

**Study and Examination Regulations for the
Master's Degree Programme
Mechatronic and Cyber-Physical Systems, M.Eng.
at Deggendorf Institute of Technology
of 15 March 2021**

Based on Art. 13 (2) clause 2, Art. 58 (1), Art. 61 (2) clause 1 of the Bavarian Higher Education Act (BayHSchG) of 23 May 2006 (GVBl. p. 245, Bay RS 2210-1-1-WK), last amended by Section 1 of the Act of 24 July 2020 (GVBl. p. 382), Deggendorf Institute of Technology hereby enacts the following by-laws:

**Section 1
Aim of the study programme**

- (1) The master's degree programme of Mechatronic and Cyber-Physical Systems is designed to enable graduates of *Diplom* or bachelor's programmes to substantiate the knowledge that they have acquired so far with theoretical knowledge, and thereby be particularly well-equipped to meet the requirements of modern research and development tasks.
- (2) ¹The programme deepens the knowledge acquired during a bachelor's or *Diplom* programme. ²Through this approach, graduates shall acquire the ability to work creatively in research and development departments. ³Particularly well-qualified students will furthermore learn the theoretical principles needed for them to pursue a doctoral programme and/or work in scientific fields.

**Section 2
Structure of the programme**

- (1) The degree programme comprises three theory semesters and is concluded by the master's thesis.
- (2) ¹Lectures are taught in English. ²Examinations are carried out in English.

Section 3

Qualification requirements for the degree programme

- (1) ¹To qualify for admission to the master's degree programme Mechatronic and Cyber-Physical Systems, students must:
- have successfully completed an undergraduate programme at an institute of higher education in Germany or abroad and attained at least 210 ECTS credits in the field of mechatronics or a related degree programme, or a degree of comparable standing to one from such an institute of higher education. ²The examination committee shall determine whether the obtained degrees are of comparable standing.
- and
- furnish proof of suitability for the programme in question pursuant to Section 5 of these by-laws.
- (2) For this degree programme proof of the following language skills has to be provided:
- Level B2 English proficiency, as defined under the Common European Framework of Reference for Languages.
 - Level A2 German proficiency, as defined under the Common European Framework of Reference for Languages.

Regarding the proof, the regulations set out in Section 3 of the general examination regulations for additional qualification in foreign languages and compulsory elective subjects of a general academic nature (AWP) of Deggendorf Institute of Technology shall apply as amended.

Section 4

Proof of ECTS credits not yet obtained

If applicants provide proof of an admission-substantiating university degree, for which less than 210 ECTS credits but at least 180 ECTS credits have been awarded or are to be regarded as equivalent, then proof of the ECTS credits not yet obtained is a prerequisite for passing the master's examination. ²ECTS points not yet obtained, which must be obtained by the start of the third semester, can be proven upon request to the Examination Committee through an additional relevant professional experience or by participating in relevant university courses. ³Proof for each variant may be furnished only once. ⁴A maximum of 30 ECTS credits may be provided this way. ⁵The following conditions apply for submission of the proof:

1. Internship:
Successful completion of a relevant internship in the field of mechatronics or a related field of no less than 20 weeks' duration.

2. University lectures and classes:

¹University lectures and classes must be drawn from the relevant undergraduate degree courses offered at the institute of higher education. ²The relevant academic advisor is to be consulted in advance, during which time an individualised concept is to be jointly developed with the applicant.

Section 5 **Aptitude assessment**

- (1) ¹A student's aptitude and suitability for the degree programme is ascertained through a written or online test of 90 minutes' duration ²The appointment for this examination is set by the examination committee. ³The examination involves complex tasks on relevant subjects relating to advanced mathematics for engineers and fundamental aspects concerning mechatronics, mechanical engineering, electrical engineering and their applications, as described in detail in, for example, the Module Handbook for the bachelor's programme in Mechatronics and Project Management for Digital Production. ⁴The subject matter covered by the following modules is of relevance: MDP-02 Engineering Mathematics 1, MDP-03 Engineering Mathematics 2, MDP-04 Basics of Physics, MDP-09 Basics of Computer Science, MDP-10 Computer Science 2, MDP-11 Basics of Electrical Engineering and MDP-12 Basics of Control Engineering. ⁵The assessment test will be deemed to have been passed if the grade "*mit Erfolg abgelegt*" ("passed successfully") was awarded. ⁶To ascertain a grade, the test is evaluated by two university instructors. ⁷The two examiners jointly set the relevant marking system to be used in order to determine whether the candidate has been successful. ⁸The approaches to solving the tasks must be logical and comprehensible. ⁹Both lecturers must reach a consensus when arriving at the test result. ¹⁰At least one of the two university instructors must teach in one of the relevant degree programmes at Deggendorf Institute of Technology. ¹¹The university instructors are appointed by the Faculty Council of Applied Natural Sciences and Industrial Engineering, or the Faculty Council of Mechanical Engineering and Mechatronics.
- (2) ¹The examination committee may waive a candidate's obligation to take the aptitude test for the degree programme if the applicant demonstrates above-average knowledge of the subject matter, as verified through their degree awards falling under Section 3(1) Clause 1. ²Above-average degree awards are deemed to be those demonstrating an overall grade of "good" (<2.5) or better, or above-average knowledge (a grade of 2.5 or better) in Mathematics, Physics, Computer Science, Electrical Engineering or Control Engineering.
- (3) The procedure for determining programme-specific aptitude is conducted biannually: in the winter semester for the following summer semester and in the summer semester for the following winter semester.

- (4) ¹Candidates not passing the aptitude test for the degree programme may register to reapply to sit the test in the following year. ²In justified cases, a candidate may register for the test at a later juncture. ³It is not possible to repeat the process.
- (5) ¹Applicants are notified in writing of their written test result. ²The reasons for the candidate not passing the examination must be provided.
- (6) No rights or entitlement to the master's degree programme being offered shall exist in the event of an insufficient number of applicants.

Section 6

Modules and course assessments

- (1) ¹The degree programme comprises modules that may consist of courses on connected subjects ²ECTS credits are allotted to each module in keeping with the amount of time students are required to invest.
- (2) ¹Compulsory and elective modules, their number of hours, forms of instruction, the examination and the ECTS credits are defined in the appendix to these by-laws. ²The regulations governing subject-specific elective modules are supplemented by the curriculum.
- (3) ¹All modules consist of compulsory modules, compulsory elective modules or optional modules:
1. Compulsory modules are mandatory for all students.
 2. ¹Compulsory elective modules are offered as alternatives. ²Students are required to select a certain number of modules based on these study and examination regulations. ³Selected modules are treated as compulsory modules.
 3. ¹Optional modules are modules that are not mandatory for the achievement of the study objective. ²They may be additionally selected from the courses offered by the Institute.
- (4) ¹No rights or entitlements exist to the envisaged compulsory elective modules or elective modules actually being offered. ²Likewise, no rights or entitlements exist to the related courses being held in the event of insufficient numbers.

Section 7

Curriculum

¹The responsible faculty draws up a curriculum detailing the progression of the degree programme to ensure that the relevant courses are offered and that students are duly informed. ²The curriculum is determined by the Faculty Council and must be announced within the university before the start of the semester. ³The announcement of changes and/or new regulations must be made no later than at the beginning of the lecture period of the semester in which these changes are to be applied for the first time.

In particular, the curriculum will contain regulations and information regarding

1. the time allocation of the weekly semester hours per module and study semester incl. ECTS credits,
2. a description of the compulsory and compulsory elective modules plus their number of semester hours per week, the form of instruction, study objectives and the content of the individual modules;
3. the subject-specific compulsory elective modules, including the number of hours involved, the form of instruction used in each individual module, provided that this has not been conclusively specified in the appendix.

Section 8 **Assessment of examination performance, overall examination grade**

- (1) ¹Each module is assigned an examination. ²Should a module examination comprise multiple module component examinations, a student's module grade will be calculated based on the arithmetic average of their individual examination grades, rounded down to one decimal point. ³The individual examination grades are weighted according to the attainable number of ECTS credits.
- (2) Should an end-of-module examination comprise multiple module component examinations, a grade of "*nicht ausreichend*" ("insufficient") awarded in one module component examination may not be offset by a higher grade in another.
- (3) ¹A student's overall grade is calculated using a weighted arithmetic average of their individual grades. ²The weighting of an individual grade equates to the number of ECTS credits assigned to the course for which the grade was awarded.
- (4) In addition to the overall grade assigned as per para. 3, a relative grade is awarded based on the numerical value attained, in keeping with the ECTS User Guide, as per the provisions of Section 8(6) General Examination Regulations of Deggendorf Institute of Technology.

Section 9 **Master's thesis**

- (1) ¹Attainment of the master's degree is contingent on a master's thesis being written. ²The aim of the thesis is to enable students to demonstrate, through an independently compiled academic paper, their ability to apply the knowledge and skills acquired during the degree programme to projects relating to engineering practice.
- (2) The time between the topic being assigned and the master's thesis being submitted should be of an adequate duration in light of the scope of the

topic and be six months.

- (3) ¹Further to approval by the examination committee, the master's thesis may be written in German. ²It is subsequently to be presented at the Institute; the presentation is taken into consideration when assessing the master's thesis.
- (4) Students wishing to register to write their master's thesis must have attained at least 30 ECTS credits.

Section 10 Certificate

On passing the master's examination, a corresponding certificate is issued in line with the sample shown in the appendix to the General Examination Regulations of Deggendorf Institute of Technology.

Section 11 Academic degree and diploma supplement

- (1) Upon successfully passing the master's examination, the academic degree "Master of Engineering", in short: "M. Eng.", is conferred.
- (2) A certificate granting the academic degree will be issued in accordance with the sample shown in the appendix to the General Examination Regulations of Deggendorf Institute of Technology.
- (3) The certificate will be accompanied by a Diploma Supplement outlining, in particular, the essential course content forming the basis of the degree, the progression of the studies, and the qualification obtained by virtue of the degree.

Section 12 Coming into effect

These Study and Examination Regulations enter into force on 15 March 2021.

Appendix 1 to the Study and Examination Regulations for the Master's Degree Programme Mechatronic and Cyber-Physical Systems at Deggendorf Institute of Technology

Overview of modules and courses

Mechatronic and Cyber-Physical Systems, M.Eng.											
Semester hours per week (SWS)											
Overview of module/course numbers, module and course descriptions, SWS and ECTS			Module	1. Sem	2. Sem	3. Sem	ECTS	Weighting of the module grade	Form of instruction	Exam format	
Module No.	Course no.	Module/Course									
MCS-1		Cyber Physical Systems	6				6			schrP 90min	
	MCS 1101	Structure and Functions of Cyber Physical Systems		4				4	SU/Ü		
	MCS 1102	Business Models for CPS		2				2	SU/Ü		
MCS-2		Cooperative and Autonomous Systems	8				8			schrP 120min	
	MCS 1103	Advanced Robotics		4				4	SU		
	MCS 1104	Autonomous Systems		4				4	SU		
MCS-3		Case Study Cooperative and Autonomous Systems	4	4			6	6	Ü	PStA	
MCS-4		Advanced Modelling and Simulation	4	4			4	4	SU	schrP 90min	
MCS-5		Case Study Mechatronic System Simulation	4	4			6	6	Ü	PStA	
MCS-6		Human Machine Interfaces	6				6			schrP 120min	
	MCS 2101	Virtual Reality / Augmented Reality			4			4	SU		
	MCS 2102	Mobile and Adaptive HMI			2			2	SU		
MCS-7		Case Study VR/AR in System Engineering	4		4		6	6	Ü	PStA	
MCS-8		Additive Manufacturing (AM)	8				8			schrP 150min	
	MCS 2103	Technologies of Additive Manufacturing			4			4	SU		
	MCS 2104	AM Production Processes			4			4	SU	schrP 150 min	
MCS-9		Case Study Cyber-physical Production Systems Using AM	4		4		6	6	Ü	PStA	
MCS-10		Subject-specific Elective Course (FWP)	4				4				
	MCS 2105	(according to the study plan) e.g. Software Engineering, CPS in Logistic Systems, Change Management			4			4	SU/Ü		
MCS-11		Functional Safety	6				6			schrP 90min	
	MCS 3101	Principles of Functional Safety				4		4	SU/Ü		
	MCS 3102	Design of Safe Systems				2		2	SU/Ü		
MCS-12		Master Module					24				
	MCS 3103	Master's Thesis						22	MA		
	MCS 3104	Master's Seminar						2	S		
		Total SWS		26	26	6	58				
		Total ECTS		30	30	30	90	90			
¹⁾ Details are regulated by the curriculum											
Abbreviations:											
	MA	Master's thesis								schrP	Written examination
	ECTS	European Credit Transfer System								GMPschr	Written overall module examination
	LN	Continuous course assessment								TMPschr	Written partial module examination
	MA	Master's thesis								SU	Seminar-based tuition
	mdP	Oral examination								SWS	Semester hours per week
	Pr	Internship								Ü	exercise class
	PstA	Written assignment									
	S	Seminar									

Issued based on the resolution of the Senate of Deggendorf Institute of Technology dated 02 December 2020 and the regulatory approval of the Vice President of Deggendorf Institute of Technology dated 15 March 2021.

signed
Prof. Waldemar Berg
Vice-President

These by-laws were recorded at Deggendorf Institute of Technology on 15 March 2021. The recorded by-laws were duly posted on the notice boards on 15 March 2021. Their day of announcement is therefore 15 March 2021.