14/2016), shall apply for the examiners. ²The topic of the Master Thesis shall be agreed upon by the student and a supervisor from the BTU. ³The Master Thesis shall be supervised by professors or academic staff at BTU who teach and conduct research, or by guest university lecturers or external lecturers who teach modules within the master's programme. ⁴The student chooses the supervisor.

(5) The processing time of the Master Thesis is five months at most.

(6) The thesis defence shall be held no later than one month following submission of the written thesis.

§ 9 Additional Regulations

(1) ¹Each partner university shall establish its own Examination Board in accordance with its own rules. ²The BTU Examination Board shall be established in accordance with Section 18 RahmenO-MA. ³The Examination Boards of the partner universities shall consult with each other via the international *Steering Committee*, which shall be made up of three members (at least two professors or academic staff members and, where applicable, one administrative member) from each of the partner universities. ⁴The three BTU members of the international *Steering*

Committee shall be elected by the Faculty Council of the faculty to which the study programme is assigned.

(2) ¹In accordance with the provisions of Article 4(A) and 9(B) of the Cooperation Agreement, students in the international master's programme TFM-ASA shall be enrolled at the BTU in the semester in which they complete their modules at the BTU and, provided they complete their Master Thesis at the BTU, also in the last semester. ²The regulations of the other partner universities shall apply to enrolment in the other semesters.

(3) ¹Common quality assurance measures and instruments shall be used by all three partner universities in the implementation, evaluation and optimisation of the study programme. ²The Study Programme Directors shall ensure the regular exchange of information between the partner institutions via the international *Steering Committee*.

(4) Quality assurance, study organisation and supervision of students in the international master's programme TFM-ASA is geared towards the "National Code for Foreign Students at German Universities", which BTU has become a member of.

§ 10 Entry into Force, Abrogation

(1) These regulations shall come into force the day after they are published in the Official Gazette of the BTU.

(2) The first enrolment in the master's programme Transfers-Fluids-Materials in Aeronautical and Space Applications shall take place in the winter semester 2019/20.

(3) These Examination and Study Regulations will cease to be valid four semesters after the final student has enrolled, and once the regular duration of the programme plus four semesters has passed.

Annex 1: Overview of the Areas of Studies and Modules at the Partner Universities with Credits Points (CP) for Each Semester

Module No.	Area of study and modules	Status	Evaluation	CP
1st Semester: UBx – Material Science and Structures in Aerospace Applications				30
	Simulation and Design of Structures	M		9
	Continuum Mechanics and Finite Element Method Applied to Solid Mechanics	M		6
	Fatigue and Fracture	M		3
	Materials and Aeronautical Structures	M		6
	Non-Destructive Evaluation for Aerospace Applications	M		3
	Assembly-Bonding	M		3
2nd Semester: UCL – Aeronautical Engineering				30
	Compulsory Elective Modules I			20
	Internal Combustion Engines	CE		5
	Aerodynamics of External Flows	CE		5
	Fluid Compressors	CE		5
	Numerical Methods in Fluid Mechanics	CE		5
	Quality Management and Control	CE		5
	Gas dynamics and Reacting Flows	CE		5
	Compulsory Elective Module II			10
	One module from Annex 3	CE		5
	One module from Annex 3	CE		5
3rd Semester: BTU – Advanced Fluid Mechanics, Thermodynamics, Heat Transfer				30
	Compulsory Elective Modules I			18
12885	Computational Fluid Dynamics	CE	EX	6
12887	Engineering Acoustics – Sound Fields	CE	EX	6
11913	Turbulence Modelling	CE	EX	6
11938	Thermodynamics, Heat and Mass Transfer	CE	EX	6
12886	Flow Measurements	CE	EX	6
	Compulsory Elective Module II			12
	One module from Annex 3	CE	EX	6
	One module from Annex 3	CE	EX	6
4th Semester: UBx/UCL/BTU				30
12884	Master Thesis	M	EX	30

M = Mandatory Module, CE = Compulsory Elective Module, EX = Examination

Annex 2: Standard Study Plan

Area of Study or Module	Credit Points (CP) in the semester				Total CP
	1 UBx	2 UCL	3 BTU	4 Thesis	
Simulation and Design of Structures	9				
Continuum Mechanics and Finite Element Method Applied to Solid Mechanics	6				
Fatigue and Fracture	3				
Materials and Aeronautical Structures	6				
Non-Destructive Evaluation for Aerospace Applications	3				
Assembly-Bonding	3				
UCL Compulsory Elective Modules I		20			
UCL Compulsory Elective Modules II		10			
BTU Compulsory Elective Modules I			18		
BTU Compulsory Elective Modules II			12		
Master Thesis				30	
Total	30	30	30	30	120

Annex 3: Compulsory Elective Modules II

Compulsory Elective Modules II in the 2nd semester (UCL):

Two modules (each 5 LP) are to be selected from the list:

- Advanced Numerical Methods
- Calculation of Planar Structures
- Aerodynamics of External Flows
- Thermodynamics of Irreversible Phenomena
- Plasticity and Metal Forming

Compulsory Elective Modules II in the 3rd semester (BTU):

The modules are to be specified following consultation with the local mentor. In that respect the following are to be selected:

- One module (6 credits) from the subjects mechanical engineering, aviation engineering, materials science, aeronautics and
- One module (6 credits) from the subjects physics, mathematics and computer science

Annex 4: Grade Equivalence Table

Converting UCL grades into ...				
UCL	UBx	BTU	ECTS	
20	20	1.0	A	Very Good
19	19	1.0	A	Very Good
18	18	1.3	A	Very Good
17	18	1.3	A	Very Good
16	16	1.7	B	Good
15	15	2.3	B	Good
14	14	2.7	C	Quite Good
13	13	3.0	C	Quite Good
12	12	3.3	D	Satisfactory
11	12	3.3	D	Satisfactory
10	10	3.7	E	Sufficient
<10	<10	5.0	F	Fail

Converting UBx grades into ...				
UBx	UCL	BTU	ECTS	
20	20	1.0	A	Very Good
19	19	1.0	A	Very Good
18	18	1.3	A	Very Good
17	16	1.7	B	Good
16	16	2.0	B	Good
15	15	2.3	B	Good
14	14	2.7	C	Quite Good
13	13	3.0	C	Quite Good
12	12	3.3	D	Satisfactory
11	10	3.7	E	Sufficient
10	10	3.7	E	Sufficient
<10	<10	5.0	F	Fail

Converting BTU grades into ...				
BTU	UCL	UBx	ECTS	
1.0	20	20	A	Very Good
1.3	18	18	A	Very Good
1.7	16	17	B	Good
2.0	16	16	B	Good
2.3	15	15	B	Good
2.7	14	14	C	Quite Good
3.0	13	13	C	Quite Good
3.3	12	12	D	Satisfactory
3.7	10	11	E	Sufficient
4.0	10	10	E	Sufficient
5.0	5	5	F	Fail

Converting ECTS grades into ...				
ECTS	UCL	UBx	BTU	
A	19	19	1.0	Very Good
B	16	16	2.0	Good
C	14	14	3.0	Quite Good
D	16	16	3.3	Satisfactory
E	10	10	4.0	Sufficient
F	5	5	5.0	Fail