

Module Catalogue

for the Subject

Functional Materials

as a Bachelor's with 1 major
with the degree "Bachelor of Science"
(180 ECTS credits)

Examination regulations version: 2012
Responsible: Faculty of Chemistry and Pharmacy

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The subject is divided into

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Content and Objectives of the Programme

The Bachelor of Science program Functional Materials at the faculty of Chemistry and Pharmacy prepares students for research and development occupations of both a scientific and a practical nature in the field of materials and natural sciences. Students learn the basic methodical principles of scientific work. The study program's interdisciplinary focus enables students to obtain extensive fundamental knowledge of the fields of chemistry, physics and mathematics. In addition, they acquire expert knowledge of the following engineering and natural sciences subjects: electronics, engineering mechanics, materials science, molecular materials, and compound materials. Close cooperation with the Fraunhofer Institute for Silicate Research ISC, Würzburg-Schweinfurt University of Applied Sciences, the Bavarian Center for Applied Energy Research and the SKZ plastics center guarantees an interdisciplinary education. Thanks to this, students are introduced to multifaceted topics relating to modern functional materials. By means of their bachelor's thesis, students show that they have the ability to act largely independently to solve a specific, time-limited experimental or theoretical assignment of engineering or natural sciences tasks. The results of the bachelor's thesis are presented and defended in a colloquium. The Bachelor of Science degree qualifies students for an occupation of both a scientific and a practical nature in the field of materials and natural sciences in general and of functional materials in particular. However, this generally requires a further qualification to be acquired either through practical experience in industry or through a consecutive master's degree.

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

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

Notes

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 the 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:

ASPO2009

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

11-Dec-2012 (2012-186)

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.

Compulsory Courses

(123 ECTS credits)

Module title			Abbreviation
Mathematics 1 and 2 for students of Functional Materials			10-M-FUN12-122-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
18	numerical grade	--	
Duration	Module level	Other prerequisites	
2 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.	
Contents			
Basics on numbers and functions, sequences and series, elementary functions, differential and integral calculus in one variable, vector calculus, linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis, integral theorems.			
Intended learning outcomes			
The student gets acquainted with important concepts and methods of mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in the technology of functional materials, and is able to interpret the results.			
Courses (type, number of weekly contact hours, language — if other than German)			
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none">10-M-FUN12-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)10-M-FUN12-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.			
Assessment in module component 10-M-FUN12-1-122: Mathematics 1 for students of Functional Materials Mathematics 1 for students of Functional Materials <ul style="list-style-type: none">10 ECTS, Method of grading: (not) successfully completedwritten examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)Language of assessment: German, English if agreed upon with the examinerOther prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Assessment in module component 10-M-FUN12-2-122: Mathematics 2 for students of Functional Materials Mathematics 2 for students of Functional Materials <ul style="list-style-type: none">8 ECTS, Method of grading: numerical gradewritten examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)Language of assessment: German, English if agreed upon with the examinerOther prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will			
Bachelor's with 1 major Functional Materials (2012)		JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Funktionswerkstoffe - 2012	
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put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Mathematics 3 for students of Physics and Engineering		11-MPL3-062-m01
Module coordinator		Module offered by
Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Ordinary and partial differential equations in Physics.		
Intended learning outcomes		
The students have basic mathematical knowledge of dynamic equations and solution methods for common and partial differential equations.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 120 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)		
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Bachelor' degree (1 major) Nanostructure Technology (2008)
 Bachelor' degree (1 major) Nanostructure Technology (2007)
 Bachelor' degree (1 major) Functional Materials (2012)
 Bachelor' degree (1 major) Technology of Functional Materials (2006)

Module title			Abbreviation
Introduction to Physics Part 1 for students of Physics Related Minor Subjects			11-ENNF1-062-m01
Module coordinator		Module offered by	
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy	
ECTS	Method of grading	Only after succ. compl. of module(s)	
7	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Mechanics, vibration theory, thermodynamics.			
Intended learning outcomes			
The students have basic knowledge of physics for engineering students.			
Courses (type, number of weekly contact hours, language — if other than German)			
V + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
written examination (approx. 120 minutes)			
Allocation of places			
Only as part of pool of general key skills (ASQ): 20 places. Places will be allocated by lot.			
Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2011) Bachelor' degree (1 major) Functional Materials (2012) Bachelor' degree (1 major) Technology of Functional Materials (2006)			

Module title			Abbreviation
Introduction to Physics Part 2 for students of Physics Related Minor Subjects			11-ENNF2-062-m01
Module coordinator		Module offered by	
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy	
ECTS	Method of grading	Only after succ. compl. of module(s)	
7	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Science of electricity, magnetism, optics, Atomic Physics.			
Intended learning outcomes			
The students have basic knowledge of physics for engineering students.			
Courses (type, number of weekly contact hours, language — if other than German)			
V + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
written examination (approx. 120 minutes)			
Allocation of places			
Only as part of pool of general key skills (ASQ): 20 places. Places will be allocated by lot.			
Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2011) Bachelor' degree (1 major) Functional Materials (2012) Bachelor' degree (1 major) Technology of Functional Materials (2006)			

Module title		Abbreviation
Physics Laboratory Course for students of Physics Related Minor Subjects		11-PNNF-o62-m01
Module coordinator		Module offered by
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics.		
Intended learning outcomes		
The students know the principles of Physics.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) oral test (approx. 15 minutes) during experiment and b) ungraded written examination (approx. 90 minutes)		
Allocation of places		
Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.		
Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Functional Materials (2012) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

Module title		Abbreviation
Experimental Chemistry, General and analytical Chemistry Lab for engineering students		o8-IAC-122-m01
Module coordinator		Module offered by
lecturer of lecture "Experimentalchemie" (Experimental Chemistry)		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>This module provides students with an overview of the fundamental principles of chemistry. It focuses on particles, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental models of chemistry and principles of inorganic chemistry. It includes practical exercises based on the lecture on experimental chemistry and its extension. After a safety briefing, the students autonomously conduct experiments in the laboratory. The course focuses on laboratory safety, simple lab techniques, the synthesis of simple substances and analyses of unknown substances. In addition, students have the opportunity to advance their laboratory knowledge.</p>		
Intended learning outcomes		
<p>Students are able to explain the principles of the periodic table and to extract information from it. They are able to explain basic models of the structure of matter. They have developed the ability to use the language of chemical formulas to describe chemical reactions and to interpret them by identifying the type of reaction. Students are able to describe the main quantitative and qualitative analytical methods and their application areas. They are able to identify fundamental problems in chemistry and perform experiments to solve them. They have developed the ability to perform the necessary stoichiometric calculations and describe the chemical processes in an appropriate manner, both in written and oral form.</p>		
Courses (type, number of weekly contact hours, language — if other than German)		
<p>This module comprises 2 module components. Information on courses will be listed separately for each module component.</p> <ul style="list-style-type: none"> o8-IAC-1-062: V (no information on SWS (weekly contact hours) and course language available) o8-IAC-2-122: P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</p> <p>Assessment in module component o8-IAC-1-062: Experimental Chemistry</p> <ul style="list-style-type: none"> 5 ECTS, Method of grading: numerical grade written examination (approx. 90 minutes) <p>Assessment in module component o8-IAC-2-122: General and analytical Chemistry Lab for engineering students</p> <ul style="list-style-type: none"> 5 ECTS, Method of grading: (not) successfully completed Vortestate (pre-experiment exams, approx. 15 minutes), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes) Assessment offered: once a year, summer semester Language of assessment: German or English Only after successful completion of module components: Successful completion of module component o4-IAC-1 is a prerequisite for participation in module component o8-IAC-2. 		
Allocation of places		
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Additional information
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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module appears in
Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Organic Chemistry for engineering students		o8-IOC-122-m01
Module coordinator		Module offered by
lab course supervisor "Organisch-chemisches Praktikum für Studierende der Ingenieurwissenschaften"		Institute of Organic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
12	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.
Contents		
This module provides students with an overview of the theoretical principles of organic chemistry. In addition, it introduces the fundamental techniques of organic chemistry in a lab course.		
Intended learning outcomes		
Students have become familiar with the fundamental principles of organic chemistry. They are able to identify fundamental problems in chemistry and perform experiments to solve them.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 3 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> o8-IOC-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available) o8-IOC-3-122: P (no information on SWS (weekly contact hours) and course language available) o8-OC1-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component o8-IOC-2-122: Organic Chemistry 2 for engineering students Organic Chemistry 2 for engineering students <ul style="list-style-type: none"> 5 ECTS, Method of grading: numerical grade a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English Only after successful completion of module components: Successful completion of module component o8-OC1-1 is a prerequisite for participation in module component o8-IOC-2. Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence). 		
Assessment in module component o8-IOC-3-122: Organic Chemistry for engineering students (practical course) <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed Vortestate (pre-experiment exams, approx. 15 minutes), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes) Assessment offered: once a year, winter semester Language of assessment: German or English Only after successful completion of module components: Successful completion of module component o8-OC1-1 is a prerequisite for participation in module component o8-IOC-3. 		
Assessment in module component o8-OC1-1-092: Organic Chemistry 1 Organic Chemistry 1 <ul style="list-style-type: none"> 5 ECTS, Method of grading: numerical grade 		
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<ul style="list-style-type: none"> a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Allocation of places
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Additional information
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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"
Module appears in
Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Physical Chemistry 1 for engineering students		o8-IPC-122-m01
Module coordinator		Module offered by
lab course supervisor "Physikalische Chemie für Studierende der Ingenieurwissenschaften, Praktikum"		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
18	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module provides students with an overview of the theoretical principles of physical chemistry. In addition, it introduces the fundamental techniques of physical chemistry in a lab course.		
Intended learning outcomes		
Students have become familiar with the fundamental principles of physical chemistry. They are able to identify fundamental problems in chemistry and perform experiments to solve them.		
Courses (type, number of weekly contact hours, language — if other than German)		
<p>This module comprises 3 module components. Information on courses will be listed separately for each module component.</p> <ul style="list-style-type: none"> o8-IPC-2-062: V + Ü (no information on SWS (weekly contact hours) and course language available) o8-IPC-1-091: V + Ü (no information on SWS (weekly contact hours) and course language available) o8-IPC-3-122: P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</p> <p>Assessment in module component o8-IPC-2-062: Physical Chemistry 2 (basics of quantum mechanics and spectroscopy) for engineering students Physical Chemistry 2 (basics of quantum mechanics and spectroscopy) for engineering students</p> <ul style="list-style-type: none"> 8 ECTS, Method of grading: numerical grade written examination (approx. 90 minutes) <p>Assessment in module component o8-IPC-1-091: Physical Chemistry 1 (thermodynamics, electrochemistry) for engineering students Physical Chemistry 1 (thermodynamics, electrochemistry) for engineering students</p> <ul style="list-style-type: none"> 5 ECTS, Method of grading: numerical grade written examination (approx. 90 minutes) <p>Assessment in module component o8-IPC-3-122: Physical Chemistry for engineering students, laboratory course</p> <ul style="list-style-type: none"> 5 ECTS, Method of grading: (not) successfully completed Vortestate (pre-experiment exams, approx. 15 minutes), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes) Assessment offered: once a year, summer semester Language of assessment: German or English Only after successful completion of module components: Successful completion of the two module components o8-IPC-1 and o8-IPC-2 is a prerequisite for participation in module component o8-IPC-3. 		
Allocation of places		
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Additional information		
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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module appears in
Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Basics of Electronics 1		99-EL1-122-m01
Module coordinator		Module offered by
Dean of the Faculty of Electrical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Theoretical and practical principles of science of electricity, passive linear networks, principles of semiconductors.		
Intended learning outcomes		
The students have basic knowledge of theoretical and practical science of electricity, especially of passive linear networks and semiconductors.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Basics of Electronics 2		99-EL2-122-m01
Module coordinator		Module offered by
Dean of the Faculty of Electrical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Theoretical and practical principles of the components of electrical engineering, basic circuits, basic elements of digital technology, combinatorial circuits and sequential circuits.		
Intended learning outcomes		
The students have theoretical and practical knowledge of the components of electrical engineering, basic circuits, basic elements of digital technology, combinatorial circuits and sequential circuits.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title			Abbreviation
Molecular Materials (Lecture and practical course)			o8-CT-122-m01
Module coordinator		Module offered by	
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis	
ECTS	Method of grading	Only after succ. compl. of module(s)	
10	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.	
Contents			
This module discusses the theoretical and practical principles of molecular and soft materials.			
Intended learning outcomes			
Students have developed a knowledge of the principles of molecular and soft materials and are able to apply that knowledge to research problems.			
Courses (type, number of weekly contact hours, language — if other than German)			
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none">o8-CT-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)o8-CT-2-122: P (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.			
Assessment in module component o8-CT-1-122: Molecular Materials (Lecture) Molecular Materials (Lecture) <ul style="list-style-type: none">5 ECTS, Method of grading: numerical gradepresentation (approx. 30 minutes) and a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes). Should a module component comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise specified; should the lecturer want to make changes to the way in which assessments are weighted, he or she must do so by two weeks after the start of the course at the latest and must communicate this to students in an appropriate manner.Language of assessment: German or EnglishOther prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).			
Assessment in module component o8-CT-2-122: Molecular Materials (Practical course) <ul style="list-style-type: none">5 ECTS, Method of grading: (not) successfully completedVortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)Assessment offered: once a year, winter semesterLanguage of assessment: German or EnglishOther prerequisites: Admission prerequisite to assessment: regular attendance (minimum 80%) of courses.			
Allocation of places			
Information on the allocation of places will be listed separately for each module component. <ul style="list-style-type: none">o8-CT-1-122: --			

- 08-CT-2-122: Students from the Faculty of Chemistry: no restrictions. Nanostrukturtechnik (Nanostructure Technology): 4. Should there be more than 4 applications from students of Nanostrukturtechnik (Nanostructure Technology), places will be allocated among these applicants as follows: (1) Places will be allocated by lot. (2) Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. (3) A waiting list will be maintained and places re-allocated as they become available.

Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2012)

Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Introduction to Functional Materials		11-TMS-102-m01
Module coordinator		Module offered by
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Theoretical and practical principles of physical material properties and semiconductor process technology, dielectrics, metals and oxides. Principles of structuring technology, growth and coating procedures.		
Intended learning outcomes		
The students have knowledge of the theoretical and practical principles of physical material properties and technology for material synthesis.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 120 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Principles of Cell Biology and Tissue Regeneration		03-FU-Zell-122-m01
Module coordinator		Module offered by
holder of the Chair of Orthopaedics (Jakob/Ebert)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Foundations of cell biology (cell structure, organelles, DNA, replication, protein biosynthesis, signal transduction, cell metabolism, stem cells, viruses and prokaryotes, immune system).		
Intended learning outcomes		
Students acquire deep knowledge about cell and molecular biology.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Biomaterials		03-FU-BM-122-m01
Module coordinator		Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
7	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Fundamental and specific knowledge about biomaterials out of metals, ceramics and polymers with surface modification and characterisation. Fabrication as well as examples for application will be addressed. Modern approaches in biomaterial research including hydrogels, additive manufacturing, 3D cell scaffolds and materials for tissue engineering will also be discussed.		
Intended learning outcomes		
Students have developed a deep knowledge in the field of biomaterials, their use in clinics as well as methods for biomaterial fabrication.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> 03-FU-BM-1-122: V (no information on SWS (weekly contact hours) and course language available) 03-FU-BM-2-122: P + P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component 03-FU-BM-1-122: Biomaterials (Lecture) <ul style="list-style-type: none"> 5 ECTS, Method of grading: numerical grade a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Assessment in module component 03-FU-BM-2-122: Biomaterials (Practical course and seminar) Biomaterials (Practical course and seminar) <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each) Assessment offered: once a year, summer semester Language of assessment: German, English if agreed upon with the examiner 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Advanced laboratory course of Functional Materials		o8-FU-VP-122-mo1
Module coordinator		Module offered by
head of the research group offering the module		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Where applicable, topic-specific modules/module components as specified by supervisor (cf. Section 12 Subsection 4 FSB (subject-specific provisions)).
Contents		
This module gives students the opportunity to explore a research topic and apply the methods commonly used in the discipline in question.		
Intended learning outcomes		
Students are able to explore a specific research topic and present the results of their work in a written report or oral presentation.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
talk (approx. 15 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Compulsory Electives

(25 ECTS credits)

Compulsory Electives Mechanical and Electrical Engineering

(17 ECTS credits)

Module title		Abbreviation
Basics of Applied Mechanics		99-TM-122-m01
Module coordinator		Module offered by
Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basics of statistics, strength of materials and dynamics.		
Intended learning outcomes		
The students have methodological competencies in determining forces and stress resultants, in calculating tensions and deformations and in dimensioning components.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Laboratory Course of mechanical and electrical Engineering		99-IP-122-m01
Module coordinator		Module offered by
Deans of the Faculties of Electrical Engineering and Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
ECTS	Method of grading	Only after succ. compl. of module(s)
6	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: regular attendance (minimum 80%) of courses.
Contents		
Engineering laboratory and internship experiments.		
Intended learning outcomes		
The students have practical experiences in applying engineering methods in electrical and mechanical engineering.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 15 to 30 pages) Assessment offered: once a year, summer semester Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Construction, Calculation and Assembly of Technical Products		99-CA-122-m01
Module coordinator		Module offered by
Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Comprehensive view of the process of product development, including the corresponding specialist subjects based on a selected example.		
Intended learning outcomes		
The students have professional and methodological competencies in the development of products with a focus on construction (CAD), calculation (CAE) and production (CAM), including prototyping and product validation.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + K (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Compulsory Electives Physics

(11 ECTS credits)

Module title		Abbreviation
Introduction to Nanoscience		11-EIN-092-m01
Module coordinator		Module offered by
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--
Duration	Module level	Other prerequisites
2 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Introduction to the principles of producing, characterising and applying nanostructures.		
Intended learning outcomes		
The students have knowledge of the fundamental properties, technologies, characterising methods and functions of nanostructures.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise specified)		
Allocation of places		
Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.		
Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010) No final examination Special study offering (2010)		

Module title		Abbreviation
Practical Course Physical Technology of Material Synthesis		11-PPT-092-m01
Module coordinator		Module offered by
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Physical material properties, growth and coating procedures, methods of characterisation and structuring technologies.		
Intended learning outcomes		
The students have knowledge of the practical basics of material characterisation and physical technology for material synthesis.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>Preparing the experiment will be considered successfully completed if an oral test (duration: approx. 15 minutes) prior to the experiment is passed. Performing and evaluating the experiment will be considered successfully completed if a Testat (exam) is passed. An experiment log (approx. 8 pages) is to be prepared. Each component of the assessment can be repeated once in the respective semester. Only if both components of the assessment have been successfully completed in the same semester will the module component be considered successfully completed.</p> <p>Assessment offered: once a year, winter semester</p>		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)		
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Bachelor' degree (1 major) Functional Materials (2012)

Compulsory Electives Mathematics and Computer Science

(62 ECTS credits)

Module title		Abbreviation
Computational Mathematics		10-M-COM-122-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
4	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Introduction to modern mathematical software for symbolic computation (e. g. Mathematica or Maple) and numerical computation (e. g. Matlab) to supplement the basic modules in analysis and linear algebra ((10-M-ANA or 10-M-ANL) and 10-M-LNA). Computer-based solution of problems in linear algebra, geometry, analysis, in particular differential and integral calculus; visualisation of functions.		
Intended learning outcomes		
The student learns the use of advanced modern mathematical software packages, and is able to assess their fields of application to solve mathematical problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Economathematics (2012) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor' degree (1 major) Functional Materials (2012)		
Bachelor's with 1 major Functional Materials (2012)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Funktionswerkstoffe - 2012	page 40 / 75

First state examination for the teaching degree Gymnasium Mathematics (2012)

Module title		Abbreviation
Ordinary Differential Equations for other Subjects		10-M-DGA-122-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Existence and uniqueness theorem; continuous dependence of solutions on initial values; systems of linear differential equations; matrix exponential series; linear differential equations of higher order.		
Intended learning outcomes		
The student is acquainted with the fundamental concepts and methods of the theory of ordinary differential equations. He/she is able to apply these methods to practical problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 90 to 180 minutes) if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Introduction to Functional Analysis for other Subjects		10-M-FAA-122-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Banach spaces and Hilbert spaces, bounded operators, principles of functional analysis.		
Intended learning outcomes		
The student knows the fundamental concepts and methods of functional analysis as well as the pertinent proof methods, is able to apply methods from linear algebra and analysis to functional analysis, and realises the broad applicability of the theory to other branches of mathematics.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 90 to 180 minutes) if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Numerical Mathematics 1 for Econometrics		10-M-NUW-122-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration.		
Intended learning outcomes		
The student is acquainted with the fundamental concepts and methods in numerical mathematics, applies them to practical problems and knows about their typical fields of application.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 90 to 180 minutes) if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Econometrics (2012) Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Numerical Mathematics 2 for other Subjects		10-M-NUA-122-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Eigenvalue problems, linear programming, methods for initial value problems for ordinary differential equations, boundary value problems.		
Intended learning outcomes		
The student is acquainted with fundamental and advanced concepts and methods in numerical mathematics, and is able to apply them independently to practical problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 90 to 180 minutes) if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Programming course for students of Mathematics and other subjects		10-M-PRG-122-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Basics of a modern programming language (e. g. C).		
Intended learning outcomes		
The student is able to work independently on small programming exercises and standard programming problems in mathematics.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Economathematics (2012) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor' degree (1 major) Functional Materials (2012) First state examination for the teaching degree Gymnasium Mathematics (2012)		

Module title		Abbreviation
Databases		10-I-DB-102-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).
Contents		
Relational algebra and complex SQL statements; database planning and normal forms; transaction management.		
Intended learning outcomes		
The students possess knowledge about database modelling and queries in SQL as well as transactions.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>written examination (approx. 50 to 60 minutes)</p> <p>if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)</p> <p>Language of assessment: German, English if agreed upon with the examiner</p>		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 49 (1) 1. b) Datenbanksysteme und Softwaretechnologie		
§ 69 (1) 1. b) Datenbanksysteme und Softwaretechnologie		
Module appears in		
<p>Bachelor' degree (1 major) Computer Science (2010)</p> <p>Bachelor' degree (1 major) Mathematics (2012)</p> <p>Bachelor' degree (1 major) Mathematics (2013)</p> <p>Bachelor' degree (1 major) Business Information Systems (2013)</p> <p>Bachelor' degree (1 major) Computational Mathematics (2012)</p> <p>Bachelor' degree (1 major) Computational Mathematics (2013)</p> <p>Bachelor' degree (1 major) Aerospace Computer Science (2009)</p> <p>Bachelor' degree (1 major) Aerospace Computer Science (2011)</p> <p>Bachelor' degree (1 major) Functional Materials (2012)</p> <p>Master's degree (1 major) Computer Science (2010)</p> <p>Master's degree (1 major) Mathematics (2012)</p>		
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Master's degree (1 major) Mathematics (2010)
 Master's degree (1 major) Physics (2010)
 Master's degree (1 major) Physics (2011)
 Master's degree (1 major) Nanostructure Technology (2011)
 Master's degree (1 major) Nanostructure Technology (2010)
 Master's degree (1 major) Computational Mathematics (2012)
 First state examination for the teaching degree Realschule Computer Science (2012)
 First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Introduction to Computer Science for Students of all Faculties		10-I-EIN-111-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: academic requirements to be met in exercises as specified at the beginning of the course.
Contents		
Foundations of computer science including representation of information and websites (HTML, XML, EBNF), databases, algorithms and data structures, programming (Java).		
Intended learning outcomes		
The students are familiar with the fundamentals of computer science, e. g. in the areas of representation of information and websites (HTML, XML, EBNF), databases, algorithms and data structures, programming in Java.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) written examination (80 to 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or oral examination in groups of 2 or 3 candidates (30 or 40 minutes respectively)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Functional Materials (2012) Master's degree (1 major) Psychology (2012) Bachelor's degree (1 major, 1 minor) Digital Humanities (Minor, 2012) Bachelor's degree (2 majors) Digital Humanities (2012)		

Compulsory Electives Chemistry

(18 ECTS credits)

Module title		Abbreviation
Programming course for Chemistry Major		o8-PKC-102-m01
Module coordinator		Module offered by
lecturer of lecture "Programmierkurs für Chemiker"		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module provides an introduction to the fundamentals of a programming language and discusses how they can be applied to problems in chemistry.		
Intended learning outcomes		
Students are able to describe the fundamentals of the programming language and to apply them to problems in chemistry.		
Courses (type, number of weekly contact hours, language — if other than German)		
S + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
practical examination: completion of programming exercises and oral description of algorithms used Language of assessment: German, English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) FOKUS Chemistry (2011) Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Biochemistry for Students of Functional materials		o8-BC-TF-122-m01
Module coordinator		Module offered by
holder of the Chair of Biochemistry		Chair of Biochemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Comprising lectures and exercises, this module acquaints students with the fundamental principles of biochemistry.		
Intended learning outcomes		
Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Drug Product Development, Quality assurance and industrialization		o8-PTF2-122-m01
Module coordinator		Module offered by
degree programme coordinator FOKUS Pharmazie (Pharmacy)		Institute of Pharmacy and Food Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
This module discusses advanced topics in drug product development, quality assurance and industrialisation.		
Intended learning outcomes		
Students have developed an advanced knowledge relating to drug product development, quality assurance and industrialisation and are able to apply that knowledge to research problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012) Master's degree (1 major) FOKUS Pharmacy (2012)		

Module title			Abbreviation
Chemically and bio-inspired Nanotechnology for Material Synthesis			o8-NT-122-m01
Module coordinator		Module offered by	
holder of the Chair of Chemical Technology of Material Synthesis		Chair of Chemical Technology of Material Synthesis	
ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	graduate	--	
Contents			
This module provides an introduction to the synthesis methods of sol-gel chemistry and discusses the methods of analysis used to characterise the generated materials. It also discusses the fundamental principles of biomineralisation and uses examples to introduce students to bio-inspired material synthesis.			
Intended learning outcomes			
Students have developed an advanced knowledge of sol-gel chemistry and biomineralisation.			
Courses (type, number of weekly contact hours, language — if other than German)			
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none">o8-NT-1-122: V (no information on SWS (weekly contact hours) and course language available)o8-NT-2-122: V (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.			
Assessment in module component o8-NT-1-122: Sol-Gel Chemistry 1: Fundamentals <ul style="list-style-type: none">2 ECTS, Method of grading: numerical gradea) written examination (approx. 45 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)			
Assessment in module component o8-NT-2-122: From Biomineralisation to biologically inspired Materials Synthesis <ul style="list-style-type: none">3 ECTS, Method of grading: numerical gradea) written examination (approx. 45 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Bachelor' degree (1 major) Nanostructure Technology (2012)			
Bachelor's with 1 major Functional Materials (2012)		JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Funktionswerkstoffe - 2012	page 54 / 75

Bachelor' degree (1 major) Functional Materials (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Technology of Functional Materials (2009)
Master's degree (1 major) Functional Materials (2012)

Compulsory Electives Medicine

(20 ECTS credits)

Module title		Abbreviation
Technology of Composite Materials (Lecture and practical course)		03-FU-TV-122-m01
Module coordinator		Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Theoretical and practical fundamental knowledge of the fabrication and evaluation of composite respectively sandwich materials.		
Intended learning outcomes		
Students have developed a deep knowledge about the fabrication and evaluation of sandwich materials.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> 03-FU-TV-1-122: V (no information on SWS (weekly contact hours) and course language available) 03-FU-TV-2-122: P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component 03-FU-TV-1-122: Technology of Composite Materials (Lecture) <ul style="list-style-type: none"> 3 ECTS, Method of grading: numerical grade a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Assessment in module component 03-FU-TV-2-122: Technology of Composite Materials (Practical course) <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each) Assessment offered: once a year, summer semester Language of assessment: German, English if agreed upon with the examiner 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		

Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Functionalized Biomaterials		03-FU-FBM-122-m01
Module coordinator		Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Fundamental principles and specific knowledge for working in natural sciences in the field of biomaterials with surface modification and characterisation.		
Intended learning outcomes		
Students have developed an advanced knowledge in the field of biomaterials for use in implants.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> 03-FU-FBM-1-122: V (no information on SWS (weekly contact hours) and course language available) 03-FU-FBM-2-122: P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component 03-FU-FBM-1-122: Functionalized Biomaterials (Lecture) <ul style="list-style-type: none"> 3 ECTS, Method of grading: numerical grade a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Assessment in module component 03-FU-FBM-2-122: Functionalized Biomaterials (Practical course) <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed Vortestate (pre-experiment exams, approx. 15 minutes each), logs (approx. 5 pages each) Assessment offered: once a year, summer semester Language of assessment: German, English if agreed upon with the examiner 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		

Bachelor' degree (1 major) Functional Materials (2012)

Module title		Abbreviation
Polymer Chemistry		03-FU-PM1-122-m01
Module coordinator		Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.		
Intended learning outcomes		
The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> • 03-FU-PM1-1-122: V (no information on SWS (weekly contact hours) and course language available) • 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component 03-FU-PM1-1-122: Polymer Chemistry (Lecture) <ul style="list-style-type: none"> • 3 ECTS, Method of grading: numerical grade • a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) • Language of assessment: German, English if agreed upon with the examiner Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course) <ul style="list-style-type: none"> • 2 ECTS, Method of grading: (not) successfully completed • Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each) • Assessment offered: once a year, summer semester • Language of assessment: German, English if agreed upon with the examiner 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in

Bachelor' degree (1 major) Functional Materials (2012)
Master's degree (1 major) Chemistry (2013)

Module title		Abbreviation
Principles of Tissue Engineering		03-FU-TE-122-m01
Module coordinator		Module offered by
holder of the Chair of Regenerative Medicine		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Medical foundations of organ and tissue damage, medical implants, xenotransplantation, cell culture technology, principles of tissue engineering, 2D and 3D tissue models, stem cell technology.		
Intended learning outcomes		
The students have developed knowledge on the medical fundamentals of organ and tissue damage, medical implants, xenotransplantation, cell culture technology, principles of tissue engineering, 2D and 3D tissue models, stem cell technology.		
Courses (type, number of weekly contact hours, language — if other than German)		
S + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Compulsory Electives Additional Qualifications

(20 ECTS credits)

Module title		Abbreviation
Industrial Internship (Short)		o8-FU-IP1-122-mo1
Module coordinator		Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
A placement in industry. The contents of the placement should correspond to the contents of a lab course offered in the context of the Bachelor's programme in Functional Materials (180 ECTS credits); please consult with the competent coordinator in advance.		
Intended learning outcomes		
Students are familiar with procedures and processes used in industry. They have developed both subject-specific and interpersonal skills.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written report (approx. 5 to 10 pages) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Foreign Studies (Short)		o8-FU-APM1-122-mo1
Module coordinator		Module offered by
Erasmus programme coordinator Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	Admission prerequisite to assessment: regular attendance of placement.
Contents		
Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Master's programme in Functional Materials (120 ECTS credits); please consult with the competent coordinator in advance.		
Intended learning outcomes		
Students are familiar with procedures and processes used at universities in countries other than Germany. They have acquired subject-specific skills as well as language and interpersonal skills.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
report (approx. 2 pages); proof of having completed lab course Language of assessment: German or English; language of the respective placement country where required		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title		Abbreviation
Courses related to Functional Materials outside of the Natural Sciences		o8-FU-WP1-122-m01
Module coordinator		Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	Please consult with course advisory service.
Contents		
This module gives students the opportunity to transfer credits from functional materials-related courses that are offered by other Faculties and are not explicitly included in the academic regulations for their programmes. Students MUST consult with their course advisors in advance.		
Intended learning outcomes		
Students have developed the knowledge and skills taught in the courses attended by them.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or d) successful completion as certified by lecturer Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		

Module title			Abbreviation
Courses related to Functional Materials inside of the Natural Sciences			o8-FU-WP2-122-m01
Module coordinator		Module offered by	
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis	
ECTS	Method of grading	Only after succ. compl. of module(s)	
5	(not) successfully completed	--	
Duration	Module level	Other prerequisites	
1 semester	graduate	Please consult with course advisory service.	
Contents			
This module gives students the opportunity to transfer credits from functional materials-related courses that are offered by other Faculties and are not explicitly included in the academic regulations for their programmes. Students MUST consult with their course advisors in advance.			
Intended learning outcomes			
Students have developed the knowledge and skills taught in the courses attended by them.			
Courses (type, number of weekly contact hours, language — if other than German)			
V (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or d) successful completion as certified by lecturer Language of assessment: German, English if agreed upon with the examiner			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Bachelor' degree (1 major) Functional Materials (2012)			

Thesis

(12 ECTS credits)

Module title		Abbreviation
Bachelor Thesis Functional Materials		o8-FU-BT-122-m01
Module coordinator		Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
12	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.
Contents		
This module gives students the opportunity to research and write on a defined problem within a given time frame and using the scientific methods they have learned during the programme.		
Intended learning outcomes		
Students are able to conduct research on a defined problem/topic, adhering to the principles of good scientific practice, and to present the results of their work in written form.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module has 2 components; information on courses listed separately for each component. <ul style="list-style-type: none"> o8-FU-BT-2-122: K (no information on language and number of weekly contact hours available) o8-FU-BT-1-122: A (no information on language and number of weekly contact hours available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole..		
Assessment component to module component o8-FU-BT-2-122: Kolloquium zur Bachelor-Arbeit <ul style="list-style-type: none"> 2 ECTS credits, method of grading: numerical grade Abschlusskolloquium mit talk (approx. 20 minutes) and Diskussion (approx. 20 minutes) Language of assessment: German or English Assessment component to module component o8-FU-BT-1-122: Bachelor-Arbeit <ul style="list-style-type: none"> 10 ECTS credits, method of grading: numerical grade written thesis (approx. 20-40 pages) Language of assessment: German or English Other prerequisites: Where applicable, topic-specific modules/module components as specified by supervisor (cf. Section 12 Subsection 4 FSB (subject-specific provisions)). 		
Allocation of places		
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Additional information		
Additional information listed separately for each module component. <ul style="list-style-type: none"> o8-FU-BT-1-122: Additional information on module duration: 8 weeks. o8-FU-BT-2-122: -- 		
Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		

Bachelor' degree (1 major) Functional Materials (2012)

Subject-specific Key Skills

(15 ECTS credits)

Module title		Abbreviation
Material Science 1 (basic introduction)		o8-FS1-122-m01
Module coordinator		Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
This module discusses the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials.		
Intended learning outcomes		
Students have become familiar with the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials. They have developed the ability to apply them to research problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Functional Materials (2012) Master's degree (1 major) Chemistry (2013)		

Module title		Abbreviation
Material Science 2 (the material groups)		o8-FS2-122-m01
Module coordinator		Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
This module deals with the fabrication and properties of the main material groups.		
Intended learning outcomes		
Students have developed a knowledge of the fabrication and properties of the main material groups and are able to apply that knowledge to research problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Functional Materials (2012) Master's degree (1 major) Chemistry (2013)		

Module title		Abbreviation
Modern Bio Analytical Methods		o8-MAM-122-m01
Module coordinator		Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Analytical principles, gravimetric methods, titration, chromatography, spectroscopic methods (UV-VIS, IR, Raman, emission, fluorescence, NMR etc.), surface analysis, structure analysis.		
Intended learning outcomes		
Students have developed modern analytics expertise.		
Courses (type, number of weekly contact hours, language — if other than German)		
<p>This module has 2 components; information on courses listed separately for each component.</p> <ul style="list-style-type: none"> o8-MAM-1-122: V (no information on language and number of weekly contact hours available) o8-MAM-2-122: P (no information on language and number of weekly contact hours available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole..</p> <p>Assessment component to module component o8-MAM-1-122: Moderne Bio-Analytik</p> <ul style="list-style-type: none"> 3 ECTS credits, method of grading: numerical grade a) 1-3 written examinations (1 written examination: approx. 90 minutes, 2 written examinations: approx. 60 or 90 minutes each, 3 written examinations: approx. 60 minutes each) or b) oral examination of on candidate each (approx. 20 minutes) or c) oral examination in groups (groups of two, approx. 30 minutes). Language of assessment: German or English <p>Assessment component to module component o8-MAM-2-122: Praktikum zu Moderne Bio-Analytik</p> <ul style="list-style-type: none"> 2 ECTS credits, method of grading: (not) successfully completed Vortestate (je approx. 15 minutes) and logs (je approx. 5 pages) Assessment offered once a year, summer semester. Language of assessment: German or English 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Functional Materials (2012)		