Module Catalogue
for the Subject
Chemistry
as a Bachelor’s with 1 major
with the degree "Bachelor of Science"
(180 ECTS credits)

Examination regulations version: 2017
Responsible: Faculty of Chemistry and Pharmacy
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Content and Objectives of the Programme

The degree subject Chemistry is offered by the Faculty of Chemistry and Pharmacy of the JMU as a fundamental course of studies with the degree "Bachelor of Science" (B.Sc.) within the framework of a consecutive Bachelor and Master study model.

The Bachelor's degree programme aims to impart the specialised knowledge and skills necessary for the transition to professional practice or a subsequent Master's degree programme. These include the theoretical foundations of inorganic, organic, physical, theoretical and bioorganic chemistry, as well as the accompanying practical laboratory techniques. The course places emphasis on the acquisition of basic knowledge and training in scientific observation and practical laboratory skills, with a progressively increasing focus on independence in a laboratory setting. This intensive training should equip students with the confidence and skills needed for independent work in a range of application-oriented areas of industry, commerce or management, or provide the basis for advanced scientific training as part of a Master's degree.
Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

*ASPO2015*

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

*9-Aug-2017 (2017-48)*

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

(47 ECTS credits)
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<td>lecturer of lecture &quot;Experimentalchemie&quot; (Experimental Chemistry)</td>
<td>Institute of Inorganic Chemistry</td>
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**Contents**

The module provides an overview of the fundamental knowledge of chemistry. Emphasis is placed on the material and particle level, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental concepts of chemistry and teaches the basics of inorganic chemistry.

**Intended learning outcomes**

The student understands the principles of the periodic table and can obtain information from it. He/she is proficient in basic models of the structure of matter and can describe them properly. He/she can depict chemical reactions using typical chemical formula language and interpret them by identifying the type of reaction. The students know how the most important quantitative and qualitative analytical methods work and their areas of application.

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

V (4) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/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)

§ 42 I Nr. 1 and § 22 II Nr. 1 h)

§ 62 I Nr. 1
## Module title
### Inorganic Chemistry 1 (lab)

### Abbreviation
08-ACP1-152-m01

### Module coordinator
holder of the Chair of Anorganic Chemistry

### Module offered by
Institute of Inorganic Chemistry

### ECTS
10

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

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

### Module level
undergraduate

### Other prerequisites
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## Contents
The module provides the opportunity to apply the knowledge of the introductory lectures in a practical course. After a safety introduction the students experiment independently in the laboratory. Focuses are laboratory safety, basic laboratory techniques, synthesis of basic compounds and analysis of an unknown compound.

## Intended learning outcomes
The student is able to identify basic chemical issues and to solve them experimentally. Therefore he/she can carry out the necessary stoichiometric calculations and correctly outline the chemical processes written and verbal.

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

P (12) + S (2)

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

(a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) and Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations)

Assessment offered: Once a year, winter semester

Language of assessment: German and/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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**Contents**

German contents available but not translated yet.


**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Der/Die Studierende kann Hauptgruppenelemente und Übergangsmetall-Elemente hinsichtlich Struktur, Reaktivität und Herstellung charakterisieren. Er/Sie ist in der Lage, die Koordination der Atome zu erkennen und zu benennen. Zudem kann er/sie das Periodensystem als grundlegendes Werkzeug in der Chemie verwenden.

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

V (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/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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**Contents**

The module provides the opportunity to apply the knowledge of the introductory lectures in a practical course. After a safety introduction the students experiment independently in the laboratory. Focuses are different analysis methods with unknown compounds.

**Intended learning outcomes**

The student is able to analyze unknown compounds using different methods. He/She is able to separate and analyze mixtures.

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

P (12) + S (1)

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

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Assessment offered: Once a year, summer semester

Language of assessment: German and/or English

**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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**Contents**

The module provides the opportunity to plan and carry out complex syntheses after an individual research. Focusses are the handling of organometallic compounds, their synthesis and the work in inert atmospheres. Spectroscopical methods are used for the precise determination of the products.

**Intended learning outcomes**

The student is able to experimentally solve complex issues after an individual research. He/She can describe the technical backrounds and explain them written and verbal using technical language. He/She can independently plan and carry out the synthesis of a chemical compound. Therefor he/she can apply advanced laboratory techniques.

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

P (12)

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

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Language of assessment: German and/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
Solid State Chemistry, Spectroscopic Methods, Organoelement Chemistry

### Abbreviation
08-AC-FSE-152-m01

### Module coordinator

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### Contents
The module imparts deepened knowledge of metals, alloys, salt-like compounds and organometallics. Focuses are structure and characteristics, special substance classes, reactivity and technical processes.

### Intended learning outcomes
The student can correctly outline the structure and characteristics of metals, alloys, salt-like compounds and organometallics. He/She is able to systemize them and to characterize them with regard to their structure and reactivity. He/She can develop and describe principles of synthesis for elemental organic compounds. He/She can list and describe appropriate spectroscopic methods for the structural analysis of solid materials.

### Courses
(V (2) + V (2) + V (3) + Ü (1))

### Method of assessment
(a) written examination (approx. 90 to 180 minutes) or (b) oral examination of one candidate each (20 to 30 minutes) or (c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or (d) log (approx. 20 pages) or (e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

### Allocation of places
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### Additional information
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<tr>
<td>holder of the Professorship of Organic Chemistry</td>
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<td>German contents available but not translated yet.</td>
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</tbody>
</table>

Das Modul bietet einen Überblick über die elementaren Grundkenntnisse der organischen Chemie. Dazu wird die Bindungssituation am Kohlenstoff betrachtet und in die Nomenklatur einfacher und mäßig komplexer organischer Verbindungen eingeführt. Es werden Grundlagen der Stereochemie, Substitutions-, Additions- und Eliminierungsreaktionen sowie der Syntheseplanung vermittelt.

<table>
<thead>
<tr>
<th>Intended learning outcomes</th>
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</thead>
<tbody>
<tr>
<td>German intended learning outcomes available but not translated yet.</td>
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<table>
<thead>
<tr>
<th>Courses</th>
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<tbody>
<tr>
<td>V (3) + Ü (1)</td>
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<table>
<thead>
<tr>
<th>Method of assessment</th>
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<tbody>
<tr>
<td>(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</td>
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a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

<table>
<thead>
<tr>
<th>Allocation of places</th>
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<table>
<thead>
<tr>
<th>Additional information</th>
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<table>
<thead>
<tr>
<th>Referred to in LPO I</th>
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<tbody>
<tr>
<td>§ 62 I Nr. 2</td>
</tr>
<tr>
<td>Module title</td>
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<tr>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Organic Chemistry 2 and analytical methods in organic chemistry</td>
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</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>holder of the Chair of Physically Organic Chemistry</td>
<td>Institute of Organic Chemistry</td>
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<table>
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<th>Method of grading</th>
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**Contents**

German contents available but not translated yet.


**Intended learning outcomes**

German intended learning outcomes available but not translated yet.


**Courses**

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**Method of assessment**

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Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
### Module title

Organic Chemistry - lab 1

| Abbreviation | 08-OCP1-172-m01 |

### Module coordinator

holder of the Chair of Organic Chemistry II

### Module offered by

Institute of Organic Chemistry

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### 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 |
| P (14) |

### Method of assessment

| type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus |
| Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations) |
| Language of assessment: German and/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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<td>08-OCP2-152-m01</td>
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<td>holder of the Chair of Organic Chemistry II</td>
<td>Institute of Organic Chemistry</td>
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<td>1 semester</td>
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</table>

### Contents

The module deepens the experimental skills of the student by handling special hazardous substances, complex work and synthesis techniques, extensive purification methods and laborious product analyses.

### Intended learning outcomes

The student is able to handle special hazardous substances responsibly. He/She can carry out extensive syntheses, purification techniques and product analyses. He/She can use specific literature to plan experiments.

### Courses

<table>
<thead>
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<th>(type, number of weekly contact hours, language — if other than German)</th>
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### Method of assessment

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<tr>
<td>Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)</td>
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Language of assessment: German and/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)
### Module title
Organic Chemistry 3 & 4

### Abbreviation
08-OC3+4-152-m01

### Module coordinator
holder of the Professorship of Organic Chemistry

### Module offered by
Institute of Organic Chemistry

### ECTS
13

### Method of grading
numerical grade

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

### Duration
2 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
The module focuses on polar rearrangements, olefination reactions, pericyclic reactions, carbenes, nitriles and radicals. It imparts basic knowledge of stereoselective synthesis, asymmetric catalysis, organometallic chemistry and retrosynthesis. Further focuses are heterocycles, dyes, natural products, biopolymers and protecting groups.

### Intended learning outcomes
The student is able to formulate olefination reactions. He/She can develop stereoselective syntheses and asymmetric catalyses. He/She can outline organometallic reactions and analyse a molecule by retrosynthesis. He/She can name important heterocyclics and outline their reactions and synthesis. He/She is able to characterize and categorize dyes and to describe the structure and the selective synthesis of proteins. Furthermore, he/she can outline the structure of DNA, carbohydrates, fats, terpenes and steroids.

### Courses
(V (2) + Ü (2) + V (2) + Ü (2) + S (1))

### Method of assessment
(a) written examination (approx. 90 to 180 minutes) or (b) oral examination of one candidate each (20 to 30 minutes) or (c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or (d) log (approx. 20 pages) or (e) presentation (approx. 30 minutes)

Language of assessment: German and/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)

--
Subfield Physical and Theoretical Chemistry
(40 ECTS credits)
### Module title

**Principles of quantum mechanics and spectroscopy**

### Abbreviation

**08-PC-QMS-152-m01**

### Module coordinator

Lecturer of lecture "Grundlagen der Quantenmechanik and Spektroskopie" (Principles of Quantum Mechanics and Spectroscopy)

### Module offered by

Institute of Physical and Theoretical Chemistry

### ECTS

**10**

### Method of grading

**Numerical grade**

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

--

### Duration

**1 semester**

### Module level

Undergraduate

### Other prerequisites

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### Contents

German contents available but not translated yet.


### Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, grundlegende Modelle der Quantenmechanik zu erklären und bei Molekülen anzuwenden. Er/Sie kann unterschiedliche spektroskopische Methoden darstellen. Die Studierenden können die mathematischen Grundlagen der elementaren Quantenmechanik anwenden.

### Courses

**V (4) + Ü (2) + V (2)**

### Method of assessment

**a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)**

Language of assessment: German and/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)

--
Module title | Thermodynamics, Kinetics, Electrochemistry
---|---
Abbreviation | 08-PC-TKE-152-m01

Module coordinator | lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"
Module offered by | Institute of Physical and Theoretical Chemistry

<table>
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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

German contents available but not translated yet.


Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, die Hauptsätze der Thermodynamik zu erklären. Er/Sie kann thermodynamische Aspekte von Lösungen, Gasen, Mischphasen sowie elektrochemischen Reaktionen darstellen. Die Studierenden können chemische Reaktionen auf kinetischer Ebene interpretieren.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English creditable for bonus

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 I Nr. 1
Module title | Abbreviation
---|---
Physical Chemistry (lab) | 08-PCP-152-m01

Module coordinator
lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"

Module offered by
Institute of Physical and Theoretical Chemistry

ECTS | Method of grading | Only after succ. compl. of module(s)
---|---|---
9 | (not) successfully completed | 08-PC-QMS or 08-PC-TKE

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)
P (6)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

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 Chemistry

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>Quantum Chemistry</td>
<td>08-TC-152-m01</td>
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### Module coordinator

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<tbody>
<tr>
<td>3</td>
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</tbody>
</table>

### Contents

German contents available but not translated yet.


### Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, mit Hilfe grundlegender Konzepte und Modelle angeregte Zustände von Molekülen zu beschreiben.

### Courses

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of weekly contact hours</th>
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<tbody>
<tr>
<td>V</td>
<td>(2)</td>
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<tr>
<td>Ù</td>
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### Method of assessment

<table>
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<th>Scope</th>
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<tr>
<td>a) written examination</td>
<td>approx. 90 to 180 minutes</td>
<td>German and/or English</td>
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<tr>
<td>b) oral examination of one candidate each</td>
<td>20 to 30 minutes</td>
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<tr>
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<tr>
<td>d) log</td>
<td>approx. 20 pages</td>
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<tr>
<td>e) presentation</td>
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Language of assessment: German and/or English creditable for bonus

### Allocation of places

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### Additional information

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

§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
Module title: Symmetry, chemical bonding and light

Abbreviation: 08-PC-SBL-152-m01

Module coordinator: Lecturer of lecture "Symmetrie, chemische Bindung and Licht"

Module offered by: Institute of Physical and Theoretical Chemistry

ECTS: 9

Method of grading: numerical grade

Duration: 2 semester

Module level: undergraduate

Other prerequisites: --

Contents:
The module provides an introduction to the symmetry of molecules. It focuses on group theory, symmetry operations, point groups, character tables, and selection rules. The module deals with the chemical bond based on the qualitative MO theory and gives an introduction into the basics of computational chemistry. The module provides the opportunity to analyze the interactions between symmetry, chemical bonding and light in detail.

Intended learning outcomes:
The student is able to analyze the symmetry of molecules. He/She can imply on the spectroscopic properties of a molecule by its symmetry.

Courses:
V (3) + Ü (2) + V (2) + Ü (2)

Method of assessment:
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

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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Subfield Basics of Natural Sciences
(23 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Biochemistry 1</td>
<td>08-BC1-152-m01</td>
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**Module coordinator**
- holder of the Chair of Biochemistry

**Module offered by**
- Chair of Biochemistry

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</table>

**Duration**
- 1 semester

**Module level**
- undergraduate

**Other prerequisites**
- --

**Contents**
The module imparts the basic knowledge of biochemistry by lectures and tutorials. Main topics of the module Biochemistry 1 are particularly the biochemistry of proteins (amino acids, peptide bond, primary, secondary, tertiary and quaternary structure), catalytic strategies and enzyme kinetics, carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle, cellular respiration, photosynthesis), fatty acid metabolism (beta-oxidation, fatty acid synthesis), nucleotide metabolism, urea cycle and metabolism of amino acids. Additionally, the module conveys basic knowledge about the structure of DNA and the basics of passing and transformation of genetic information (central dogma).

**Intended learning outcomes**
The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

**Courses**
- V (2) + Ü (1)

**Method of assessment**
- written examination (approx. 60 to 90 minutes)

**Allocation of places**
- --

**Additional information**
- --

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
- § 42 I Nr. 2
- § 62 I Nr. 2
<table>
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<td>Mathematics for students in Chemistry and Biochemistry</td>
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<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
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<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

**Contents**

Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation and integration of functions in several variables, curve integrals, matrix calculus, power series.

**Intended learning outcomes**

The student is able to recognise and phrase questions from natural sciences as mathematical problems, apply basic mathematical methods to them and interpret the results.

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

V (3) + Ü (2)

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

written examination (approx. 90 to 120 minutes) and written exercises (approx. 25)

**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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<td>Introduction to Physics for Students of other Disciplines</td>
<td>11-EFNF-152-m01</td>
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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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<tbody>
<tr>
<td>2 semester</td>
<td>undergraduate</td>
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</table>

**Contents**
Mechanics, vibration theory, thermodynamics, optics, science of electricity, Atomic and Nuclear Physics.

**Intended learning outcomes**
The students have knowledge of the principles of Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)
V (4) + V (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (60 to 120 minutes)

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
### Module title
Laboratory Course Physics for Students of other Disciplines

### Abbreviation
11-PFN-152-m01

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

### Module offered by
Faculty of Physics and Astronomy

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<td>1 semester</td>
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### Contents
Simple experiments in the fields of mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics, imaging methods.

### Intended learning outcomes
The students have detected and understood physical contexts on the basis of the implementation of own experiments. They have a basic understanding of physical phenomena and know the basic ideas and ways of functioning of different measuring and imaging methods as well as their applications, especially in the field of Biomedicine.

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

P (4)

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

a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).

Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

### Allocation of places
Only as part of pool of general transferable skills (ASQ): 10 places (lottery)

### Additional information
--

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

--
**Module title**

Toxicology and legal studies

**Abbreviation**

03-TR-152-m01

---

**Module coordinator**

Lecturer of lecture "Toxikologie und Rechtskunde"

**Module offered by**

Faculty of Medicine

---

**ECTS**

3

**Method of grading**

Numerical grade

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

--

---

**Duration**

1 semester

**Module level**

Undergraduate

**Other prerequisites**

--

---

### Contents

Basics of legal regulations for chemists (handling and transportation of hazardous materials), fundamentals of toxicology.

---

### Intended learning outcomes

The students master the basics of legal regulations for chemists (handling and transport of hazardous substances) as well as the fundamentals of toxicology.

---

### Courses

V (1) + V (1)

---

### Method of assessment

Written examination (approx. 90 minutes)

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### Allocation of places

--

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### Additional information

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---

### Referred to in LPO I

(examination regulations for teaching-degree programmes)

§ 22 II Nr. 1 h)

§ 22 II Nr. 2 f)

§ 22 II Nr. 3 f)
Key Skills Area
(20 ECTS credits)
General Key Skills
(5 ECTS credits)

Students may select any of the modules offered as part of the pool of general transferable skills (ASQ) of JMU.
Subject-specific Key Skills
(15 ECTS credits)
Subject-specific Key Skills, Compulsory Courses
(5 ECTS credits)
### Module Catalogue for the Subject Chemistry

Bachelor's with 1 major, 180 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced laboratory course</td>
<td>08-VP-152-m01</td>
</tr>
</tbody>
</table>

#### Module coordinator

head of the research group offering the module

#### Module offered by

Faculty of Chemistry and Pharmacy

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
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<tbody>
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<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>undergraduate</td>
<td>--</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       | 10                      |

#### Method of assessment

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

talk (approx. 15 minutes)

Language of assessment: German and/or English

#### Allocation of places

--

#### Additional information

--

#### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
Subject-specific Key Skills, Compulsory Electives
(10 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry 2</td>
<td>08-BC2-152-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
holder of the Chair of Biochemistry

**Module offered by**
Chair of Biochemistry

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

**Contents**
The module imparts the basic knowledge of biochemistry by lectures and in-depth tutorials. Main topics of the module Biochemistry 2 are particularly Replication, DNA repair, transcription, mRNA maturation, translation and regulation of translation, protein targeting, nuclear transport, and protein degradation. Additionally the module conveys basic knowledge about the cellular signal transduction.

**Intended learning outcomes**
The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

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

V (2) + Ü (1)

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

written examination (approx. 60 to 90 minutes)

**Allocation of places**
--

**Additional information**
Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. II 2. Letter e) and No. II 1. Letter c) of Annex 1 of APOLmCh and No. 3 of Annex 3 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
### Module title
Practical course of Biochemistry

### Abbreviation
08-BCP-152-m01

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

### Contents
In this module the basics of scientific biochemical experimentation shall be practiced in practical exercises.

### Intended learning outcomes
After participating in the practical exercises the students master basic biochemical methods and are able to purposefully apply them.

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

**P (6)**

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

Log (approx. 30 pages)
Assessment offered: Once a year, summer semester

### Allocation of places
Students of the Bachelor's degree programme Biochemie (Biochemistry, 180 ECTS credits): no restrictions with regard to available places.

Students of the Bachelor's degree programme Chemie (Chemistry, 180 ECTS credits): no more than 6 places; places will be allocated according to the number of subject semesters, among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

### Additional information

---

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

---
Module title | Abbreviation
--- | ---
Applied Spectroscopy 3 | 08-PS3-152-m01

Module coordinator | Module offered by
lecturer of lecture "Praktische Spektroskopie 3" | Institute of Physical and Theoretical Chemistry

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

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

Contents

German contents available but not translated yet.

Das Modul bietet die Möglichkeit, das theoretische Wissen über spektroskopische Methoden praktisch umzusetzen und die erhaltenen Messwerte bzw. Graphen zu interpretieren. Im Detail werden UV/VIS-, Fluoreszenz- und Schwingungsspektren aufgenommen sowie analysiert. Im Modul werden zudem modernere Methoden der Massenspektrometrie behandelt.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, verschiedene Spektrometer zu bedienen und das erhaltene Spektrum zu interpretieren. Er/Sie kann eine Fehlerdiskussion durchführen.

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

V (3)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places

--

Additional information

--

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

--
Module title | Programming and numerical methods
---|---
Abbreviation | 08-PKC-152-m01

| Module coordinator | Module offered by |
---|---|
| lecturer of lecture "Programmierkurs für Chemiker" | Institute of Physical and Theoretical Chemistry |

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

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

**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 (2) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Assessment offered: Once a year, summer semester

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Advanced chemical practical course</td>
<td>08-OP-152-m01</td>
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**Module coordinator**  
head of the research group offering the module  

**Module offered by**  
Faculty of Chemistry and Pharmacy  

<table>
<thead>
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<th>ECTS</th>
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<tr>
<td>5</td>
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</table>

**Duration**  
undergraduate  

**Other prerequisites**  

**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 (10)  

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)  
a) talk (approx. 15 minutes) or b) log (approx. 10 to 20 pages)  
Language of assessment: German and/or English  

**Allocation of places**  
--  

**Additional information**  
--  

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

(10 ECTS credits)
Module title | Abbreviation
---|---
Bachelor Thesis | 08-BA-152-m01

Module coordinator | Module offered by
head of the research group offering the module | Faculty of Chemistry and Pharmacy

<table>
<thead>
<tr>
<th>ECTS</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
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</tbody>
</table>

Duration | Module level | Other prerequisites
1 semester | undergraduate | The supervisor may make the successful completion of certain modules that are relevant for the respective topic a prerequisite for the assignment of the topic.

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

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

Courses (type, number of weekly contact hours, language — if other than German)
No courses assigned to module

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Bachelor’s thesis (approx. 40 pages)
Language of assessment: German and/or English

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Compulsory Electives, Appendix DA
(170 ECTS credits)
Subfield General and Inorganic Chemistry
(35 ECTS credits)
Module title: Principles of Inorganic Chemistry  
Abbreviation: 08-AC1-152-m01

Module coordinator: Lecturer of lecture "Experimental Chemistry"  
Module offered by: Institute of Inorganic Chemistry

ECTS: 8  
Method of grading: Numerical grade  
Only after succ. compl. of module(s): --

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

Contents:
The module provides an overview of the fundamental knowledge of chemistry. Emphasis is placed on the material and particle level, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental concepts of chemistry and teaches the basics of inorganic chemistry.

Intended learning outcomes:
The student understands the principles of the periodic table and can obtain information from it. He/she is proficient in basic models of the structure of matter and can describe them properly. He/she can depict chemical reactions using typical chemical formula language and interpret them by identifying the type of reaction. The students know how the most important quantitative and qualitative analytical methods work and their areas of application.

Courses:
- V (4) + V (2)

Method of assessment:
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places:
--

Additional information:
--

Referred to in LPO I (examination regulations for teaching-degree programmes):
- § 42 I Nr. 1 and § 22 II Nr. 1 h)
- § 62 I Nr. 1
Module title | Abbreviation
---|---
Inorganic Chemistry 1 (lab) | 08-ACP1-152-m01

Module coordinator | Module offered by
holder of the Chair of Anorganic Chemistry | Institute of Inorganic Chemistry

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

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

Contents
The module provides the opportunity to apply the knowledge of the introductory lectures in a practical course. After a safety introduction the students experiment independently in the laboratory. Focuses are laboratory safety, basic laboratory techniques, synthesis of basic compounds and analysis of an unknown compound.

Intended learning outcomes
The student is able to identify basic chemical issues and to solve them experimentally. Therefore he/she can carry out the necessary stoichiometric calculations and correctly outline the chemical processes written and verbal.

Courses (type, number of weekly contact hours, language — if other than German)
P (12) + S (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
(a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) and Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Inorganic Chemistry of the Elements</td>
<td>08-AS1-152-m01</td>
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</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>lecturer of lecture &quot;Chemie der Hauptgruppeneleme-</td>
<td>Institute of Inorganic Chim-</td>
</tr>
<tr>
<td>nte&quot; (Chemistry of Main-group Elements)</td>
<td>istry)</td>
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<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
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</tbody>
</table>

### Contents

German contents available but not translated yet.


### Intended learning outcomes

German intended learning outcomes available but not translated yet.

Der/Die Studierende kann Hauptgruppenelemente und Übergangsmetall-Elemente hinsichtlich Struktur, Reaktivität und Herstellung charakterisieren. Er/Sie ist in der Lage, die Koordination der Atome zu erkennen und zu benennen. Zudem kann er/sie das Periodensystem als grundlegendes Werkzeug in der Chemie verwenden.

### Courses

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

V (2) + V (2)

### Method of assessment

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

### Allocation of places

--

### Additional information

--

### Referred to in LPO I

(examination regulations for teaching-degree programmes)

§ 62 I Nr. 1
Module title: Analytical Chemistry (lab)

Abbreviation: 08-ANP-152-m01

Module coordinator:
holder of the Chair of Anorganic Chemistry

Module offered by:
Institute of Inorganic Chemistry

ECTS:
6

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

(6 not) successfully completed: --

Duration:
1 semester

Module level:
undergraduate

Other prerequisites:
--

Contents:
The module provides the opportunity to apply the knowledge of the introductory lectures in a practical course. After a safety introduction the students experiment independently in the laboratory. Focuses are different analysis methods with unknown compounds.

Intended learning outcomes:
The student is able to analyze unknown compounds using different methods. He/She is able to separate and analyze mixtures.

Courses:
(type, number of weekly contact hours, language — if other than German)
P (12) + S (1)

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

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Assessment offered: Once a year, summer semester

Language of assessment: German and/or English

Allocation of places:
--

Additional information:
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title: Solid State Chemistry, Spectroscopic Methods (DD)
Abbreviation: 08-AC-FS-DA-152-m01

Module coordinator:
Lecturer of lecture "Festkörperchemie" (Solid State Chemistry)

Module offered by:
Institute of Inorganic Chemistry

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

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

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)
V (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places:
--

Additional information:
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Subfield Organic Chemistry
(28 ECTS credits)
Module title | Abbreviation
--- | ---
Organic Chemistry 1 | 08-OC1-152-m01

Module coordinator | Module offered by
holder of the Professorship of Organic Chemistry | Institute of Organic Chemistry

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tr>
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<table>
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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>undergraduate</td>
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</table>

Contents
German contents available but not translated yet.

Das Modul bietet einen Überblick über die elementaren Grundkenntnisse der organischen Chemie. Dazu wird die Bindungssituation am Kohlenstoff betrachtet und in die Nomenklatur einfacher und mäßig komplexer organischer Verbindungen eingeführt. Es werden Grundlagen der Stereochemie, Substitutions-, Additions- und Eliminierungsreaktionen sowie der Syntheseplanung vermittelt.

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


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

V (3) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places
--

Additional information
--

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

§ 62 I Nr. 2
### Module title
Organic Chemistry 2 and analytical methods in organic chemistry

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Organic Chemistry 2 and analytical methods in organic chemistry</td>
<td>08-OC2-152-m01</td>
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### Module coordinator
holder of the Chair of Physically Organic Chemistry

### Module offered by
Institute of Organic Chemistry

<table>
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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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</thead>
<tbody>
<tr>
<td>9</td>
<td>numerical grade</td>
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</tbody>
</table>

### Duration
1 semester

### 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)

V (3) + Ü (1) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

### Allocation of places
--

### Additional information
--

### Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title: Organic Chemistry - lab 1
Abbreviation: 08-OCP1-172-m01

Module coordinator: holder of the Chair of Organic Chemistry II
Module offered by: Institute of Organic Chemistry

ECTS: 8
Method of grading: Only after succ. compl. of module(s)
(08-OC1 and (08-ACP1 or 08-ANP))

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

Contents:
German contents available but not translated yet.

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

Courses:
P (14)

Method of assessment:
Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places:
--

Additional information:
--

Referred to in LPO I:
(examination regulations for teaching-degree programmes)
--
Module title
Organic Chemistry 3 (DD)

Abbreviation
08-OC-OC3-DA-152-m01

Module coordinator
holder of the Professorship of Organic Chemistry

Module offered by
Institute of Organic Chemistry

ECTS
6

Method of grading
numerical grade

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

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
The module focuses on polar rearrangements, olefination reactions, pericyclic reactions, carbenes, nitriles and radicals. It imparts basic knowledge of stereoselective synthesis, asymmetric catalysis, organometallic chemistry and retrosynthesis.

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


Courses
V (2) + Ü (2)

Method of assessment
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places
--

Additional information
--

Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
Subfield Physical and Theoretical Chemistry
(37 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Principles of quantum mechanics and spectroscopy</td>
<td>08-PC-QMS-152-m01</td>
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<th>Module coordinator</th>
<th>Module offered by</th>
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<tr>
<td>lecturer of lecture &quot;Grundlagen der Quantenmechanik and Spektroskopie&quot; (Principles of Quantum Mechanics and Spectroscopy)</td>
<td>Institute of Physical and Theoretical Chemistry</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tr>
</tbody>
</table>

**Contents**

German contents available but not translated yet.


**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, grundlegende Modelle der Quantenmechanik zu erklären und bei Molekülen anzuwenden. Er/Sie kann unterschiedliche spektroskopische Methoden darstellen. Die Studierenden können die mathematischen Grundlagen der elementaren der Quantenmechanik anwenden.

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

V (4) + Ü (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English creditable for bonus

**Allocation of places**

--

**Additional information**

--

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

--
Module title | Abbreviation
--- | ---
Thermodynamics, Kinetics, Electrochemistry | 08-PC-TKE-152-m01

Module coordinator | Module offered by
lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie" | Institute of Physical and Theoretical Chemistry

<table>
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<tbody>
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Contents

German contents available but not translated yet.


Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, die Hauptsätze der Thermodynamik zu erklären. Er/Sie kann thermodynamische Aspekte von Lösungen, Gasen, Mischphasen sowie elektrochemischen Reaktionen darstellen. Die Studierenden können chemische Reaktionen auf kinetischer Ebene interpretieren.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English creditable for bonus

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 I Nr. 1
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<td>Physical Chemistry (lab)</td>
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**Module coordinator**

lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"

**Module offered by**

Institute of Physical and Theoretical Chemistry

**ECTS**

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**Duration**

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**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)

P (6)

**Method of assessment**

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

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

**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>
<th>Abbreviation</th>
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<td>Quantum Chemistry</td>
<td>08-TC-152-m01</td>
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</table>

**Module coordinator**

lecturer of lecture "Quantenchemie"

**Module offered by**

Institute of Physical and Theoretical Chemistry

**ECTS** | **Method of grading**          | **Only after succ. compl. of module(s)** |
----------|---------------------------------|----------------------------------------|
3         | 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.

Die Studierenden sind in der Lage, mit Hilfe grundlegender Konzepte und Modelle angeregte Zustände von Molekülen zu beschreiben.

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

V (2) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English creditable for bonus

**Allocation of places**

--

**Additional information**

--

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

§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
### Module title

Symmetry, chemical bonding and light (DD)

### Abbreviation

08-PC-SBL-DA-152-m01

### Module coordinator

lecturer of lecture "Symmetrie, chemische Bindung und Licht"

### Module offered by

Institute of Physical and Theoretical Chemistry

### ECTS

6

### Method of grading

numerical grade

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

--

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

--

### Contents

The module provides an introduction to the symmetry of molecules. It focuses on group theory, symmetry operations, point groups, character tables, and selection rules. The module deals with the chemical bond based on the qualitative MO theory and gives an introduction into the basics of computational chemistry.

### Intended learning outcomes

The student is able to analyze the symmetry of molecules. He/She can imply on the spectroscopic properties of a molecule by its symmetry.

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

V (3) + Ü (2)

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

- a) written examination (approx. 90 to 180 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or
- d) log (approx. 20 pages) or
- e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

### Allocation of places

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### Additional information

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

--
Subfield Basics of Natural Sciences
(20 ECTS credits)
Module title
Biochemistry 1

Abbreviation
08-BC1-152-m01

Module coordinator
holder of the Chair of Biochemistry

Module offered by
Chair of Biochemistry

ECTS
5

Method of grading
numeral grade

Only after succ. compl. of module(s)

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
The module imparts the basic knowledge of biochemistry by lectures and tutorials. Main topics of the module Biochemistry 1 are particularly the biochemistry of proteins (amino acids, peptide bond, primary, secondary, tertiary and quaternary structure), catalytic strategies and enzyme kinetics, carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle, cellular respiration, photosynthesis), fatty acid metabolism (beta-oxidation, fatty acid synthesis), nucleotide metabolism, urea cycle and metabolism of amino acids. Additionally the module conveys basic knowledge about the structure of DNA and the basics of passing and transformation of genetic information (central dogma).

Intended learning outcomes
The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (1)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (approx. 60 to 90 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)
§ 42 I Nr. 2
§ 62 I Nr. 2
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<th>Module title</th>
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<td>Mathematics for students in Chemistry and Biochemistry</td>
<td>10-M-MCH-172-m01</td>
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<th>Module offered by</th>
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<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

### Contents

Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation and integration of functions in several variables, curve integrals, matrix calculus, power series.

### Intended learning outcomes

The student is able to recognise and phrase questions from natural sciences as mathematical problems, apply basic mathematical methods to them and interpret the results.

### Courses

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

V (3) + Ü (2)

### Method of assessment

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

written examination (approx. 90 to 120 minutes) and written exercises (approx. 25)

### 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>Introduction to Physics for Students of other Disciplines</td>
<td>11-EFNF-152-m01</td>
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</table>

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

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

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

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

**Contents**
Mechanics, vibration theory, thermodynamics, optics, science of electricity, Atomic and Nuclear Physics.

**Intended learning outcomes**
The students have knowledge of the principles of Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)
V (4) + V (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (60 to 120 minutes)

**Allocation of places**
--

**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>
<th>Abbreviation</th>
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<td>Laboratory Course Physics for Students of other Disciplines</td>
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<tbody>
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<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
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</tbody>
</table>

**Contents**

Simple experiments in the fields of mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics, imaging methods.

**Intended learning outcomes**

The students have detected and understood physical contexts on the basis of the implementation of own experiments. They have a basic understanding of physical phenomena and know the basic ideas and ways of functioning of different measuring and imaging methods as well as their applications, especially in the field of Biomedicine.

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

P (4)

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

a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).

Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

**Allocation of places**

Only as part of pool of general transferable skills (ASQ): 10 places (lottery)

**Additional information**

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

--
Subfield Competences from foreign university
(50 ECTS credits)
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<tbody>
<tr>
<td>2 semester</td>
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Contents
The topics covered in this module correspond to the syllabus of the foreign partner university.

Intended learning outcomes
German intended learning outcomes available but not translated yet.
Die Studierenden erwerben Kompetenzen entsprechend den besuchten Veranstaltungen an der Partneruniversität.

Courses (type, number of weekly contact hours, language — if other than German)
No courses assigned to module
Course(s) as specified by partner university abroad

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Assessments as specified by partner university abroad
Language of assessment: German and/or language spoken at partner university abroad

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
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<table>
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<td>Please consult with course advisory service in advance.</td>
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</table>

**Contents**

The topics covered in this module correspond to the syllabus of the foreign partner university.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Die Studierenden erwerben Kompetenzen entsprechend den besuchten Veranstaltungen an der Partneruniversität.

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

No courses assigned to module

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

Assessments as specified by partner university abroad

Language of assessment: German and/or language spoken at partner university abroad

**Allocation of places**

--

**Additional information**

--

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

--
Thesis

(10 ECTS credits)
### Module title

Bachelor Thesis

### Abbreviation

08-BA-152-m01

### Module coordinator

head of the research group offering the module

### Module offered by

Faculty of Chemistry and Pharmacy

### ECTS

10

### Method of grading

Numerical grade

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

--

### Duration

1 semester

### Module level

Undergraduate

### Other prerequisites

The supervisor may make the successful completion of certain modules that are relevant for the respective topic a prerequisite for the assignment of the topic.

### 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

No courses assigned to module

### Method of assessment

Bachelor’s thesis (approx. 40 pages)

Language of assessment: German and/or English

### Allocation of places

--

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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