Subdivided Module Catalogue for the Subject

Functional Materials

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

Examination regulations version: 2012
Responsible: Faculty of Chemistry and Pharmacy
Course of Studies - Contents and Objectives

The Bachelor of Science program Functional Materials at the faculty of Chemistry and Pharmacy prepares students for research and development occupations of both a scientific and a practical nature in the field of materials and natural sciences. Students learn the basic methodical principles of scientific work. The study program’s interdisciplinary focus enables students to obtain extensive fundamental knowledge of the fields of chemistry, physics and mathematics. In addition, they acquire expert knowledge of the following engineering and natural sciences subjects: electronics, engineering mechanics, materials science, molecular materials, and compound materials. Close cooperation with the Fraunhofer Institute for Silicate Research ISC, Würzburg-Schweinfurt University of Applied Sciences, the Bavarian Center for Applied Energy Research and the SKZ plastics center guarantees an interdisciplinary education. Thanks to this, students are introduced to multifaceted topics relating to modern functional materials. By means of their bachelor’s thesis, students show that they have the ability to act largely independently to solve a specific, time-limited experimental or theoretical assignment of engineering or natural sciences tasks. The results of the bachelor’s thesis are presented and defended in a colloquium. The Bachelor of Science degree qualifies students for an occupation of both a scientific and a practical nature in the field of materials and natural sciences in general and of functional materials in particular. However, this generally requires a further qualification to be acquired either through practical experience in industry or through a consecutive master’s degree.
Module Catalogue for the Subject
Functional Materials
Bachelor’s with 1 major, 180 ECTS credits

Abbreviations used

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

Term: SS = summer semester, WS = winter semester

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2009

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

11-Dec-2012 (2012-186)

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

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<td>Compulsory Electives Mechanical and Electrical Engineering (17 ECTS credits)</td>
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<td>11-PPT-092-m01</td>
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<td>Compulsory Electives Chemistry (18 ECTS credits)</td>
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### Module Catalogue for the Subject
**Functional Materials**
Bachelor’s with 1 major, 180 ECTS credits

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<th>Code</th>
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<th>Type</th>
<th>ECTS</th>
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<td>Drug Product Development, Quality assurance and industrialization</td>
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<td>08-NT-122-m01</td>
<td>Chemically and bio-inspired Nanotechnology for Material Synthesis</td>
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**Compulsory Electives Medicine (20 ECTS credits)**

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<td>03-FU-TE-122-m01</td>
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**Compulsory Electives Additional Qualifications (20 ECTS credits)**

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<tr>
<td>08-FU-IP1-122-m01</td>
<td>Industrial Internship (Short)</td>
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<td>08-FU-APM1-122-m01</td>
<td>Foreign Studies (Short)</td>
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<td>08-FU-WP1-122-m01</td>
<td>Courses related to Functional Materials outside of the Natural Sciences</td>
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<td>08-FU-WP2-122-m01</td>
<td>Courses related to Functional Materials inside of the Natural Sciences</td>
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**Thesis (12 ECTS credits)**

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**Subject-specific Key Skills (15 ECTS credits)**

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<td>08-MAM-122-m01</td>
<td>Modern Bio Analytical Methods</td>
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Module title | Abbreviation
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Mathematics 3 for students of Physics and Engineering | 11-MPI3-062-m01

Module coordinator | Module offered by
---|---
Managing Director of the Institute of Theoretical Physics and Astrophysics | Faculty of Physics and Astronomy

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<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tbody>
<tr>
<td>8</td>
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<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>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.</td>
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Contents

Ordinary and partial differential equations in Physics.

Intended learning outcomes

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

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

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 120 minutes)

Allocation of places

--

Additional information

--

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

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<thead>
<tr>
<th>Module title</th>
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<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
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<table>
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<th>ECTS</th>
<th>Method of grading</th>
<th>Other prerequisites</th>
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<tr>
<td>7</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</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 can be chosen to earn a bonus)
written examination (approx. 120 minutes)

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

**Additional information**
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**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
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<tr>
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<th>Module level</th>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
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**Contents**

Science of electricity, magnetism, optics, Atomic Physics.

**Intended learning outcomes**

The students have basic knowledge of physics for engineering students.

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

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a 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)

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### Module catalogue for the subject Functional Materials

**Bachelor’s with 1 major, 180 ECTS credits**

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<tr>
<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
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<table>
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<tr>
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<th>Module level</th>
<th>Other prerequisites</th>
</tr>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
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**Contents**

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

**Intended learning outcomes**

The students know the principles of Physics.

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

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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

**Allocation of places**

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

**Additional information**

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

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<td>Abbreviation</td>
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**Module coordinator**
Dean of Studies Informatik (Computer Science)

**Module offered by**
Institute of Computer Science

**ECTS**
5

**Method of grading**
numerical grade

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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

**Intended learning outcomes**
The students possess knowledge about database modelling and queries in SQL as well as transactions.

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

**Method of assessment**
written examination (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes) Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**
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**Additional information**
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**Referred to in LPO I**
§ 49 (1) 1. b) Datenbanksysteme und Softwaretechnologie
§ 69 (1) 1. b) Datenbanksysteme und Softwaretechnologie
Module title
Introduction to Nanoscience

Abbreviation
11-EIN-092-m01

Module coordinator
Managing Director of the Institute of Applied Physics

Module offered by
Faculty of Physics and Astronomy

ECTS
6

Method of grading
Numerical grade

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
Introduction to the principles of producing, characterising and applying nanostructures.

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

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise specified)

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

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
--
## Module Catalogue for the Subject
**Functional Materials**
Bachelor's with 1 major, 180 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Functional Materials</td>
<td>11-TMS-102-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>
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<thead>
<tr>
<th>ECTS</th>
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<tr>
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<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<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

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

### Intended learning outcomes

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

### Courses

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

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

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 120 minutes)

Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.

### Allocation of places

--

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
### Module Catalogue for the Subject Functional Materials

#### Bachelor's with 1 major, 180 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Practical Course Physical Technology of Material Synthesis</td>
<td>11-PPT-092-m01</td>
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</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
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<tr>
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</tr>
</tbody>
</table>

### Contents

Physical material properties, growth and coating procedures, methods of characterisation and structuring technologies.

### Intended learning outcomes

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

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

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

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Preparing the experiment will be considered successfully completed if an oral test (duration: approx. 15 minutes) prior to the experiment is passed. Performing and evaluating the experiment will be considered successfully completed if a Testat (exam) is passed. An experiment log (approx. 8 pages) is to be prepared. Each component of the assessment can be repeated once in the respective semester. Only if both components of the assessment have been successfully completed in the same semester will the module component be considered successfully completed.

Assessment offered: once a year, winter semester

### Allocation of places

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### Additional information

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

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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Programming course for Chemistry Major</td>
<td>08-PKC-102-m01</td>
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<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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</thead>
<tbody>
<tr>
<td>lecturer of lecture &quot;Programmierkurs für Chemiker&quot;</td>
<td>Institute of Physical and Theoretical Chemistry</td>
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</table>

<table>
<thead>
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<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).</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**

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

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

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

practical examination: completion of programming exercises and oral description of algorithms used

Language of assessment: German, English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Chemically and bio-inspired Nanotechnology for Material Synthesis</td>
<td>08-NT-122-m01</td>
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<table>
<thead>
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<th>Module coordinator</th>
<th>Module offered by</th>
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</thead>
<tbody>
<tr>
<td>holder of the Chair of Chemical Technology of Material Synthesis</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
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<table>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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</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

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

- 08-NT-1-122: V (no information on SWS (weekly contact hours) and course language available)
- 08-NT-2-122: V (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-NT-1-122: Sol-Gel Chemistry 1: Fundamentals

- 2 ECTS, Method of grading: numerical grade
- a) written examination (approx. 45 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

#### Assessment in module component 08-NT-2-122: From Biomineralisation to biologically inspired Materials Synthesis

- 3 ECTS, Method of grading: numerical grade
- a) written examination (approx. 45 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

### Allocation of places

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### Additional information

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

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## Module Catalogue for the Subject
### Functional Materials
#### Bachelor's with 1 major, 180 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Introduction to Computer Science for Students of all Faculties</td>
<td>10-I-EIN-111-m01</td>
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<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
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<table>
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<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Admission prerequisite to assessment: academic requirements to be met in exercises as specified at the beginning of the course.</td>
</tr>
</tbody>
</table>

### Contents

Foundations of computer science including representation of information and websites (HTML, XML, EBNF), databases, algorithms and data structures, programming (Java).

### Intended learning outcomes

The students are familiar with the fundamentals of computer science, e.g. in the areas of representation of information and websites (HTML, XML, EBNF), databases, algorithms and data structures, programming in Java.

### Courses

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

### Method of assessment

(a) written examination (80 to 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or oral examination in groups of 2 or 3 candidates (30 or 40 minutes respectively)

### Allocation of places

--

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)
### Module Catalogue for the Subject
### Functional Materials

#### Bachelor’s with 1 major, 180 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Drug Product Development, Quality assurance and industrialization</td>
<td>08-PTF2-122-m01</td>
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</tbody>
</table>

<table>
<thead>
<tr>
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<th>Module offered by</th>
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<tbody>
<tr>
<td>degree programme coordinator FOKUS Pharmazie (Pharmacy)</td>
<td>Institute of Pharmacy and Food Chemistry</td>
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<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
<td>--</td>
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</tbody>
</table>

#### Contents

German contents available but not translated yet.

Das Modul behandelt spezielle Themen des Drug Product Development, der Qualitätssicherung und der Industrialisierung.

#### Intended learning outcomes

German intended learning outcomes available but not translated yet.


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

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

#### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or
- b) oral examination of one candidate each (approx. 20 minutes) or
- c) oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German or English

#### Allocation of places

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#### Additional information

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

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**Module title**  
Computational Mathematics

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>10-M-COM-122-m01</td>
<td>Institute of Mathematics</td>
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**Module coordinator**  
Dean of Studies Mathematik (Mathematics)

**ECTS** | **Method of grading** | **Only after succ. compl. of module(s)**
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**Duration** | **Module level** | **Other prerequisites**
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<tr>
<td>1 semester</td>
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</table>

**Contents**

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

**Intended learning outcomes**

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

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

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course)  
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
<tr>
<th>Module title</th>
<th>Programming course for students of Mathematics and other subjects</th>
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</thead>
<tbody>
<tr>
<td>Abbreviation</td>
<td>10-M-PRG-122-m01</td>
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<th>Module coordinator</th>
<th>Dean of Studies Mathematik (Mathematics)</th>
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</table>

**Contents**

Basics of a modern programming language (e.g. C).

**Intended learning outcomes**

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

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

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course)

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

**Allocation of places**

--

**Additional information**

--

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

--
**Module title**  
Numerical Mathematics 1 for Economathematics  
**Abbreviation**  
10-M-NUW-122-m01

**Module coordinator**  
Dean of Studies Mathematik (Mathematics)  
**Module offered by**  
Institute of Mathematics

<table>
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</table>

**Duration**  
1 semester  
**Module level**  
undergraduate

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

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

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

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

**Method of assessment**  
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)  
written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)  
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**  
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**Additional information**  
--

**Referred to in LPO I**  
(examination regulations for teaching-degree programmes)  
--
Module title: Mathematics 1 and 2 for students of Functional Materials  
Abbreviation: 10-M-FUN12-122-m01

Module coordinator: Dean of Studies Mathematik (Mathematics)  
Module offered by: Institute of Mathematics

ECTS: 18  
Method of grading: Only after succ. compl. of module(s)

Duration: 2 semester  
Module level: undergraduate  
Other prerequisites: By way of exception, additional prerequisites are listed in the section on assessments.

Contents
Basics on numbers and functions, sequences and series, elementary functions, differential and integral calculus in one variable, vector calculus, linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis, integral theorems.

Intended learning outcomes
The student gets acquainted with important concepts and methods of mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in the technology of functional materials, and is able to interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)
This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 10-M-FUN12-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-FUN12-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)

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

Assessment in module component 10-M-FUN12-1-122: Mathematics 1 for students of Functional Materials
- 10 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- 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.

Assessment in module component 10-M-FUN12-2-122: Mathematics 2 for students of Functional Materials
- 8 ECTS, Method of grading: numerical grade
- written examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- 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.
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.

<table>
<thead>
<tr>
<th>Allocation of places</th>
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<tr>
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<tr>
<td>Referred to in LPO I (examination regulations for teaching-degree programmes)</td>
<td>--</td>
</tr>
</tbody>
</table>
Module title | Abbreviation
---|---
Experimental Chemistry, General and analytical Chemistry Lab for engineering students | 08-IAC-122-m01

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

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

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

Contents
German contents available but not translated yet.


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 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-2-122: P (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a 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-IAC-1-062: Experimental Chemistry**
- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 90 minutes)

**Assessment in module component 08-IAC-2-122: General and analytical Chemistry Lab for engineering students**
- 5 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes)
- Assessment offered: once a year, summer semester
- Language of assessment: German or English
- Only after successful completion of module components: Successful completion of module component 04-IAC-1 is a prerequisite for participation in module component 08-IAC-2.
## Allocation of places

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## Additional information

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

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## Module title
Organic Chemistry for engineering students

### Abbreviation
08-IOC-122-m01

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

### Module offered by
Institute of Organic Chemistry

### ECTS
12

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
By way of exception, additional prerequisites are listed in the section on assessments.

## 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-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-IOC-3-122: P (no information on SWS (weekly contact hours) and course language available)
- 08-OC1-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)

## Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a 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-2-122: Organic Chemistry 2 for engineering students
Organic Chemistry 2 for engineering students

- 5 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German or English
- Only after successful completion of module components: Successful completion of module component 08-OC1-1 is a prerequisite for participation in module component 08-IOC-2.
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

### Assessment in module component 08-IOC-3-122: Organic Chemistry for engineering students (practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortesteate (pre-experiment exams, approx. 15 minutes), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes)
- Assessment offered: once a year, winter semester
- Language of assessment: German or English
- Only after successful completion of module components: Successful completion of module component 08-OC1-1 is a prerequisite for participation in module component 08-IOC-3.
### Assessment in module component 08-OC1-1-092: Organic Chemistry 1

- 5 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

### Allocation of places

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### Additional information

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

§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"
Module title: Physical Chemistry 1 for engineering students
Abbreviation: 08-IPC-122-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): --

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

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:
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-3-122: 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-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-3-122: Physical Chemistry for engineering students, laboratory course
- 5 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes)
- Assessment offered: once a year, summer semester
- Language of assessment: German or English
- Only after successful completion of module components: Successful completion of the two module components 08-IPC-1 and 08-IPC-2 is a prerequisite for participation in module component 08-IPC-3.

Allocation of places:
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Additional information:
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Referred to in LPO I (examination regulations for teaching-degree programmes)

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<th>Module title</th>
<th>Abbreviation</th>
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<td>Basics of Electronics 1</td>
<td>99-EL1-122-m01</td>
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<th>Module coordinator</th>
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<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>
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<tr>
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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</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 can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

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

**Allocation of places**

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**Additional information**

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

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### Module Catalogue for the Subject
**Functional Materials**

**Bachelor's with 1 major, 180 ECTS credits**

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<tr>
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<td>Basics of Electronics 2</td>
<td>99-EL2-122-m01</td>
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<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>
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<td>1 semester</td>
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</table>

### Contents

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

### Intended learning outcomes

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

### Courses

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

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

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

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

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
Module title: Molecular Materials (Lecture and practical course)

Abbreviation: 08-CT-122-m01

Module coordinator: Dean of Studies Funktionswerkstoffe (Functional Materials)

Module offered by: Chair of Chemical Technology of Material Synthesis

ECTS: 10

Method of grading: Numerical grade

Other prerequisites: Only after successful completion of module(s)

Duration: 1 semester

Module level: Undergraduate

Contents:
The module imparts the theoretical and practical fundamentals of molecular and soft materials.

Intended learning outcomes:

German intended learning outcomes available but not translated yet.

Intended learning outcomes:

Der/Die Studierende verfügt über Kenntnisse der molekularen und weichen Materialien 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-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-CT-2-122: 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-1-122: Molecular Materials (Lecture) Molecular Materials (Lecture)

- 5 ECTS, Method of grading: numerical grade
- Presentation (approx. 30 minutes) and a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes). Should a module component comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise specified; should the lecturer want to make changes to the way in which assessments are weighted, he or she must do so by two weeks after the start of the course at the latest and must communicate this to students in an appropriate manner.
- Language of assessment: German or English
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Assessment in module component 08-CT-2-122: Molecular Materials (Practical course)

- 5 ECTS, Method of grading: not successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, winter semester
- Language of assessment: German or English
- Other prerequisites: Admission prerequisite to assessment: regular attendance (minimum 80%) of courses.

Allocation of places:

Information on the allocation of places will be listed separately for each module component.

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

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<th>Additional information</th>
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<th>Referred to in LPO I (examination regulations for teaching-degree programmes)</th>
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</table>
**Module title**
Principles of Cell Biology and Tissue Regeneration

**Abbreviation**
03-FU-Zell-122-m01

**Module coordinator**
holder of the Chair of Orthopaedics (Jakob/Ebert)

**Module offered by**
Faculty of Medicine

**ECTS**
5

**Method of grading**
Only after succ. compl. of module(s)

**Numerical grade**
--

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

## Contents
Foundations of cell biology (cell structure, organelles, DNA, replication, protein biosynthesis, signal transduction, cell metabolism, stem cells, viruses and prokaryotes, immune system).

## Intended learning outcomes
Students acquire deep knowledge about cell and molecular biology.

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

## Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

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

## Allocation of places
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## Additional information
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## Referred to in LPO I
(examination regulations for teaching-degree programmes)
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Module title | Biomaterials
---|---
Abbreviation | 03-FU-BM-122-m01

Module coordinator | holder of the Chair of Functional Materials in Medicine and Dentistry
Module offered by | Faculty of Medicine

ECTS | 7
Method of grading | numerical grade
Only after succ. compl. of module(s) | --

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

Contents
Fundamental and specific knowledge about biomaterials out of metals, ceramics and polymers with surface modification and characterisation. Fabrication as well as examples for application will be addressed. Modern approaches in biomaterial research including hydrogels, additive manufacturing, 3D cell scaffolds and materials for tissue engineering will also be discussed.

Intended learning outcomes
Students have developed a deep knowledge in the field of biomaterials, their use in clinics as well as methods for biomaterial fabrication.

Courses (type, number of weekly contact hours, language — if other than German)
This module comprises 2 module components. Information on courses will be listed separately for each module component.
- 03-FU-BM-1-122: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-BM-2-122: P + P (no information on SWS (weekly contact hours) and course language available)

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

Assessment in module component 03-FU-BM-1-122: Biomaterials (Lecture)
- 5 ECTS, Method of grading: numerical grade
  - a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
Language of assessment: German, English if agreed upon with the examiner

Assessment in module component 03-FU-BM-2-122: Biomaterials (Practical course and seminar)
- 2 ECTS, Method of grading: (not) successfully completed
  - Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
  - Assessment offered: once a year, summer semester
Language of assessment: German, English if agreed upon with the examiner

Allocation of places
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Additional information
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Referred to in LPO 1 (examination regulations for teaching-degree programmes)
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<table>
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<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Advanced laboratory course of Functional Materials</td>
<td>08-FU-VP-122-m01</td>
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<th>Module offered by</th>
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<tbody>
<tr>
<td>head of the research group offering the module</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
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<td>3</td>
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<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Where applicable, topic-specific modules/module components as specified by supervisor (cf. Section 12 Subsection 4 FSB (subject-specific provisions)).</td>
</tr>
</tbody>
</table>

**Contents**

German contents available but not translated yet.

Das Modul bietet die Möglichkeit sich mit Hilfe der für den jeweiligen Fachbereich üblichen wissenschaftlichen Arbeitstechniken und Methoden vertieft in ein Forschungsthema einzuarbeiten.

**Intended learning outcomes**

The student is able to deeply acquaint himself/herself with a specific research topic, and to process and to present the results in a written report or a talk.

**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 can be chosen to earn a bonus)

| talk (approx. 15 minutes) | Language of assessment: German, English if agreed upon with the examiner |

**Allocation of places**

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**Additional information**

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

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<table>
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<tr>
<td>Basics of Applied Mechanics</td>
<td>99-TM-122-m01</td>
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<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>
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<td>1 semester</td>
<td>undergraduate</td>
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</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 (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 can be chosen to earn a bonus)
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

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

### Allocation of places
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### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)
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<table>
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<tr>
<td>Laboratory Course of mechanical and electrical Engineering</td>
<td>99-IP-122-m01</td>
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<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>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Admission prerequisite to assessment: regular attendance (minimum 80%) of courses.</td>
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</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 can be chosen to earn a bonus)

placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 15 to 30 pages)
Assessment offered: once a year, summer semester
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

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

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### Module Catalogue for the Subject Functional Materials

**Bachelor’s with 1 major, 180 ECTS credits**

<table>
<thead>
<tr>
<th>Module title</th>
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<tr>
<td>Construction, Calculation and Assembly of Technical Products</td>
<td>99-CA-122-m01</td>
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<table>
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<tr>
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<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>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</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** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

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

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
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<td>Ordinary Differential Equations for other Subjects</td>
<td>10-M-DGA-122-m01</td>
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<tbody>
<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
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<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 dependence of solutions on initial values, systems of linear differential equations, matrix exponential series, linear differential equations of higher order.

**Intended learning outcomes**

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

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

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

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

**Allocation of places**

--

**Additional information**

--

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

--
Module title: Introduction to Functional Analysis for other Subjects
Abbreviation: 10-M-FAA-122-m01

Module coordinator: Dean of Studies Mathematik (Mathematics)
Module offered by: Institute of Mathematics

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

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
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 can be chosen to earn a bonus)
Written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)
Language of assessment: German, English if agreed upon with the examiner

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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<td>Numerical Mathematics 2 for other Subjects</td>
<td>10-M-NUA-122-m01</td>
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</tr>
</tbody>
</table>

### Contents

Eigenvalue problems, linear programming, methods for initial value problems for ordinary differential equations, boundary value problems.

### Intended learning outcomes

The student is acquainted with fundamental and advanced concepts and methods in numerical mathematics, and is able to apply them independently to practical problems.

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

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

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

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

### Allocation of places

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### Additional information

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

--
### Biochemistry for Students of Functional Materials

<table>
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<th>Module title</th>
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<td>Biochemistry for Students of Functional Materials</td>
<td>08-BC-TF-122-m01</td>
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<td>Chair of Biochemistry</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</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

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

### Method of assessment

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German or English

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
### Technology of Composite Materials (Lecture and practical course)

**Module title** | **Abbreviation**  
--- | ---  
Technology of Composite Materials (Lecture and practical course) | 03-FU-TV-122-m01  

| **Module coordinator** | **Module offered by**  
--- | ---  
holder of the Chair of Functional Materials in Medicine and Dentistry | Faculty of Medicine  

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

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

### Contents

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

### Intended learning outcomes

Students have developed a deep knowledge about the fabrication and evaluation of sandwich materials.

### Courses

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

- 03-FU-TV-1-122: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-TV-2-122: P (no information on SWS (weekly contact hours) and course language available)

### Method of assessment

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

#### Assessment in module component 03-FU-TV-1-122: Technology of Composite Materials (Lecture)

- 3 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner

#### Assessment in module component 03-FU-TV-2-122: Technology of Composite Materials (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
Module title: Functionalized Biomaterials

Abbreviation: 03-FU-FBM-122-m01

Module coordinator: holder of the Chair of Functional Materials in Medicine and Dentistry

Module offered by: Faculty of Medicine

ECTS: 5

Method of grading: numerical grade

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

Duration: 1 semester

Module level: undergraduate

Other prerequisites: --

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

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

- 03-FU-FBM-1-122: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-FBM-2-122: P (no information on SWS (weekly contact hours) and course language available)

Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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

Assessment in module component 03-FU-FBM-1-122: Functionalized Biomaterials (Lecture)

- 3 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner

Assessment in module component 03-FU-FBM-2-122: Functionalized Biomaterials (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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

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<table>
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<td>Faculty of Medicine</td>
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<tbody>
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<td>1 semester</td>
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</tbody>
</table>

### Contents

Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.

### Intended learning outcomes

The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.

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

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

- 03-FU-PM1-1-122: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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

**Assessment in module component 03-FU-PM1-1-122: Polymer Chemistry (Lecture)**

- 3 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner

**Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course)**

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

### Allocation of places

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### Additional information

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

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<td>Principles of Tissue Engineering</td>
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<tr>
<td>holder of the Chair of Regenerative Medicine</td>
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<tbody>
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</tr>
</tbody>
</table>

## Contents

Medical foundations of organ and tissue damage, medical implants, xenotransplantation, cell culture technology, principles of tissue engineering, 2D and 3D tissue models, stem cell technology.

## Intended learning outcomes

The students have developed knowledge on the medical fundamentals of organ and tissue damage, medical implants, xenotransplantation, cell culture technology, principles of tissue engineering, 2D and 3D tissue models, stem cell technology.

## Courses

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

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

## Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

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

## Allocation of places

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## Additional information

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## Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
**Module title** | **Abbreviation**
---|---
Industrial Internship (Short) | 08-FU-IP1-122-m01

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

**ECTS** | **Method of grading** | **Only after succ. compl. of module(s)**
---|---|---
5 | (not) successfully completed | --

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

**Contents**

German contents available but not translated yet.

Das Praktikum wird in einem industriellen Betrieb durchgeführt. Die inhaltlichen Anforderungen sollen denen eines im Bachelor-Studienganges Funktionswerkstoffe (180 ECTS) angebotenen Praktikums entsprechen, was im Vorfeld mit dem Verantwortlichen abzusprechen ist.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Die Studierenden sind mit Arbeitsweisen in der Industrie vertraut. Sie haben neben Fachkompetenz auch Kompetenzen im sozialen Bereich erworben.

**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 can be chosen to earn a bonus)

written report (approx. 5 to 10 pages)
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
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<th>Module title</th>
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<tbody>
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<td>Erasmus programme coordinator Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
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<td>Admission prerequisite to assessment: regular attendance of placement.</td>
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</table>

**Contents**

The internship is carried out at universities abroad and can be embedded within offered study programs (e.g. Erasmus). The content requirements should comply with those of the electives of the Functional Materials Master program at the University of Würzburg (what has to be ascertained in advance under discussion with the module coordinator).

**Intended learning outcomes**

The students are familiar with working methods at universities abroad. Besides professional competences they have also acquired language and social skills.

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

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

report (approx. 2 pages); proof of having completed lab course
Language of assessment: German or English; language of the respective placement country where required

**Allocation of places**

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**Additional information**

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

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Module title

Courses related to Functional Materials outside of the Natural Sciences

08-FU-WP1-122-m01

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

Module offered by

ECTS
5

Method of grading
Only after succ. compl. of module(s)

Duration
1 semester

Module level
graduate

Other prerequisites
Please consult with course advisory service.

Contents

German contents available but not translated yet.

Das Modul bietet die Möglichkeit, funktionswerkstoffnahe Veranstaltungen anderer Fachbereiche, die nicht explizit in der Studienordnung vorgesehen sind, anrechnen zu lassen. Eine vorherige Rücksprache mit der Fachstudienberatung ist zwingend notwendig.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden erwerben Kompetenzen entsprechend der besuchten Veranstaltungen.

Courses

(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 can be chosen to earn a bonus)

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
Courses related to Functional Materials inside of the Natural Sciences

### Abbreviation
08-FU-WP2-122-m01

### Module coordinator
Dean of Studies Funktionswerkstoffe (Functional Materials)

### Module offered by
Chair of Chemical Technology of Material Synthesis

### ECTS
5

### Method of grading
Only after succ. compl. of module(s)

### (not) successfully completed
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### Duration
1 semester

### Module level
graduate

### Other prerequisites
Please consult with course advisory service.

### Contents

German contents available but not translated yet.

Das Modul bietet die Möglichkeit, funktionswerkstoffnahe Veranstaltungen anderer Fachbereiche, die nicht ex-plicit in der Studienordnung vorgesehen sind, anrechnen zu lassen. Eine vorherige Rücksprache mit der Fachstu-dienberatung ist zwingend notwendig.

### Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden erwerben Kompetenzen entsprechend der besuchten Veranstaltungen.

### Courses

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 seme-ster, information on whether module can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candida-te each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or d) successful completion as certified by lecturer

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

### Allocation of places

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### Additional information

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

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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Material Science 1 (basic introduction)</td>
<td>08-FS1-122-m01</td>
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<table>
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<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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</thead>
<tbody>
<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Chemical Technology of Material Synthesis</td>
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<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
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<table>
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<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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</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 can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Material Science 2 (the material groups)</td>
<td>08-FS2-122-m01</td>
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<td>graduate</td>
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</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 can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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

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Module title: Modern Bio Analytical Methods
Abbreviation: 08-MAM-122-m01

Module coordinator: Dean of Studies Funktionswerkstoffe (Functional Materials), Chair of Chemical Technology of Material Synthesis

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

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

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 has 2 components; information on courses listed separately for each component.
- 08-MAM-1-122: V (no information on language and number of weekly contact hours available)
- 08-MAM-2-122: P (no information on language and number of weekly contact hours available)

Method of assessment:
This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole.

Assessment component to module component 08-MAM-1-122: Moderne Bio-Analytik
- 3 ECTS credits, method of grading: numerical grade
  a) 1-3 written examinations (1 written examination: approx. 90 minutes, 2 written examinations: approx. 60 or 90 minutes each, 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of two, approx. 30 minutes).
  - Language of assessment: German or English

Assessment component to module component 08-MAM-2-122: Praktikum zu Moderne Bio-Analytik
- 2 ECTS credits, method of grading: (not) successfully completed
  - Vortestate (je approx. 15 minutes) and logs (je approx. 5 pages)
  - Assessment offered once a year, summer semester.
  - Language of assessment: German or English

Allocation of places:
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Additional information:
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module title | Bachelor Thesis Functional Materials
---|---
Abbreviation | 08-FU-BT-122-m01

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

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

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments.

Contents
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)
This module has 2 components; information on courses listed separately for each component.
- 08-FU-BT-2-122: K (no information on language and number of weekly contact hours available)
- 08-FU-BT-1-122: A (no information on language and number of weekly contact hours available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole..

Assessment component to module component 08-FU-BT-2-122: Kolloquium zur Bachelor-Arbeit
- 2 ECTS credits, method of grading: numerical grade
- Abschlusskolloquium mit talk (approx. 20 minutes) and Diskussion (approx. 20 minutes)
- Language of assessment: German or English

Assessment component to module component 08-FU-BT-1-122: Bachelor-Arbeit
- 10 ECTS credits, method of grading: numerical grade
- written thesis (approx. 20-40 pages)
- Language of assessment: German or English
- Other prerequisites: Where applicable, topic-specific modules/module components as specified by supervisor (cf. Section 12 Subsection 4 FSB (subject-specific provisions)).

Allocation of places
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Additional information
Additional information listed separately for each module component.
- 08-FU-BT-1-122: Additional information on module duration: 8 weeks.
- 08-FU-BT-2-122: --

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