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
Contents

The subject is divided into 3
Content and Objectives of the Programme 4
Abbreviations used, Conventions, Notes, In accordance with 5
Compulsory Courses 6
Experimental Chemistry, General and analytical laboratory course for engineering students 7
Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science 9
Fundamentals of Engineering Mechanics 10
Mathematics 3 for students of Physics and Engineering 11
Introduction to Physics Part 1 for students of Physics Related Minor Subjects 12
Introduction to Physics Part 2 for students of Physics Related Minor Subjects 13
Physics Laboratory Course for students of Physics Related Minor Subjects 14
Bachelor Thesis’ Colloquium 15
Technology of Composite Materials and Technology of Composite Materials laboratory course 16
Mathematics 1 for students of Technology of Functional Materials 17
Mathematics 2 for students of Technology of Functional Materials 18
Chemical Technology of Material Synthesis. Lecture, exercises 29
Compulsory Electives 30
Introduction to computer science of all faculties 31
Data bases 32
Basics of Nanostructure Technology 33
Ordinary Differential Equations 34
Biochemistry for students of Technology of Functional Materials 35
Programming course for Chemistry Majors 36
Chemically and biologically inspired Nanotechnology for Materials Synthesis 37
Biochemistry for Engineering Majors 38
Functional Biomaterials for students of Technology of Functional Materials 39
Introduction to Functional Analysis 40
Numerical Mathematics 1 41
Numerical Mathematics 2 42
Programming course for students of Mathematics and other subjects 43
Computer-oriented Mathematics 44
Subject-specific Key Skills 45
Material Science 2 (the material groups) 46
Material Science 1 (basic introduction) 47
Thesis 48
Bachelor’s Thesis 49
The subject is divided into

<table>
<thead>
<tr>
<th>section / sub-section</th>
<th>ECTS credits</th>
<th>starting page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory Courses</td>
<td>143</td>
<td>6</td>
</tr>
<tr>
<td>Compulsory Electives</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Subject-specific Key Skills</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>Thesis</td>
<td>12</td>
<td>48</td>
</tr>
</tbody>
</table>
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 08-PKC-072 which has been replaced by 08-PKC-092

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)
Module title | Abbreviation
--- | ---
Experimental Chemistry, General and analytical laboratory course for engineering students | 08-IAC-062-m01

Module coordinator | Module offered by
lecturer of lecture "Experimentalchemie" (Experimental Chemistry) | Institute of Inorganic Chemistry

ECTS | Method of grading | Only after succ. compl. of module(s)
--- | --- | ---
10 | numerical grade | --

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | undergraduate | --

Contents
German contents available but not translated yet.


Intended learning outcomes
German intended learning outcomes available but not translated yet.


Courses
This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-IAC-1-062: V (no information on SWS (weekly contact hours) and course language available)
- 08-IAC-2-062: P (no information on SWS (weekly contact hours) and course language available)

Method of assessment
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-IAC-1-062: Experimental Chemistry
- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 90 minutes)

Assessment in module component 08-IAC-2-062: General and analytical Chemistry Lab for engineering students
- 5 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance, Nachtestate (post-experiment exams, approx. 15 minutes each)

Allocation of places
--
<table>
<thead>
<tr>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referred to in LPO I</td>
</tr>
</tbody>
</table>

(examination regulations for teaching-degree programmes)
<table>
<thead>
<tr>
<th><strong>Module title</strong></th>
<th><strong>Abbreviation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science</td>
<td>08-IOC-062-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
lab course supervisor "Organisch-chemisches Praktikum für Studierende der Ingenieurwissenschaften"

**Module offered by**
Institute of Organic Chemistry

<table>
<thead>
<tr>
<th><strong>ECTS</strong></th>
<th><strong>Method of grading</strong></th>
<th><strong>Only after succ. compl. of module(s)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Duration</strong></th>
<th><strong>Module level</strong></th>
<th><strong>Other prerequisites</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**
This module will provide students with an overview of organic chemistry. Furthermore, in a lab course it introduces on the basics techniques of organic chemistry.

**Intended learning outcomes**
German intended learning outcomes available but not translated yet.


**Courses** (type, number of weekly contact hours, language — if other than German)
This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 08-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available)
- 08-IOC-2-062: P (no information on SWS (weekly contact hours) and course language available)
- 08-IOC-3-062: S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

**Assessment in module component 08-IOC-1-072:** Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science
- 3 ECTS, Method of grading: numerical grade
- written examination (approx. 60 minutes)

**Assessment in module component 08-IOC-2-062:** Organic Chemistry Lab for engineering students
- 4 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance, Nachtestate (post-experiment exams, approx. 15 minutes each)
- Only after successful completion of module components: 08-IOC-1

**Assessment in module component 08-IOC-3-062:** Tutorial on the Organic Chemistry Lab for engineering students
- 3 ECTS, Method of grading: numerical grade
- written examination (60 minutes)

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt</td>
<td>University of Applied Sciences Würzburg-Schweinfurt (FHWS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**
Basics of statistics, strength of materials and dynamics.

**Intended learning outcomes**
The students have methodological competencies in determining forces and stress resultants, in calculating tensions and deformations and in dimensioning components.

**Courses**
V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
written examination (90 minutes)

**Allocation of places**
--

**Additional information**
--

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

Mathematics 3 for students of Physics and Engineering

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 3 for students of Physics and Engineering</td>
<td>11-MPI3-062-m01</td>
</tr>
</tbody>
</table>

Module coordinator

Managing Director of the Institute of Theoretical Physics and Astrophysics

Module offered by

Faculty of Physics and Astronomy

ECTS

8

Method of grading

numerical grade

Only after succ. compl. of module(s)

Duration

1 semester

Module level

undergraduate

Other prerequisites

Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Contents

Ordinary and partial differential equations in Physics.

Intended learning outcomes

The students have basic mathematical knowledge of dynamic equations and solution methods for common and partial differential equations.

Courses

V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment

written examination (approx. 120 minutes)

Allocation of places

--

Additional information

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Physics Part 1 for students of Physics Related Minor Subjects</td>
<td>11-ENNF1-062-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Mechanics, vibration theory, thermodynamics.

**Intended learning outcomes**

The students have basic knowledge of physics for engineering students.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 120 minutes)

**Allocation of places**

Only as part of pool of general key skills (ASQ): 20 places. Places will be allocated by lot.

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Physics Part 2 for students of Physics Related Minor Subjects</td>
<td>11-ENNF2-062-m01</td>
</tr>
<tr>
<td>Module coordinator</td>
<td>Module offered by</td>
</tr>
<tr>
<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
</tr>
<tr>
<td>ECTS</td>
<td>Method of grading</td>
</tr>
<tr>
<td>7</td>
<td>Only after succ. compl. of module(s)</td>
</tr>
<tr>
<td>Duration</td>
<td>Module level</td>
</tr>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
</tr>
<tr>
<td>Other prerequisites</td>
<td>--</td>
</tr>
<tr>
<td>Contents</td>
<td></td>
</tr>
<tr>
<td>Science of electricity, magnetism, optics, Atomic Physics.</td>
<td></td>
</tr>
<tr>
<td>Intended learning outcomes</td>
<td></td>
</tr>
<tr>
<td>The students have basic knowledge of physics for engineering students.</td>
<td></td>
</tr>
<tr>
<td>Courses</td>
<td></td>
</tr>
<tr>
<td>V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td></td>
</tr>
<tr>
<td>Method of assessment</td>
<td></td>
</tr>
<tr>
<td>written examination (approx. 120 minutes)</td>
<td></td>
</tr>
<tr>
<td>Allocation of places</td>
<td></td>
</tr>
<tr>
<td>Only as part of pool of general key skills (ASQ): 20 places. Places will be allocated by lot.</td>
<td></td>
</tr>
<tr>
<td>Additional information</td>
<td>--</td>
</tr>
<tr>
<td>Referred to in LPO I (examination regulations for teaching-degree programmes)</td>
<td>--</td>
</tr>
<tr>
<td>Module title</td>
<td>Abbreviation</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Physics Laboratory Course for students of Physics Related Minor Subjects</td>
<td>11-PNNF-062-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
Managing Director of the Institute of Applied Physics

**Module offered by**
Faculty of Physics and Astronomy

**ECTS**
3

**Method of grading**
Only after successfully completed

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

**Contents**
Mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics.

**Intended learning outcomes**
The students know the principles of Physics.

**Courses**
(P no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) oral test (approx. 15 minutes) during experiment and b) ungraded written examination (approx. 90 minutes)

**Allocation of places**
Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.

**Additional information**
--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor Thesis’ Colloquium</td>
<td>08-BKOLL-062-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents

German contents available but not translated yet.

**Kolloquium: Wissenschaftliche Verteidigung der Ergebnisse der Bachelor-Thesis.**

### Intended learning outcomes

The student is able to defend the results of her/his Bachelor's Thesis in a scientific discussion.

### Courses

K (no information on SWS (weekly contact hours) and course language available)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

final colloquium (60 minutes)

### Allocation of places

--

### Additional information

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology of Composite Materials and Technology of Composite Materials laboratory course</td>
<td>03-TV-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>holder of the Chair of Functional Materials in Medicine and Dentistry</td>
<td>Faculty of Medicine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Theoretical and practical fundamental knowledge of the fabrication and evaluation of composite respectively sandwich materials.

**Intended learning outcomes**

Students have developed a knowledge of the theoretical and practical foundations of the fabrication and evaluation of sandwich materials.

**Courses** (type, number of weekly contact hours, language — if other than German)

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 03-TV-1-091: V (no information on SWS (weekly contact hours) and course language available)
- 03-TV-2-091: P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

**Assessment in module component 03-TV-1-091:** Technology of Composite Materials

- 3 ECTS, Method of grading: numerical grade
- written examination (60 minutes)

**Assessment in module component 03-TV-2-091:** Technology of Composite Materials, laboratory course

- 2 ECTS, Method of grading: (not) successfully completed
- oral examination (approx. 15 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 1 for students of Technology of Functional Materials</td>
<td>10-M-TFU1-091-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
Dean of Studies Mathematik (Mathematics)

**Module offered by**
Institute of Mathematics

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

**Contents**
Fundamentals on numbers and functions, sequences and series, differential and integral calculus in one variable, vector spaces, simple differential equations.

**Intended learning outcomes**
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.

**Courses**
V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
written examination (approx. 90 minutes)

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 2 for students of Technology of Functional Materials</td>
<td>10-M-TFU2-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis.

**Intended learning outcomes**

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.

**Courses** (type, number of weekly contact hours, language — if other than German)

Ü + V (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 90 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
Module title

Physical Chemistry for engineering students (lecture and laboratory course)

Abbreviation

08-IPC-091-m01

Module coordinator

lab course supervisor "Physikalische Chemie für Studierende der Ingenieurwissenschaften, Praktikum"

Module offered by

Institute of Physical and Theoretical Chemistry

ECTS

18

Method of grading

numerical grade

Only after succ. compl. of module(s)

Module level

undergraduate

Other prerequisites

Duration

1 semester

Contents

This module will provide students with an overview of physical chemistry. Furthermore, in a lab course it introduces the basics techniques of physical chemistry.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Courses (type, number of weekly contact hours, language — if other than German)

This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 08-IPC-2-062: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-IPC-1-091: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-IPC-3-091: P (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-IPC-2-062: Physical Chemistry 2 (basics of quantum mechanics and spectroscopy) for engineering students Physical Chemistry 2 (basics of quantum mechanics and spectroscopy) for engineering students

- 8 ECTS, Method of grading: numerical grade
- written examination (approx. 90 minutes)

Assessment in module component 08-IPC-1-091: Physical Chemistry 1 (thermodynamics, electrochemistry) for engineering students Physical Chemistry 1 (thermodynamics, electrochemistry) for engineering students

- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 90 minutes)

Assessment in module component 08-IPC-3-091: Physical Chemistry for engineering students, laboratory course Physical Chemistry for engineering students, laboratory course

- 5 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance, Nachtestate (post-experiment exams, approx. 15 minutes each)

Allocation of places

--

Additional information

--

Referred to in LPO 1 (examination regulations for teaching-degree programmes)

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basics of Electronics 1</td>
<td>99-EL1-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of the Faculty of Electrical Engineering at the University of Applied Sciences Würzburg-Schweinfurt</td>
<td>University of Applied Sciences Würzburg- Schweinfurt (FHWS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Theoretical and practical principles of science of electricity, passive linear networks, principles of semiconductors.

**Intended learning outcomes**

The students have basic knowledge of theoretical and practical science of electricity, especially of passive linear networks and semiconductors.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (60 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
### Basics of Electronics 2

#### Module title
Basics of Electronics 2

#### Abbreviation
99-EL2-091-m01

#### Module coordinator
Dean of the Faculty of Electrical Engineering at the University of Applied Sciences Würzburg-Schweinfurt

#### Module offered by
University of Applied Sciences Würzburg-Schweinfurt (FHWS)

#### ECTS
5

#### Method of grading
numeral grade

#### Only after succ. compl. of module(s)
--

#### Duration
1 semester

#### Module level
undergraduate

#### Other prerequisites
--

## Contents
Theoretical and practical principles of the components of electrical engineering, basic circuits, basic elements of digital technology, combinatorial circuits and sequential circuits.

## Intended learning outcomes
The students have theoretical and practical knowledge of the components of electrical engineering, basic circuits, basic elements of digital technology, combinatorial circuits and sequential circuits.

## Courses

- V + Ü (no information on SWS (weekly contact hours) and course language available)

## Method of assessment

- written examination (60 minutes)

## Allocation of places

- --

## Additional information

- --

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

- --
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer-based Construction and Assembly (CAD/CAM)</td>
<td>99-CA-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt</td>
<td>University of Applied Sciences Würzburg-Schweinfurt (FHWS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Comprehensive view of the process of product development, including the corresponding specialist subjects based on a selected example.

**Intended learning outcomes**

The students have professional and methodological competencies in the development of products with a focus on construction (CAD), calculation (CAE) and production (CAM), including prototyping and product validation.

**Courses**

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

written examination (90 minutes)

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Course on Engineering (mechanical and electrical engineering)</td>
<td>99-IP-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deans of the Faculties of Electrical Engineering and Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt</td>
<td>University of Applied Sciences Würzburg-Schweinfurt (FHWS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Engineering laboratory and internship experiments.

**Intended learning outcomes**

The students have practical experiences in applying engineering methods in electrical and mechanical engineering.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 15 to 30 pages)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Technology of Material Synthesis. Lecture, exercises</td>
<td>11-TMS-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Theoretical and practical principles of semiconductor process technology, dielectrics, metals and oxides. Principles of structuring technology, growth and coating procedures.

**Intended learning outcomes**

The students have knowledge of the theoretical and practical principles of physical technology for material synthesis.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — If not every semester, information on whether module is creditable for bonus)

Written examination (approx. 120 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory course on Physical Technology of Material Synthesis</td>
<td>11-PPT-091-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
Managing Director of the Institute of Applied Physics

**Module offered by**
Faculty of Physics and Astronomy

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

**Contents**
Growth and coating procedures, methods of characterisation and exemplary structuring technologies.

**Intended learning outcomes**
The students have knowledge of the practical basics of material characterisation and physical technology for material synthesis.

**Courses**
(no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) 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.

**Allocation of places**
--

**Additional information**
--

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

--
Module title | Abbreviation
--- | ---
Modern Analytical Methods (lecture and laboratory course) | 08-MAM-091-m01

Module coordinator | Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials) | Chair of Chemical Technology of Material Synthesis

ECTS | Method of grading | Only after succ. compl. of module(s)
--- | --- | ---
5 | numerical grade | --

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | undergraduate | --

Contents

German contents available but not translated yet.

Analytische Grundlagen, Gravimetrische Verfahren, Titrationen, Chromatographie, Spektroskopische Methoden (UV-VIS, IR, Raman, Emission, Fluoreszenz, NMR etc.), Oberflächen-Analytik, Struktur-Analytik.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über Kenntnisse der modernen Analytik.

Courses

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-MAM-1-091: V (no information on SWS (weekly contact hours) and course language available)
- 08-MAM-2-091: P (no information on SWS (weekly contact hours) and course language available)

Method of assessment

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-MAM-1-091: Modern Analytics

- 3 ECTS, Method of grading: numerical grade
- written examination (60 minutes)

Assessment in module component 08-MAM-2-091: Modern Analytics (practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), logs (approx. 5 pages each), Nachtestate (post-experiment exams, approx. 15 minutes)

Allocation of places

--

Additional information

--

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

--
Module title | Abbreviation
--- | ---
Organische Chemie für Studierende der Ingenieurwissenschaften | 08-IOC-062-m02

Module coordinator | Module offered by
lab course supervisor "Organisch-chemisches Praktikum für Studierende der Ingenieurwissenschaften" | Institute of Organic Chemistry

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>By way of exception, additional prerequisites are listed in the section on assessments.</td>
</tr>
</tbody>
</table>

Contents
This module will provide students with an overview of organic chemistry. Furthermore, in a lab course it introduces the basics techniques of organic chemistry.

Intended learning outcomes
German intended learning outcomes available but not translated yet.


Courses
This module comprises 3 module components. Information on courses will be listed separately for each module component.
- 08-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available)
- 08-IOC-2-062: P (no information on SWS (weekly contact hours) and course language available)
- 08-IOC-3-062: S (no information on SWS (weekly contact hours) and course language available)

Method of assessment
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-IOC-1-072: Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science
- 3 ECTS, Method of grading: numerical grade
- written examination (approx. 60 minutes)

Assessment in module component 08-IOC-2-062: Organic Chemistry Lab for engineering students
- 4 ECTS, Method of grading: (not) successfully completed
- 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)
- Other prerequisites: Registration for assessment: as specified.

Assessment in module component 08-IOC-3-062: Tutorial on the Organic Chemistry Lab for engineering students
- 3 ECTS, Method of grading: numerical grade
- written examination (60 minutes)
- Other prerequisites: Registration for assessment: as specified.

Allocation of places
--

Additional information
--
Referred to in LPO I (examination regulations for teaching-degree programmes)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Technology of Material Synthesis. Lecture, exercises</td>
<td>08-CT-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>holder of the Chair of Chemical Technology of Material Synthesis</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

The module imparts the theoretical and practical fundamentals of chemical technology of material synthesis.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über Kenntnisse der theoretischen und praktischen Grundlagen der chemischen Technologie der Materialsynthese und kann diese auf wissenschaftliche Fragestellungen anwenden.

**Courses**

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-CT-1-091: V (no information on SWS (weekly contact hours) and course language available)
- 08-CT-2-091: P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

**Assessment in module component 08-CT-1-091: Chemical Technology of Material Synthesis Lecture, exercises**

- 5 ECTS, Method of grading: numerical grade
- written examination (90 minutes)

**Assessment in module component 08-CT-2-091: Chemical Technology of Material Synthesis Lecture, exercises**

- 5 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), logs (approx. 5 pages each), Nachtestate (post-experiment exams, approx. 15 minutes)

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)
Compulsory Electives

(5 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to computer science of all faculties</td>
<td>10-I-EPIN-062-m01</td>
</tr>
</tbody>
</table>

### Module coordinator
Dean of Studies Informatik (Computer Science)

### Module offered by
Institute of Computer Science

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents
Representation of information and web sites (HTML, XML, EBNF), databases, programming (Java).

### Intended learning outcomes
The students possess a basic knowledge about the representation of information and websites (HTML, XML, EBNF), databases and programming in Java.

### Courses
V + Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
written examination (50 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 25 minutes, groups of 3: 25 minutes)

### Allocation of places
--

### Additional information
--

### Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bases</td>
<td>10-I-DB-072-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
Dean of Studies Informatik (Computer Science)

**Module offered by**
Institute of Computer Science

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

**Contents**
Relational algebra and complex SQL statements; database planning and normal forms; xml data modelling; transaction management.

**Intended learning outcomes**
The students possess a knowledge about database modelling and queries in SQL, transactions as well as easy data modelling in XML.

**Courses**
V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
written examination (50 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basics of Nanostructure Technology</td>
<td>11-N1-072-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Principles of producing, characterising and applying nanostructures.

**Intended learning outcomes**

The students have knowledge of the fundamental properties, technologies, characterising methods and functions of nanostructures.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 90 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary Differential Equations</td>
<td>10-M-ODE-082-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Contents**

Existence and uniqueness theorem, continuous dependance of solutions on initial values, systems of linear differential equations, matrix exponential series, linear differential equations of higher order.

**Intended learning outcomes**

The student is acquainted with the fundamental concepts and methods of the theory of ordinary differential equations. He/she is able to apply these methods to practical problems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

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

--
Module title
Biochemistry for students of Technology of Functional Materials

Abbreviation
08-BC-TF-062-m01

Module coordinator
holder of the Chair of Biochemistry

Module offered by
Chair of Biochemistry

ECTS
3

Method of grading
numerical grade

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
The module imparts the basic knowledge of biochemistry by lectures and in-depth tutorials.

Intended learning outcomes
German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über Grundlagenkenntnisse der Biochemie. Er/Sie ist in der Lage, die grundlegenden biochemischen Prozesse in zellulären Systemen zu beschreiben.

Courses (type, number of weekly contact hours, language — if other than German)
V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (60 minutes)

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming course for Chemistry Majors</td>
<td>08-PKC-092-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>lecturer of lecture &quot;Programmierkurs für Chemiker&quot;</td>
<td>Institute of Physical and Theoretical Chemistry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

The module introduces students to the basics of a programming language and gives applications to problems related to chemistry.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Die Studierenden können einfach Grundlagen der Programmiersprache beschreiben und auf chemierelevante Probleme anwenden.

**Courses**

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

practical examination: completion of programming exercises and oral description of algorithms used (length/expenditure of time as specified at the beginning of the course)

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
Module title | Abbreviation
---|---
Chemically and biologically inspired Nanotechnology for Materials Synthesis | 08-NT-091-m01

Module coordinator | Module offered by
holder of the Chair of Chemical Technology of Material Synthesis | Chair of Chemical Technology of Material Synthesis

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

Contents

German contents available but not translated yet.

Das Modul gibt eine Einführung in die Synthesemethoden der Sol-Gel Chemie und behandelt die zur Charakterisierung der erzeugten Materialien verwendeten Analyseverfahren. Es beinhaltet Grundprinzipien der Biomineralisation und gibt anhand von Beispielen eine Einführung in die biologisch inspirierte Materialsynthese.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über vertiefte Kenntnisse in den Bereichen der Sol-Gel Chemie und der Biomineralisation.

Courses (type, number of weekly contact hours, language — if other than German)

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-NT-1-091: V (no information on SWS (weekly contact hours) and course language available)
- 08-NT-2-091: V (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-NT-1-091: Chemically and biologically inspired Nanotechnology for Materials Synthesis

- 2 ECTS, Method of grading: numerical grade
- oral examination (approx. 15 minutes)

Assessment in module component 08-NT-2-091: From Biomineralisation to biologically inspired Materials Synthesis

- 3 ECTS, Method of grading: numerical grade
- oral examination (approx. 20 minutes)

Allocation of places

--

Additional information

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry for Engineering Majors</td>
<td>08-BC-TF-082-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>holder of the Chair of Biochemistry</td>
<td>Chair of Biochemistry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

The module imparts the basic knowledge of biochemistry by lectures and in-depth tutorials.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über Grundlagenkenntnisse der Biochemie. Er/Sie ist in der Lage, die grundlegenden biochemischen Prozesse in zellulären Systemen zu beschreiben.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (60 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional Biomaterials for students of Technology of Functional Materials</td>
<td>03-TF-FBM-082-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>holder of the Chair of Functional Materials in Medicine and Dentistry</td>
<td>Faculty of Medicine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Fundamental principles and specific knowledge for working in natural sciences in the field of biomaterials with surface modification and characterisation.

**Intended learning outcomes**

Students have developed an advanced knowledge in the field of biomaterials for use in implants.

**Courses** (type, number of weekly contact hours, language — if other than German)

- V + P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 10 pages)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Functional Analysis</td>
<td>10-M-FAN-072-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Contents**

Banach spaces and Hilbert spaces, bounded operators, principles of functional analysis.

**Intended learning outcomes**

The student knows the fundamental concepts and methods of functional analysis as well as the pertinent proof methods, is able to apply methods from linear algebra and analysis to functional analysis, and realises the broad applicability of the theory to other branches of mathematics.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

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

§ 73 (1) 1. Mathematik Analysis
### Module title
Numerical Mathematics 1

### Abbreviation
10-M-NM1-082-m01

### Module coordinator
Dean of Studies Mathematik (Mathematics)

### Module offered by
Institute of Mathematics

### ECTS
8

### Method of grading
Numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
Undergraduate

### Other prerequisites
Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

### Contents
Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration.

### Intended learning outcomes
The student is acquainted with the fundamental concepts and methods in numerical mathematics, applies them to practical problems and knows about their typical fields of application.

### Courses (type, number of weekly contact hours, language — if other than German)
V + Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English if agreed upon with the examiner

### Allocation of places
--

### Additional information
--

### Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 73 (1) 5. Mathematik Angewandte Mathematik
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerical Mathematics 2</td>
<td>10-M-NM2-082-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Contents**

Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems.

**Intended learning outcomes**

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.

**Courses**

<table>
<thead>
<tr>
<th>(type, number of weekly contact hours, language — if other than German)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
</tr>
</tbody>
</table>

**Method of assessment**

<table>
<thead>
<tr>
<th>(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)</td>
</tr>
</tbody>
</table>

Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

§ 73 (1) 5. Mathematik Angewandte Mathematik
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming course for students of Mathematics and other subjects</td>
<td>10-M-PRG-082-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Admission prerequisite to assessment: regular attendance (attendance monitored, a maximum of one incident of unexcused absence).</td>
</tr>
</tbody>
</table>

**Contents**

Basics of a modern programming language (e.g. C or Fortran) taking into account the particular needs in mathematics.

**Intended learning outcomes**

The student is able to work independently on small programming exercises and standard programming problems in mathematics.

**Courses**

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

- 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

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

§ 73 (1) 5. Mathematik Angewandte Mathematik
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer-oriented Mathematics</td>
<td>10-M-COM-082-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**

Dean of Studies Mathematik (Mathematics)  
Institute of Mathematics

**ECTS**

<table>
<thead>
<tr>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>(not) successfully completed</td>
</tr>
</tbody>
</table>

**Duration**

1 semester  
**Module level**

undergraduate

**Other prerequisites**

Admission prerequisite to assessment: regular attendance of exercises (attendance monitored, a maximum of one incident of unexcused absence).

**Contents**

Introduction to modern mathematical software for symbolic computation (e.g., Mathematica or Maple) and numerical computation (e.g., Matlab) to supplement the basic modules in analysis and linear algebra ((10-M-ANA or 10-M-ANL) and 10-M-LNA). Computer-based solution of problems in linear algebra, geometry, analysis, in particular differential and integral calculus; visualisation of functions.

**Intended learning outcomes**

The student learns the use of advanced modern mathematical software packages, and is able to assess their fields of application to solve mathematical problems.

**Courses**

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

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

**Allocation of places**

--

**Additional information**

--

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

§ 73 (1) 5. Mathematik Angewandte Mathematik
Subject-specific Key Skills
(10 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Science 2 (the material groups)</td>
<td>08-FS2-062-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

This module deals with production and properties of the most important materials groups.

**Intended learning outcomes**

The students possess comprehensive knowledge about fabrication and properties of the major classes of materials and are able to apply this to scientific problems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (60 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Science 1 (basic introduction)</td>
<td>08-FS1-091-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

German contents available but not translated yet.

Das Modul vermittelt die grundlegenden Beziehungen zwischen chemischer Bindung, Struktur, Gefüge und Eigenschaften von Werkstoffen.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über Kenntnisse der grundlegenden Beziehungen zwischen chemischer Bindung, Struktur, Gefüge und Eigenschaften von Werkstoffen und kann diese auf wissenschaftliche Fragestellungen anwenden.

**Courses**

(type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (90 minutes)

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
Thesis
(12 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's Thesis</td>
<td>08-BT-062-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Registration for assessment on a continuous basis as agreed upon with supervisor.</td>
</tr>
</tbody>
</table>

**Contents**

The module enables the processing of a defined problem within a specified period by applying the scientific methods learned in the course of study.

**Intended learning outcomes**

The student has the ability to deal with a defined problem/issue using scientific methods and to document the results.

**Courses** (type, number of weekly contact hours, language — if other than German)

- no courses assigned

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- written thesis
  - Language of assessment: German or English

**Allocation of places**

- --

**Additional information**

- --

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

- --