



# Module Catalogue

for the Subject

# Technology of Functional Materials

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

Examination regulations version: 2009  
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 curriculum of Bachelor of Science program with specialization in Technology of Functional Materials is intended to provide students with hands-on practical experience in the field of functional materials for advanced technologies. This program offers students the opportunity to acquire basic knowledge and comprehensive understanding of key techniques commonly related to modern functional materials. It is an interdisciplinary course which involves lectures dealing with basic principles of chemistry, physics, mathematics, engineering, electronics and materials science. This course is closely coordinated by Fraunhofer Institut für Silicatforschung, Fachhochschule Würzburg-Schweinfurt, Bayerischen Zentrum für Angewandte Energieforschung and Süddeutschen Kunststoffzentrum. Through this course students are given an opportunity to become well-educated and well-rounded individuals with a broad range of skills. In the bachelors thesis process, the students are supposed to demonstrate their ability to apply their theoretical and practical knowledge and to solve material science related problems. The bachelors certification enables students to qualify for scientific occupation in the field of functional materials for advanced technologies. Moreover, students are encouraged to do additional industrial internships or Master of Science to further develop their knowledge and skills.

## 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:

**ASPO2007**

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

**21-Jul-2009 (2009-42) except module o8-PKC-072 which has been replaced by o8-PKC-092**

**05-Oct-2009 (2009-85)**

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

(143 ECTS credits)

<b>Module title</b>		<b>Abbreviation</b>
Experimental Chemistry, General and analytical laboratory course for engineering students		o8-IAC-o62-m01
<b>Module coordinator</b>		<b>Module offered by</b>
lecturer of lecture "Experimentalchemie" (Experimental Chemistry)		Institute of Inorganic Chemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
10	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
<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>		
<b>Intended learning outcomes</b>		
<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>		
<b>Courses</b> (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"> <li>o8-IAC-1-062: V (no information on SWS (weekly contact hours) and course language available)</li> <li>o8-IAC-2-062: P (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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><b>Assessment in module component o8-IAC-1-062: Experimental Chemistry</b></p> <ul style="list-style-type: none"> <li>5 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 90 minutes)</li> </ul> <p><b>Assessment in module component o8-IAC-2-062: General and analytical Chemistry Lab for engineering students</b></p> <ul style="list-style-type: none"> <li>5 ECTS, Method of grading: (not) successfully completed</li> <li>Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance, Nachtestate (post-experiment exams, approx. 15 minutes each)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>
--
<b>Teaching cycle</b>
--
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)
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<b>Module appears in</b>
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Technology of Functional Materials (2006)



<b>Module title</b>		<b>Abbreviation</b>
<b>Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science</b>		o8-IOC-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
lab course supervisor "Organisch-chemisches Praktikum für Studierende der Ingenieurwissenschaften"		Institute of Organic Chemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
10	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (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"> <li>o8-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available)</li> <li>o8-IOC-2-062: P (no information on SWS (weekly contact hours) and course language available)</li> <li>o8-IOC-3-062: S (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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. <p><b>Assessment in module component o8-IOC-1-072:</b> Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science</p> <ul style="list-style-type: none"> <li>3 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 60 minutes)</li> </ul> <p><b>Assessment in module component o8-IOC-2-062:</b> Organic Chemistry Lab for engineering students</p> <ul style="list-style-type: none"> <li>4 ECTS, Method of grading: (not) successfully completed</li> <li>Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance, Nachtestate (post-experiment exams, approx. 15 minutes each)</li> <li>Only after successful completion of module components: o8-IOC-1</li> </ul> <p><b>Assessment in module component o8-IOC-3-062:</b> Tutorial on the Organic Chemistry Lab for engineering students</p> <ul style="list-style-type: none"> <li>3 ECTS, Method of grading: numerical grade</li> <li>written examination (60 minutes)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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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) Technology of Functional Materials (2009)

Bachelor' degree (1 major) Technology of Functional Materials (2006)

<b>Module title</b>		<b>Abbreviation</b>
Fundamentals of Engineering Mechanics		99-TM-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Basics of statistics, strength of materials and dynamics.		
<b>Intended learning outcomes</b>		
The students have methodological competencies in determining forces and stress resultants, in calculating tensions and deformations and in dimensioning components.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (90 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Mathematics 3 for students of Physics and Engineering		11-MPI3-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
8	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
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.
<b>Contents</b>		
Ordinary and partial differential equations in Physics.		
<b>Intended learning outcomes</b>		
The students have basic mathematical knowledge of dynamic equations and solution methods for common and partial differential equations.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
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)		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 12 / 58

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)

<b>Module title</b>		<b>Abbreviation</b>
Introduction to Physics Part 1 for students of Physics Related Minor Subjects		11-ENNF1-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
7	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Mechanics, vibration theory, thermodynamics.		
<b>Intended learning outcomes</b>		
The students have basic knowledge of physics for engineering students.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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)		
<b>Allocation of places</b>		
Only as part of pool of general key skills (ASQ): 20 places. Places will be allocated by lot.		
<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
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)		

<b>Module title</b>		<b>Abbreviation</b>
Introduction to Physics Part 2 for students of Physics Related Minor Subjects		11-ENNF2-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
7	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Science of electricity, magnetism, optics, Atomic Physics.		
<b>Intended learning outcomes</b>		
The students have basic knowledge of physics for engineering students.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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)		
<b>Allocation of places</b>		
Only as part of pool of general key skills (ASQ): 20 places. Places will be allocated by lot.		
<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
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)		

<b>Module title</b>		<b>Abbreviation</b>
Physics Laboratory Course for students of Physics Related Minor Subjects		11-PNNF-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
3	(not) successfully completed	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics.		
<b>Intended learning outcomes</b>		
The students know the principles of Physics.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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)		
<b>Allocation of places</b>		
Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.		
<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
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)		



<b>Module title</b>		<b>Abbreviation</b>
Bachelor Thesis' Colloquium		o8-BKOLL-o62-mo1
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
3	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Bachelor's thesis defence.		
<b>Intended learning outcomes</b>		
Students are able to orally defend their Bachelor's thesis.		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
K (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
final colloquium (60 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Technology of Composite Materials and Technology of Composite Materials laboratory course		03-TV-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Theoretical and practical fundamental knowledge of the fabrication and evaluation of composite respectively sandwich materials.		
<b>Intended learning outcomes</b>		
Students have developed a knowledge of the theoretical and practical foundations of the fabrication and evaluation of sandwich materials.		
<b>Courses</b> (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"> <li>• 03-TV-1-091: V (no information on SWS (weekly contact hours) and course language available)</li> <li>• 03-TV-2-091: P (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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. <p><b>Assessment in module component 03-TV-1-091:</b> Technology of Composite Materials</p> <ul style="list-style-type: none"> <li>• 3 ECTS, Method of grading: numerical grade</li> <li>• written examination (60 minutes)</li> </ul> <p><b>Assessment in module component 03-TV-2-091:</b> Technology of Composite Materials, laboratory course</p> <ul style="list-style-type: none"> <li>• 2 ECTS, Method of grading: (not) successfully completed</li> <li>• oral examination (approx. 15 minutes)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		

<b>Module title</b>		<b>Abbreviation</b>
Mathematics 1 for students of Technology of Functional Materials		10-M-TFU1-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
10	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Fundamentals on numbers and functions, sequences and series, differential and integral calculus in one variable, vector spaces, simple differential equations.		
<b>Intended learning outcomes</b>		
The student gets acquainted with fundamental concepts of mathematics. He/She learns to apply these methods to simple problems in natural and engineering sciences, in particular in the technology of functional materials, and is able to interpret the results.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Mathematics 2 for students of Technology of Functional Materials		10-M-TFU2-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
10	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis.		
<b>Intended learning outcomes</b>		
The student gets acquainted with fundamental concepts of advanced 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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
Ü + V (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		

<b>Module title</b>		<b>Abbreviation</b>
Physical Chemistry for engineering students (lecture and laboratory course)		o8-IPC-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
lab course supervisor "Physikalische Chemie für Studierende der Ingenieurwissenschaften, Praktikum"		Institute of Physical and Theoretical Chemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
18	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (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"> <li>• o8-IPC-2-062: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>• o8-IPC-1-091: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>• o8-IPC-3-091: P (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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. <p><b>Assessment in module component o8-IPC-2-062:</b> 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"> <li>• 8 ECTS, Method of grading: numerical grade</li> <li>• written examination (approx. 90 minutes)</li> </ul> <p><b>Assessment in module component o8-IPC-1-091:</b> Physical Chemistry 1 (thermodynamics, electrochemistry) for engineering students Physical Chemistry 1 (thermodynamics, electrochemistry) for engineering students</p> <ul style="list-style-type: none"> <li>• 5 ECTS, Method of grading: numerical grade</li> <li>• written examination (approx. 90 minutes)</li> </ul> <p><b>Assessment in module component o8-IPC-3-091:</b> Physical Chemistry for engineering students, laboratory course</p> <ul style="list-style-type: none"> <li>• 5 ECTS, Method of grading: (not) successfully completed</li> <li>• Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance, Nachtestate (post-experiment exams, approx. 15 minutes each)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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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) Technology of Functional Materials (2009)

Bachelor' degree (1 major) Technology of Functional Materials (2010)

<b>Module title</b>		<b>Abbreviation</b>
Basics of Electronics 1		99-EL1-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of the Faculty of Electrical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Theoretical and practical principles of science of electricity, passive linear networks, principles of semiconductors.		
<b>Intended learning outcomes</b>		
The students have basic knowledge of theoretical and practical science of electricity, especially of passive linear networks and semiconductors.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (60 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Basics of Electronics 2		99-EL2-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of the Faculty of Electrical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Theoretical and practical principles of the components of electrical engineering, basic circuits, basic elements of digital technology, combinatorial circuits and sequential circuits.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (60 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		



<b>Module title</b>		<b>Abbreviation</b>
Computer-based Construction and Assembly (CAD/CAM)		99-CA-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt		University of Applied Sciences Würzburg-Schweinfurt (FHWS)
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
6	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Comprehensive view of the process of product development, including the corresponding specialist subjects based on a selected example.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (90 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Laboratory Course on Engineering (mechanical and electrical engineering)		99-IP-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
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)
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
6	(not) successfully completed	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Engineering laboratory and internship experiments.		
<b>Intended learning outcomes</b>		
The students have practical experiences in applying engineering methods in electrical and mechanical engineering.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Physical Technology of Material Synthesis. Lecture, exercises		11-TMS-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Theoretical and practical principles of semiconductor process technology, dielectrics, metals and oxides. Principles of structuring technology, growth and coating procedures.		
<b>Intended learning outcomes</b>		
The students have knowledge of the theoretical and practical principles of physical technology for material synthesis		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		

<b>Module title</b>		<b>Abbreviation</b>
Laboratory course on Physical Technology of Material Synthesis		11-PPT-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	(not) successfully completed	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Growth and coating procedures, methods of characterisation and exemplary structuring technologies.		
<b>Intended learning outcomes</b>		
The students have knowledge of the practical basics of material characterisation and physical technology for material synthesis.		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) Preparing the experiment will be considered successfully completed if an oral test (duration: approx. 15 minutes) prior to the experiment is passed. b) 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 (a and b) 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.		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Modern Analytical Methods (lecture and laboratory course)		o8-MAM-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Analytical principles, gravimetric methods, titration, chromatography, spectroscopic methods (UV-VIS, IR, Raman, emission, fluorescence, NMR etc.), surface analysis, structure analysis.		
<b>Intended learning outcomes</b>		
Students have developed modern analytics expertise.		
<b>Courses</b> (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"> <li>o8-MAM-1-091: V (no information on SWS (weekly contact hours) and course language available)</li> <li>o8-MAM-2-091: P (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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.		
<b>Assessment in module component o8-MAM-1-091: Modern Analytics</b> <ul style="list-style-type: none"> <li>3 ECTS, Method of grading: numerical grade</li> <li>written examination (60 minutes)</li> </ul>		
<b>Assessment in module component o8-MAM-2-091: Modern Analytics (practical course)</b> <ul style="list-style-type: none"> <li>2 ECTS, Method of grading: (not) successfully completed</li> <li>Vortestate (pre-experiment exams, approx. 15 minutes each), logs (approx. 5 pages each), Nachtestate (post-experiment exams, approx. 15 minutes)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		
Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Organische Chemie für Studierende der Ingenieurwissenschaften		o8-IOC-o62-m02
<b>Module coordinator</b>		<b>Module offered by</b>
lab course supervisor "Organisch-chemisches Praktikum für Studierende der Ingenieurwissenschaften"		Institute of Organic Chemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
10	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (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"> <li>• o8-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available)</li> <li>• o8-IOC-2-062: P (no information on SWS (weekly contact hours) and course language available)</li> <li>• o8-IOC-3-062: S (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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.		
<p><b>Assessment in module component o8-IOC-1-072:</b> Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science</p> <ul style="list-style-type: none"> <li>• 3 ECTS, Method of grading: numerical grade</li> <li>• written examination (approx. 60 minutes)</li> </ul> <p><b>Assessment in module component o8-IOC-2-062:</b> Organic Chemistry Lab for engineering students</p> <ul style="list-style-type: none"> <li>• 4 ECTS, Method of grading: (not) successfully completed</li> <li>• Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes each)</li> <li>• Other prerequisites: Registration for assessment: as specified.</li> </ul> <p><b>Assessment in module component o8-IOC-3-062:</b> Tutorial on the Organic Chemistry Lab for engineering students</p> <ul style="list-style-type: none"> <li>• 3 ECTS, Method of grading: numerical grade</li> <li>• written examination (60 minutes)</li> <li>• Other prerequisites: Registration for assessment: as specified.</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)
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<b>Module appears in</b>
Bachelor' degree (1 major) Technology of Functional Materials (2009)

<b>Module title</b>		<b>Abbreviation</b>
Chemical Technology of Material Synthesis. Lecture, exercises		o8-CT-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Chemical Technology of Material Synthesis		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
10	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
This module discusses the theoretical and practical principles of the chemical technology of material synthesis.		
<b>Intended learning outcomes</b>		
Students have become familiar with the theoretical and practical principles of the chemical technology of material synthesis and are able to apply the knowledge they have developed to research problems.		
<b>Courses</b> (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"> <li>o8-CT-1-091: V (no information on SWS (weekly contact hours) and course language available)</li> <li>o8-CT-2-091: P (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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. <p><b>Assessment in module component o8-CT-1-091:</b> Chemical Technology of Material Synthesis Lecture, exercises</p> <ul style="list-style-type: none"> <li>5 ECTS, Method of grading: numerical grade</li> <li>written examination (90 minutes)</li> </ul> <p><b>Assessment in module component o8-CT-2-091:</b> Chemical Technology of Material Synthesis Lecture, exercises</p> <ul style="list-style-type: none"> <li>5 ECTS, Method of grading: (not) successfully completed</li> <li>Vortestate (pre-experiment exams, approx. 15 minutes each), logs (approx. 5 pages each), Nachtestate (post-experiment exams, approx. 15 minutes)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		



## Compulsory Electives

(5 ECTS credits)

<b>Module title</b>		<b>Abbreviation</b>
Introduction to computer science of all faculties		10-I-EPIN-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Representation of information and web sites (HTML, XML, EBNF), databases, programming (Java).		
<b>Intended learning outcomes</b>		
The students possess a basic knowledge about the representation of information and websites (HTML, XML, EBNF), databases and programming in Java.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (50 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 25 minutes, groups of 3: 25 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Data bases		10-I-DB-072-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Relational algebra and complex SQL statements; database planning and normal forms; xml data modelling; transaction management.		
<b>Intended learning outcomes</b>		
The students possess a knowledge about database modelling and queries in SQL, transactions as well as easy data modelling in XML.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (50 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
--		
<b>Module appears in</b>		
Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Mathematics (2008) 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) Business Information Systems (2007) Bachelor' degree (1 major) Business Information Systems (2009) Bachelor' degree (1 major) Business Information Systems (2008) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Basics of NanostructureTechnology		11-N1-072-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
6	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Principles of producing, characterising and applying nanostructures.		
<b>Intended learning outcomes</b>		
The students have knowledge of the fundamental properties, technologies, characterising methods and functions of nanostructures.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + S (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
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 (2008) Bachelor' degree (1 major) Nanostructure Technology (2007) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Ordinary Differential Equations		10-M-ODE-o82-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
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.
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 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		
<b>Allocation of places</b>		
--		
<b>Additional information</b>		
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<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Computer Science (2010) 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's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 37 / 58

Bachelor' degree (1 major) Economathematics (2009)  
 Bachelor' degree (1 major) Economathematics (2008)  
 Bachelor' degree (1 major) Aerospace Computer Science (2009)  
 Bachelor' degree (1 major) Aerospace Computer Science (2011)  
 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)  
 Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)  
 Bachelor' degree (1 major) Technology of Functional Materials (2006)

<b>Module title</b>		<b>Abbreviation</b>
Biochemistry for students of Technology of Functional Materials		o8-BC-TF-o62-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Biochemistry		Chair of Biochemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
3	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Comprising lectures and exercises, this module acquaints students with the fundamental principles of biochemistry.		
<b>Intended learning outcomes</b>		
Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (60 minutes)		
<b>Allocation of places</b>		
--		
<b>Additional information</b>		
--		
<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
--		
<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Programming course for Chemistry Majors		o8-PKC-092-m01
<b>Module coordinator</b>		<b>Module offered by</b>
lecturer of lecture "Programmierkurs für Chemiker"		Institute of Physical and Theoretical Chemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	(not) successfully completed	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
This module provides an introduction to the fundamentals of a programming language and discusses how they can be applied to problems in chemistry.		
<b>Intended learning outcomes</b>		
Students are able to describe the fundamentals of the programming language and to apply them to problems in chemistry.		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 (length/expenditure of time as specified at the beginning of the course)		
<b>Allocation of places</b>		
--		
<b>Additional information</b>		
--		
<b>Workload</b>		
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<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		



<b>Module title</b>		<b>Abbreviation</b>
Chemically and biologically inspired Nanotechnology for Materials Synthesis		o8-NT-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Chemical Technology of Material Synthesis		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
<p>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.</p>		
<b>Intended learning outcomes</b>		
Students have developed an advanced knowledge of sol-gel chemistry and biomineralisation.		
<b>Courses</b> (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"> <li>o8-NT-1-091: V (no information on SWS (weekly contact hours) and course language available)</li> <li>o8-NT-2-091: V (no information on SWS (weekly contact hours) and course language available)</li> </ul>		
<b>Method of assessment</b> (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><b>Assessment in module component o8-NT-1-091:</b> Chemically and biologically inspired Nanotechnology for Materials Synthesis</p> <ul style="list-style-type: none"> <li>2 ECTS, Method of grading: numerical grade</li> <li>oral examination (approx. 15 minutes)</li> </ul> <p><b>Assessment in module component o8-NT-2-091:</b> From Biomineralisation to biologically inspired Materials Synthesis</p> <ul style="list-style-type: none"> <li>3 ECTS, Method of grading: numerical grade</li> <li>oral examination (approx. 20 minutes)</li> </ul>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
<p>Bachelor' degree (1 major) Technology of Functional Materials (2009)</p> <p>Bachelor' degree (1 major) Technology of Functional Materials (2006)</p>		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 41 / 58

<b>Module title</b>		<b>Abbreviation</b>
Biochemistry for Engineering Majors		o8-BC-TF-o82-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Biochemistry		Chair of Biochemistry
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
3	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Comprising lectures and exercises, this module acquaints students with the fundamental principles of biochemistry.		
<b>Intended learning outcomes</b>		
Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (60 minutes)		
<b>Allocation of places</b>		
--		
<b>Additional information</b>		
--		
<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)		

<b>Module title</b>		<b>Abbreviation</b>
Functional Biomaterials for students of Technology of Functional Materials		03-TF-FBM-o82-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
Fundamental principles and specific knowledge for working in natural sciences in the field of biomaterials with surface modification and characterisation.		
<b>Intended learning outcomes</b>		
Students have developed an advanced knowledge in the field of biomaterials for use in implants.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + P (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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. 10 pages)		
<b>Allocation of places</b>		
--		
<b>Additional information</b>		
--		
<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		

<b>Module title</b>		<b>Abbreviation</b>
Introduction to Functional Analysis		10-M-FAN-072-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
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.
<b>Contents</b>		
Banach spaces and Hilbert spaces, bounded operators, principles of functional analysis.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 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		
<b>Allocation of places</b>		
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<b>Additional information</b>		
--		
<b>Workload</b>		
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<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
§ 73 (1) 1. Mathematik Analysis		
<b>Module appears in</b>		
Bachelor' degree (1 major) Mathematics (2008) 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) Economathematics (2009)		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 44 / 58

Bachelor' degree (1 major) Economathematics (2008)  
 Bachelor' degree (1 major) Mathematical Physics (2009)  
 Bachelor' degree (1 major) Computational Mathematics (2009)  
 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)  
 Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)  
 First state examination for the teaching degree Gymnasium Mathematics (2009)  
 Bachelor' degree (1 major) Technology of Functional Materials (2006)

<b>Module title</b>		<b>Abbreviation</b>
Numerical Mathematics 1		10-M-NM1-082-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
8	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
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.
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 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		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
§ 73 (1) 5. Mathematik Angewandte Mathematik		
<b>Module appears in</b>		
Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012)		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 46 / 58

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) Economathematics (2009)  
 Bachelor' degree (1 major) Economathematics (2008)  
 Bachelor' degree (1 major) Mathematical Physics (2009)  
 Bachelor' degree (1 major) Computational Mathematics (2009)  
 Bachelor' degree (1 major) Aerospace Computer Science (2009)  
 Bachelor' degree (1 major) Aerospace Computer Science (2011)  
 Master's degree (1 major) Physics (2010)  
 Master's degree (1 major) Physics (2011)  
 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) Nanostructure Technology (2011)  
 Master's degree (1 major) Nanostructure Technology (2010)  
 Master's degree (1 major) Functional Materials (2012)  
 Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)  
 First state examination for the teaching degree Gymnasium Mathematics (2009)

<b>Module title</b>		<b>Abbreviation</b>
Numerical Mathematics 2		10-M-NM2-o82-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
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.
<b>Contents</b>		
Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems.		
<b>Intended learning outcomes</b>		
The student is able to draw a distinction between the different concepts of numerical mathematics and knows about their advantages and limitations concerning the possibilities of application in different fields of natural and engineering sciences and economics.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 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		
<b>Allocation of places</b>		
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<b>Additional information</b>		
--		
<b>Workload</b>		
--		
<b>Teaching cycle</b>		
--		
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
§ 73 (1) 5. Mathematik Angewandte Mathematik		
<b>Module appears in</b>		
Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012)		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 48 / 58



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) Economathematics (2009)  
 Bachelor' degree (1 major) Economathematics (2008)  
 Bachelor' degree (1 major) Mathematical Physics (2009)  
 Bachelor' degree (1 major) Computational Mathematics (2009)  
 Bachelor' degree (1 major) Aerospace Computer Science (2009)  
 Bachelor' degree (1 major) Aerospace Computer Science (2011)  
 Master's degree (1 major) Physics (2010)  
 Master's degree (1 major) Physics (2011)  
 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) Nanostructure Technology (2011)  
 Master's degree (1 major) Nanostructure Technology (2010)  
 Master's degree (1 major) Functional Materials (2012)  
 Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)  
 First state examination for the teaching degree Gymnasium Mathematics (2009)

<b>Module title</b>		<b>Abbreviation</b>
Programming course for students of Mathematics and other subjects		10-M-PRG-o82-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
3	(not) successfully completed	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	Admission prerequisite to assessment: regular attendance (attendance monitored, a maximum of one incident of unexcused absence).
<b>Contents</b>		
Basics of a modern programming language (e. g. C or Fortran) taking into account the particular needs in mathematics.		
<b>Intended learning outcomes</b>		
The student is able to work independently on small programming exercises and standard programming problems in mathematics.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 (as specified at the beginning of the course) Language of assessment: German, English if agreed upon with the examiner		
<b>Allocation of places</b>		
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<b>Additional information</b>		
--		
<b>Workload</b>		
--		
<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
§ 73 (1) 5. Mathematik Angewandte Mathematik		
<b>Module appears in</b>		
Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) 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) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Physics (2010) Master's degree (1 major) Technology of Functional Materials (2010)		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 50 / 58

Master's degree (1 major) Technology of Functional Materials (2009)  
Master's degree (1 major) Functional Materials (2012)  
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)  
First state examination for the teaching degree Gymnasium Mathematics (2009)

<b>Module title</b>		<b>Abbreviation</b>
Computeroriented Mathematics		10-M-COM-o82-mo1
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
3	(not) successfully completed	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	Admission prerequisite to assessment: regular attendance of exercises (attendance monitored, a maximum of one incident of unexcused absence).
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
The student learns the use of advanced modern mathematical software packages, and is able to assess their fields of application to solve mathematical problems.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (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 (as specified at the beginning of the course) Assessment offered: once a year, summer semester Language of assessment: German, English if agreed upon with the examiner		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
§ 73 (1) 5. Mathematik Angewandte Mathematik		
<b>Module appears in</b>		
Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) 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) Economathematics (2009)		
Bachelor's with 1 major Technology of Functional Materials (2009)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Technologie der Funktionswerkstoffe - 2009	page 52 / 58

Bachelor' degree (1 major) Economathematics (2008)  
 Bachelor' degree (1 major) Mathematical Physics (2009)  
 Bachelor' degree (1 major) Computational Mathematics (2009)  
 Master's degree (1 major) Physics (2010)  
 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)  
 Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)  
 First state examination for the teaching degree Gymnasium Mathematics (2009)

## Subject-specific Key Skills

(10 ECTS credits)

<b>Module title</b>		<b>Abbreviation</b>
Material Science 2 (the material groups)		o8-FS2-062-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
This module deals with the fabrication and properties of the main material groups.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (60 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2006)		

<b>Module title</b>		<b>Abbreviation</b>
Material Science 1 (basic introduction)		o8-FS1-091-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	--
<b>Contents</b>		
This module discusses the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written examination (90 minutes)		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009)		



## Thesis

(12 ECTS credits)

<b>Module title</b>		<b>Abbreviation</b>
Bachelor's Thesis		o8-BT-o62-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
12	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	undergraduate	Registration for assessment on a continuous basis as agreed upon with supervisor.
<b>Contents</b>		
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.		
<b>Intended learning outcomes</b>		
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.		
<b>Courses</b> (type, number of weekly contact hours, language – if other than German)		
no courses assigned		
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
written thesis Language of assessment: German or English		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
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<b>Teaching cycle</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Technology of Functional Materials (2006)		