FSB (Subject-Specific Provisions) for the Master of Science Degree Programme in Quantum Engineering (120 ECTS credits)

at Julius-Maximilians-Universität Würzburg

of 06.09.2023

While we have made every effort to ensure that all the information provided in this document is accurate and up to date, we do not warrant its accuracy, correctness or completeness. The English text in this document is intended solely as a convenience to non-German-reading students and staff members. Any discrepancies or differences that may arise in the translation of the official German version shall not be legally binding. In the event of a conflict between the information provided here and the information provided in the official publications of the University of Würzburg, the official publications shall prevail.

Article 13 Subarticle 1 Sentence 2 in conjunction with Article 58 Subarticle 1 and Article 61 Subarticle 2 Sentence 1 *Bayerisches Hochschulgesetz* (Bavarian Higher Education Act, BayHSchG) dated 23 May 2006 (*Bayerisches Gesetz- und Verordnungsblatt* (Bavarian Law and Ordinance Gazette, GVBI, p. 245, *Bayerische Rechtssammlung* (Collection of Bavarian Laws, BayRS) 2210-1-1-WFK) as amended from time to time forms the framework for the following subject-specific provisions decreed by Julius-Maximilians-Universität Würzburg.

Contents

Part 1: General Provisions

Section 1 Scope

These subject-specific provisions (FSB) shall supplement the ASPO (General Academic and Examination Regulations) for the Bachelor's and Master's Degree Programmes Offered by Julius-Maximilians-Universität Würzburg (JMU) dated 1 July 2015 as amended periodically.

Section 2 Aims and Objectives of the Degree Programme, Learning Outcomes

(1) [1]The Quantum Engineering programme leading to the degree of Master of Science (MSc) is offered by the Faculty of Physics and Astronomy at JMU as a research-based programme in the framework of a consecutive Bachelor's/Master's model. [2]The degree of Master of Science is a further qualification; it has a research focus and prepares graduates to enter a profession. [3]The objective of the degree programme is to give students an in-depth understanding of the physical and technical fundamentals of quantum engineering as well as provide them with sound knowledge of theoretical and experimental methods for gaining new insights, including the necessary capacity for abstract and analytical thinking, excellent problem-solving skills and the ability to structure complex issues, so that they can work responsibly and successfully as scientists in interdisciplinary and in particular international and English-speaking teams of (natural) scientists and/or engineers in research, industry and business.

(2) [1]The overall programme is designed as an English-taught course. [2]Most of the modules are therefore held in English, as per the rules of Section 12 Subsection 3 and Section 19 Subsection 5 ASPO.

Section 3 Start, Structure and Standard Length of Programme

(1) In accordance with Section 7 of the ASPO, the MSc in Quantum Engineering allows either winter or summer starts in any given academic year.

(2) [1]The programme is structured as follows:

Area or sub-area	*ECTS credits*		
Mandatory electives	60		
Sub-section "Quantum Engineering"		Min. 55	
Advanced Laboratory Course			Min. 9
Advanced Seminar			Min. 5
Advanced Quantum Engineering			
Sub-section "Non-Technical Minor Subject"		0-5	
Masters Research and Thesis	60		
Total	120		

[2]Students must successfully complete modules totalling at least 40 ECTS credits and having graded assessments, in the sub-area "Quantum Engineering".

(3) The standard length of programme for the MSc in Quantum Engineering shall be four semesters, during which students should earn a total of 120 ECTS credits.

Section 4 Prerequisites for Admission to the Programme, Recommended Fundamental Knowledge and Skills

(1) Admission to the MSc in Quantum Engineering shall be conditional on the following prerequisites (to be met cumulatively):

a) A Bachelor's degree (180 ECTS credits) completed at JMU or another higher education institution in Germany or abroad or an equivalent German or foreign qualification (e.g. State Examination), and

b) Proof of

aa) Competences equivalent to at least 29 ECTS credits from modules in the fundamentals of nanosciences and from advanced modules in the field of nanosciences,

bb) Competences equivalent to at least 8 ECTS credits from modules in the field of chemistry,

cc) Competences equivalent to at least 27 ECTS credits from modules in the following sub-areas of experimental physics: Mechanics, electromagnetism, optics, thermodynamics, atomic und molecular physics, solid state physics,

dd) Competences equivalent to at least 12 ECTS credits from modules in theoretical physics in the following sub-areas: Quantum mechanics, thermodynamics, statistical physics,

ee) Competences equivalent to at least 18 ECTS credits from modules in mathematics in the following sub-areas: Analysis, linear algebra, differential equations,

ff) Competences equivalent to at least 18 ECTS credits from practical training in physics or engineering or industrial work placements, and

gg) A thesis (term paper) equivalent to at least 10 ECTS credits on a topic from a subarea of nanostructure technology or in the case of an interdisciplinary thesis on a topic in which nanoscience methods are essentially applied,

according to the ECTS credits scheme used at JMU for the BSc in Nanostructure Technology or – in the case of programmes not modularised within the meaning of the ECTS – competences on the corresponding grading scale (as a rule acquired in the framework of the first degree indicated under Letter a)). The required competences are taught at JMU in particular in the framework of the BSc in Nanostructure Technology (180 ECTS credits); and

c) Proof of English language proficiency to Level B2 of the Common European Framework of Reference for Languages (CEFR), for example:

aa) Test of English as a Foreign Language (TOEFL) with at least 72 internet-based TOEFL points or at least 550 paper-based TOEFL points, or

bb) International English Language Test System (IELTS) with a result of 6.0 or higher, or

cc) Cambridge First Certificate in English (FCE), or

dd) A grade in English of at least 'Satisfactory' (*befriedigend*; equivalent to at least 7 out of 15 points) as part of a German higher education entrance qualification, or

A foreign higher education entrance qualification with proof of English language proficiency which is at least equivalent to the above-mentioned higher education entrance qualification, or

ee) Proof that training (in particular in the framework of the first degree indicated under a)) has been or is being completed, in which English language skills on the level specified in aa) to dd) are taught.

(2) [1]Applications for admission to the MSc in Quantum Engineering for the respective following semester shall be submitted to the chairperson of the examination committee (cf. Subsection 4) for the MSc in Quantum Engineering in the form and by the closing date specified, i.e. by 1 May (for the winter semester) or 1 November (for the summer semester); in particular, an electronic application procedure via the relevant JMU websites may be established. [2]Should there be reasons beyond the applicant's control, the documents referred to in Subsection 3 Sentence 1 No. 1 a) may be submitted later, but no later than August 1 (for the winter semester) or January 1 (for the summer semester) in order to be granted final admission to the MSc in Quantum Engineering. [3]In the event that the applicant cannot meet this closing date (e.g. because the Bachelor's degree certificate has not yet been issued), the only remaining option shall be conditional admission in accordance with Subsection 7.

(3) [1]Applications shall include:

1. Academic achievements from the first degree as specified in Subsection 1a)
   a) Proof of a university degree or an equivalent qualification (in the case of applications for final admission to the Master's programme) or
   b) Proof of 150 ECTS credits or – in the case of programmes not modularised within the framework of ECTS – academic achievements on a corresponding scale (in the case of applications for admission to the Master's programme subject to a conditional approval).

:

2. Previous study and examination achievements
   a) An overview of previous study and examination achievements (transcript of records) detailing the modules passed which are relevant to the Quantum Engineering programme and any corresponding examinations, including the ECTS credits and grades awarded as well, if applicable, as accredited examination achievements or
   b) In the case of applications for admission to the Master's programme subject to a conditional approval, a provisional overview of previous study and examination achievements with the details referred to above.
3. In the case of applications for conditional admission to the Master's programme, proof of a thesis required for the successful completion of the undergraduate degree in accordance with Subsection 1.
4. Proof of English language skills as specified in Subsection 1 c).

[2]At the request of the examination committee, further proof of the competences in accordance with Subsection 1 b), e.g. module descriptions, may be required.

(4) [1]The examination committee for the Quantum Engineering programme shall decide whether the requirements set out in Subsection 1 a) and the required minimum competences (Subsection 1 b)) are met. [2]The provisions of Section 14 ASPO shall apply mutatis mutandis. [3]When deciding on the equivalence of first degrees with the above-mentioned reference qualification as well as for verifying the required minimum competences and their scale (in particular in the case of non-modularised programmes), the principle of reverse burden of proof and the obligation to establish equivalence shall apply in accordance with Article 63 *Bayerisches Hochschulgesetz* (Bavarian Higher Education Act, BayHSchG) or Article 86 *Bayerisches Hochschulinnovationsgesetz* (Bavarian Higher Education Innovation Act, BayHIG) respectively, insofar as there are no significant

differences with regard to the competences acquired (learning outcomes). [4]Even if the requirements in accordance with Subsection 1 a) and b) are met, the examination committee may recommend in individual cases that an applicant completes further modules at Bachelor level. [5]Admission to the programme shall not depend on whether the applicant follows such a recommendation.

(5) [1]In the case that the requirements set out in Subsection 1 a) and/or b) are not met, admission to the MSc programme in Quantum Engineering shall not be possible, unless admission to the Master's programme is possible in accordance with Subsection 7. [2]In the case of non-admission, applicants shall receive a corresponding notification stating the reasons for the decision and instructions on the available legal remedies.

(6) If the requirements set out in Subsection 1 a) and b) are met, the applicant shall be admitted to the MSc in Quantum Engineering.

(7) [1]In order to facilitate an uninterrupted transition from a Bachelor's degree to the Master's programme, applicants who are not yet able to produce corresponding proof of the degree required in accordance with Subsection 1 a) at the time of application may be conditionally admitted to the Master's programme in the semester immediately following, subject to:

a) Proof at the time of application of at least 150 ECTS credits or – in the case of programmes not modularised within the ECTS framework– academic achievements on a corresponding scale in the first degree required in accordance with Subsection 1 a).

b) Proof of the competences indicated in Subsection 1 b) Points aa) to ff) according to the ECTS credits scheme used at JMU for the BSc in Nanostructure Technology or – in the case of programmes not using the ECTS framework – competences on the corresponding scale (as a rule acquired in the framework of the first degree indicated under Letter a)). The required competences are taught at JMU in particular in the framework of the BSc in Nanostructure Technology (180 ECTS credits).

c) Proof in accordance with Subsection 3 Sentence 1 No. 3.

d) Proof of English language skills in accordance with Subsection 1 c).

[2]In the event that the condition is not met, i.e. that proof of the first degree specified in Subsection 1 a) is not produced at the latest by the end of the re-enrolment period for the third subject semester of the MSc in Quantum Engineering, the applicant is to be unenrolled at the end of the second semester. [3]In the event that the condition is met, final admission to programme shall be possible.

(8) [1]It is recommended that applicants who have not obtained their higher education entrance qualification or a relevant first degree at a German-speaking institution acquire sufficient knowledge of the German language in the course of the first study year (e.g. Level B2 of the Common Framework of Reference for Languages (CEFR)). [2]Proof of German language proficiency is not required for admission to the MSc in Quantum Engineering.

Section 5 Minimum ECTS Score Requirement

These FSB do not prescribe a minimum ECTS score requirement as described in Section 13 Subsection 5 ASPO.

Section 6 Examination Committee

(1) [1]By way of derogation from Section 14 Subsection 1 Sentence 3 ASPO, the examination committee for the Quantum Engineering programme shall comprise seven members, of which five have voting rights and two an advisory capacity. [2]The examination committee shall include both a representative of the full-time academic staff or of the full-time teaching staff assigned to special tasks as well as a representative of the student body without voting rights as advisory members. [3]The members of the examination committee shall be elected by the Faculty Board of the Faculty of Physics and Astronomy.[4]Only the members with voting rights and not the advisory members shall take part in the election of the chairperson of the examination committee.

(2) The examination committee shall include at least three full-time university professors from the Faculty of Physics and Astronomy as members with voting rights; the chairperson must be a full-time university professor at the Faculty of Physics and Astronomy.

(3) The examination committee may bring in additional members for consultation and advice, including, but not limited to, course advisors; these members shall be non-voting.

Part 2: Assessments

Section 7 Other Subject-Specific Assessments

(1) Supplementary to the other examinations indicated in Section 24 ASPO, the following other subject-specific assessments shall be foreseen for the MSc in Quantum Engineering:

- Pre-experiment examinations, post-experiment examinations and assessment of laboratory work as well as logs from modules run by the Faculty of Chemistry and Pharmacy
- Special rules for modules run by the Faculty of Physics and Astronomy.

(2) [1]Pre-experiment examinations: Pre-experiment examinations shall be conducted immediately prior to the practical parts of the respective course. [2]First, the examinee shall be given instructions and information on the forthcoming practical work. [3]This may also be done by making reference to corresponding teaching materials. [4]Instructions and information may also be made available to the examinee in electronic form only. [5]After a reasonable period of time for preparation, a short oral examination may take place. [6]The purpose of this oral examination shall be to determine whether the examinee has understood the instructions and information and is able to commence the practical part of the course.

(3) [1]Post-experiment examinations: Assessments in the shape of post-experiment examinations shall be conducted after the respective practical part of the course. [2]A post-experiment examination shall comprise a written log of the practical work undertaken and a short oral examination. [3]Examinees shall demonstrate through the log that they are capable of summarising and presenting the practical work undertaken in an appropriate form. [4]Examinees shall demonstrate in the oral examination that they are capable of explaining their observations from the laboratory work as recorded in the log. [5]Details of the type of examination achievements to be produced and the scale are specified in the SFB in the appendix. [6]The number of examination parts to be completed shall depend on the number of experiments to be conducted and shall be announced by the respective module leader at the latest one week after the start of the laboratory course.

(4) [1]Assessment of laboratory work: This shall be done by inspecting the examinee's laboratory work on the basis of random checks. [2]The aim here shall be to determine whether the examinee has worked on the tasks assigned in the framework of the course under consideration of safety aspects, with the necessary care and attention and using scientific methods.

(5) Logs in modules run by the Faculty of Chemistry and Pharmacy: Logs are written examination achievements intended to demonstrate that the examinee is capable of reproducing the

contents of a course or activities undertaken in a laboratory course in a structured and appropriate way.

(6) [1]Other subject-specific assessments are foreseen for laboratory courses for individual modules run by the Faculty of Physics and Astronomy.

[2]To gain a “Pass” in a laboratory course, the following must be successfully completed: Test preparation, successful test implementation, logging of the measurement results and, if applicable, evaluation, including error analysis, and presentation of the results in a report. [3]Further details shall be governed by the SFB and the respective module description.

[4]The purpose of a project report shall be to verify that the examinee is capable of working on a clearly defined thematic task or a (research) project using scientific methods as well as of developing problem-solving approaches and concepts and of presenting these in written form.

Section 8 Area of Degree Finalisation: Master’s Thesis and Master’s Defence

(1) [1]The Master’s thesis shall be worth 30 ECTS credits. [2]The time allowed for completion of the thesis shall be six months. [3]Topics shall only be assigned to examinees once a total of at least 40 ECTS credits have been earned in the mandatory electives. [4]In individual and justified cases, the examination committee may allow exceptions. [5]It shall also be possible for the supervisor of the Master’s thesis to make the assignment of the topic for that thesis dependent on proof of successful participation in specific modules relevant to the respective topic. [6]In particular modules 11-FS-N-Int und 11-MP-N-Int, the purpose of which is to acquire the necessary specialist knowledge and professional practical skills in preparation for the Master’s thesis, which is to be carried out as an independent research project, are to be aligned with the topic of the Master’s thesis in terms of content; they shall therefore be completed before starting the Master’s thesis. [7]The examinee shall provide the supervisor with proof of successful participation in these modules at the latest at the signing of the confirmation in accordance with Section 26 Subsection 3 Sentence 5 ASPO. [8]Without such proof, the topic for the Master’s thesis shall not be assigned to the examinee.

(2) [1]Upon written justification and application by the examinee and with the consent of the chairperson of the examination committee, the Master’s thesis may be produced at an institution outside the Faculty of Physics and Astronomy. [2]Such consent shall only be given if the examination committee has satisfied itself beforehand that sufficient supervision is guaranteed at that institution; in particular, the person at that institution responsible for the local supervision of the examinee shall at least hold a university degree in the subject concerned or a related subject. [3]If the Master’s thesis is produced at an institution outside the Faculty of Physics and Astronomy or is supervised by a person not employed full-time at the Faculty of Physics and Astronomy, the examination committee shall appoint as supervisor a full-time member of JMU who is entitled to administer examinations; in this case, a university professor shall as a rule be nominated, who generally shall be a member of the Faculty of Physics and Astronomy. [4]The person supervising the work shall assist the JMU supervisor in their assessment of the work by commenting on it in the shape of a review. [5]The Master’s thesis shall be paginated and include a title page, a table of contents and a summary. [6]The written version must be bound and submitted in duplicate. [7]The Master’s thesis shall additionally be submitted electronically in the form and format and by the means of transmission specified by the examination committee; examinees shall be informed of these specifications when registering their Master’s thesis. [8]Upon substantiated request, the examination committee shall permit a regulation deviating from the provisions of Sentence 7.

(3) By way of derogation from Section 26 Subsection 9 Sentence 1 ASPO, the Master’s thesis shall be presented in English.

(4) At least one of the two reviewers must be a full-time university professor at the Faculty of Physics and Astronomy.

(5) There shall be no oral defence.

Section 9 Overall Grade, Grade in Degree Subject and Grades Awarded for Individual Areas

[1]A student's overall grade shall be calculated in accordance with the provisions of Section 35 Subsection 1 ASPO. [2]The grade for the degree subject (Quantum Engineering) shall be calculated in accordance with Section 35 Subsection 2 ASPO, the grades for the individual areas shall be calculated in accordance with Section 35 Subsection 3 to 5 ASPO.

[3]When calculating the grades for the individual areas, the "basket model" described in Section 35 Subsection 5 Sentence 7 and 8 ASPO shall apply.[4]The grade for the mandatory electives shall be calculated from the respective best graded modules in the "Advanced Seminar" and "Advanced Quantum Engineering" on a scale of 40 ECTS credits under consideration of the provisions of Section 35 Subsection 4 ASPO. [5]The modules in the sub-area "Non-Technical Minor Subject" shall not count towards the grade for the degree subject.

[6]The grade for the area of degree finalisation shall be the grade awarded for the Master's thesis.

[7]When calculating the grade for the degree subject and the overall grade, the individual areas shall be assigned the following weight values:

Area or sub-area	*ECTS credits*			*Weight value for*		
				Area	*Grade in degree subject*	*Overall grade*
Mandatory electives	60				60/120	120/120
Sub-area "Quantum Engineering"						
Advanced Laboratory Course						
Advanced Seminar						
Advanced Quantum Engineering						
Sub-area "Non-Technical Minor Subject"						
Area of degree finalisation (research and thesis)	60				60/120	
Total	120					

Part 3: Final Provisions

Section 10 Entry into Force

[1]These FSB shall enter into force on the day following their announcement. [2]They shall apply to all students enrolled in the Quantum Engineering programme that leads to the award of the degree of Master of Science (120 ECTS credits) who commence studies in that programme at JMU in the 2020/2021 winter semester or later and whose programmes are governed by the ASPO (General Academic and Examination Regulations) for the Bachelor's and Master's Degree Programmes offered by Julius-Maximilians-Universität Würzburg dated 1 July 2015 as amended from time to time.

Appendix SFB

Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Annex SFB

Studienfachbeschreibung (subject description, SFB) for the subject Quantum Engineering as a Master's with 1 major

with the degree "Master of Science" (120 ECTS credits)

Responsible: Faculty of Physics and Astronomy

Examination regulations version: 2024

Abbreviations used:

Course types: **E** = field trip, **K** = colloquium, **O** = conversatorium, **P** = placement/lab course, **R** = project, **S** = seminar, **T** = tutorial, **Ü** = exercise, **V** = lecture

Term: **SS** = summer semester, **WS** = winter semester

Methods of grading: **NUM** = numerical grade, **B/NB** = (not) successfully completed

Regulations: **(L)ASPO** = general academic and examination regulations (for teaching-degree programmes), **FSB** = subject-specific provisions, **SFB** = list of modules

Other: **A** = thesis, **LV** = course(s), **PL** = assessment(s), **TN** = participants, **VL** = prerequisite(s)

Conventions for the modules in this SFB:

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Information on assessment procedures:

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should a module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with the general regulations governing the degree subject described in this module catalogue:

ASPO2015

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

06-Sep-2023 (2023-71)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.

Every module will be described using the following form:

Abbreviation	**Module title**							
	ECTS		Duration	(in semesters)	Method of grading		Module level	
	Courses	To be specified in the form X (y) with course type X abbreviated as specified above and number of weekly contact hours y						
	Method of assessment							
	Only after successful completion of	if applicable						
	Other prerequisites	if applicable						
	Participants and allocation of places	if applicable						
	Additional information	if applicable						
	Referred to in LPO I	if applicable (examination regulations for teaching-degree programmes)						

Electives Field (60 ECTS credits)								
Subfield Quantum Engineering (55 ECTS credits)								
Advanced Laboratory Courses (9 ECTS credits)								
11-P-FM1-Int-201-m01	**Advanced Laboratory Course Master Part 1**							
	ECTS	3	Duration	1 semester	Method of grading	(not) successfully completed	Modul level	graduate
	Courses	P (3) Module taught in: English						
	Method of assessment	practical examination Students must successfully prepare, perform, document (lab notebook) and evaluate (in the form of a scientific publication) an experiment to be considered to have successfully completed this experiment. Students must successfully complete two experiments to be considered to have successfully completed this module. Detailed regulations are laid down in the respective module description. Language of assessment: English						
	other prerequisites	Preparation and safety briefing.						
11-P-FM2-Int-201-m01	**Advanced Laboratory Course Master Part 2**							
	ECTS	3	Duration	1 semester	Method of grading	(not) successfully completed	Modul level	graduate
	Courses	P (3) Module taught in: English						
	Method of assessment	practical examination Students must successfully prepare, perform, document (lab notebook) and evaluate (in the form of a scientific publication) an experiment to be considered to have successfully completed this experiment. Students must successfully complete two experiments to be considered to have successfully completed this module. Detailed regulations are laid down in the respective module description. Language of assessment: English						
	other prerequisites	Preparation and safety briefing.						
11-P-FM3-Int-201-m01	**Advanced Laboratory Course Master Part 3**							
	ECTS	3	Duration	1 semester	Method of grading	(not) successfully completed	Modul level	graduate
	Courses	P (3) Module taught in: English						
	Method of assessment	practical examination Students must successfully prepare, perform, document (lab notebook) and evaluate (in the form of a scientific publication) an experiment to be considered to have successfully completed this experiment. Students must successfully complete two experiments to be considered to have successfully completed this module. Detailed regulations are laid down in the respective module description. Language of assessment: English						
	other prerequisites	Preparation and safety briefing.						

11-P-FM4-Int-201-m01	**Advanced Laboratory Course Master Part 4**							
	ECTS	3	Duration	1 semester	Method of grading	(not) successfully completed	Modul level	graduate
	Courses		P (3) Module taught in: English					
	Method of assessment		practical examination Students must successfully prepare, perform, document (lab notebook) and evaluate (in the form of a scientific publication) an experiment to be considered to have successfully completed this experiment. Students must successfully complete two experiments to be considered to have successfully completed this module. Detailed regulations are laid down in the respective module description. Language of assessment: English					
	other prerequisites		Preparation and safety briefing.					
Advanced Seminar (5 ECTS credits)								
11-OSN-A-Int-201-m01	**Advanced Seminar Quantum Engineering A**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		S (2) Module taught in: English					
	Method of assessment		talk with discussion (30 to 45 minutes) Language of assessment: English					
11-OSN-B-Int-201-m01	**Advanced Seminar Quantum Engineering B**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		S (2) Module taught in: English					
	Method of assessment		talk with discussion (30 to 45 minutes) Language of assessment: English					
Specialization Quantum Engineering								
11-HNS-Int-201-m01	**Optical Properties of Semiconductor Nanostructures**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-HPH-Int-201-m01	**Semiconductor Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-QTR-Int-201-m01	**Quantum Transport**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-NOP-Int-201-m01	**Nano-Optics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-SPI-Int-201-m01	**Spintronics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-BSV-Int-201-m01	**Image and Signal Processing in Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + Ü (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-PMM-Int-201-m01	**Physics of Advanced Materials**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-OHL-Int-201-m01	**Organic Semiconductors**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
08-FU-SAM-161-m01	**Sensor and Actor Materials - Functional Ceramics and Magnetic Particles**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + P (2)					
	Method of assessment		a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) Assessment offered: Once a year, summer semester Language of assessment: German and/or English P: creditable for bonus					
08-PCM4-161-m01	**Ultrafast spectroscopy and quantum-control**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		S (2) + Ü (1) Module taught in: German or English					
	Method of assessment		a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) talk (approx. 30 minutes) Language of assessment: German and/or English					
	other prerequisites		Prior completion of modules 08-PCM1a and 08-PCM1b recommended.					
08-FU-EEW-222-m01	**Electrochemical Energy Storage and Conversion**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (2) + S (2) Module taught in: German or English					
	Method of assessment		a) written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 30 minutes) and b) talk (approx. 30 minutes); (weighted 65:35) Language of assessment: German and/or English Assessment offered: Once a year, summer semester					

08-FU-MW-222-mo1	**Structure-Properties Correlations of Light Materials - Experiments and Numerical Simulations**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + S (2) Module taught in: German or English					
	Method of assessment		a) written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 30 minutes) and b) talk (approx. 30 minutes); (weighted 60:40) Language of assessment: German and/or English Assessment offered: Once a year, summer semester					
11-EXN5-Int-241-mo1	**Current Topics in Quantum Engineering**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English					
	other prerequisites		Approval from examination committee required.					
11-EXN6-Int-241-mo1	**Current Topics in Quantum Engineering**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English					
	other prerequisites		Approval from examination committee required.					

11-EXN7-Int-241-mo1	**Current Topics in Quantum Engineering**							
	ECTS	7	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-EXN8-Int-241-mo1	**Current Topics in Quantum Engineering**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required					
11-EXN6A-Int-241-mo1	**Current Topics in Quantum Engineering**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					

11-CSFM-Int-201-mo1	**Advanced Topics in Solid State Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-CSNM-Int-241-mo1	**Advanced Topics in Quantum Engineering**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-FK2-Int-201-mo1	**Solid State Physics 2**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English				
	other prerequisites		Approval from examination committee required.					

11-EIM-Int-201-m01	**Electron and Ion Microscopy**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English Assessment offered: In the semester in which the course is offered and in the following semester					
11-CSPM-Int-201-m01	**Advanced Topics in Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English					
	other prerequisites		Approval from examination committee required.					
11-FKS-Int-201-m01	**Solid State Spectrocopy**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-TEFK-Int-201-m01	**Topological Effects in Solid State Physics**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-FFK-Int-201-m01	**Field Theory in Solid State Physics**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-AKTF-Int-201-m01	**Selected Topics of Theoretical Solid State Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-MAG-Int-201-mo1	**Magnetism**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-QM2-Int-201-mo1	**Quantum Mechanics II**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-TQO-Int-221-mo1	**Theoretical Quantum Optics**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-TFK-Int-201-m01	**Theoretical Solid State Physics**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-PTS-Int-201-m01	**Phenomenology and Theory of Superconductivity**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-QIC-Int-201-m01	**Advanced Theory of Quantum Computing and Quantum Information**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-MRI-Int-201-m01	**Advanced Magnetic Resonance Imaging**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-SSC-Int-201-m01	**Surface Science**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-FPA-Int-201-m01	**Visiting Research**							
	ECTS	10	Duration		Method of grading	numerical grade	Modul level	graduate
	Courses		R (0) Module taught in: English					
	Method of assessment		project report (10 to 20 pages) Language of assessment: English					
	other prerequisites		Approval from examination committee required.					

11-EXP5-Int-201-m01	**Current Topics in Physics**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-EXP6-Int-201-m01	**Current Topics in Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1)					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-EXP7-Int-201-m01	**Current Topics in Physics**							
	ECTS	7	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					

11-EXP8-Int-201-m01	**Current Topics in Physics**							
	ECTS	8	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (4) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-EXP6A-Int-201-m01	**Current Topics in Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
Subfield Nontechnical Minors								
10-M-VAN-222-m01	**Advanced Analysis**							
	ECTS	10	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (4) + Ü (2)					
	Method of assessment		a) written examination (approx. 90 to 180 minutes, usually chosen) or b) oral examination of one candidate each (15 to 30 minutes) or c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate) Language of assessment: German and/or English creditable for bonus					

10-M=VDI-Min-152-m01	**Discrete Mathematics**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + Ü (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 60 to 90 minutes, usually chosen) or b) oral examination of one candidate each (approx. 15 minutes) or c) oral examination in groups (groups of 2, approx. 10 minutes per candidate) Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English creditable for bonus					
10-I=QC-221-m01	**Quantum Communications**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + V (2) Module taught in: English					
	Method of assessment		written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: English creditable for bonus					
	Additional Information		Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): LR					
10-I-APR-172-m01	**Advanced Programming**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (2) + Ü (2)					
	Method of assessment		written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
10-I=DB-161-m01	**Databases**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + Ü (2)					
	Method of assessment		written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Separate written examination for Master's students. Language of assessment: German and/or English creditable for bonus					
	Additional Information		Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IS, HCI, GE.					

10-I-BS-191-m01	**Operating Systems**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (2) + Ü (2) Module taught in: English					
	Method of assessment		written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
10-I=KI1-212-m01	**Artificial Intelligence 1**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + Ü (2)					
	Method of assessment		written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
	Additional Information		Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT,SE,KI,HCI					
02-N-Ö-W2-05-152-m01	**Environmental Law**							
	ECTS	3	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (2)					
	Method of assessment		a) written examination (approx. 120 minutes) or b) oral examination (approx. 15 minutes) Assessment offered: Usually every two years, winter semester					
	other prerequisites		Prior completion of the following module is recommended: 02-N-Ö-V					
11-AP-Int-201-m01	**Astrophysics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	undergraduate
	Courses		V (2) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					

11-ASM-Int-201-m01	**Methods of Observational Astronomy**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-ASP-Int-201-m01	**Introduction to Space Physics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: English					
11-EXZ5-Int-201-m01	**Nontechnical Special Topics**							
	ECTS	5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (2) + R (2) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English					
	other prerequisites		Approval from examination committee required.					

11-EXZ6-Int-201-m01	**Nontechnical Special Topics**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
11-EXNT6-Int-201-m01	**Nontechnical Minor Subject**							
	ECTS	6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		V (3) + R (1) Module taught in: English					
	Method of assessment		a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English				
	other prerequisites		Approval from examination committee required.					
Master Project Modules (60 ECTS credits)								
11-FS-N-Int-201-m01	**Professional Specialization Quantum Engineering**							
	ECTS	15	Duration	1 semester	Method of grading	(not) successfully completed	Modul level	
	Courses		S (4) Module taught in: English					
	Method of assessment		talk with discussion (30 to 45 minutes) Language of assessment: English					
11-MP-N-Int-201-m01	**Scientific Methods and Project Management Quantum Engineering**							
	ECTS	15	Duration	1 semester	Method of grading	(not) successfully completed	Modul level	
	Courses		R (4) Module taught in: English					
	Method of assessment		talk with discussion (30 to 45 minutes) Language of assessment: English					

11-MA-N-Int-201-m01	**Master Thesis Quantum Engineering**							
	ECTS	30	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate
	Courses		no courses assigned Module taught in: English					
	Method of assessment		Master's thesis (750 to 900 hours total) Language of assessment: English					
	Additional Information		Time to complete: 6 months					