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

Examination regulations version: 2014
Responsible: Institute of Mathematics
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Bachelor’s with 1 major, 180 ECTS credits

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Content and Objectives of the Programme

The mathematics Bachelor programme is offered by the Department of Mathematics, with a total of currently (SS 2010) 9 chairs.

At the end of this course of study, the student should be familiar with the main branches of mathematics, taught methods of mathematical reasoning and working as well as analytical thinking, abstract concepts and the ability to recognize and construct complex structures and interconnections.

Through the course these skills which the students acquire provide the basic knowledge required for a consecutive Bachelor-Masters degree. Moreover, they can later familiarize themselves with the many areas of society which mathematical methods can be applied to or be of use. This is supported through the study of an integrated elective application-oriented subject (biology, chemistry, geography, computer science, philosophy, physics or economics) in which the students’ choice is trusted to utilize the basic ideas and technical skills of the subject where mathematical methods apply.

In the mathematics Bachelor study, the main emphasis is put on basic mathematical knowledge, method knowledge and the development of the mental constructs which are typical for mathematics. The acquisition of special topics in different secondary branches of mathematics is subordinate.

For the Bachelor thesis the student should work on a thematic and temporally closely limited frame in order to carry out a mathematical task, using well-known procedures and scientific criteria under guidance but, to a large extent, independently.

The exam enables the acquisition of a comparable, international degree in the field of mathematics and provides the framework of a consecutive Bachelor-Masters degree as an initial professional qualification which can be used as a mean for entry into the working world or as preparation for further Masters study.

The exam should ascertain whether the candidate overlooks the context of the basics in mathematics and possesses the ability to use the corresponding scientific methods, with regards to mathematics and the selected elective application-oriented subjects.
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: \( \text{NUM} = \) numerical grade, \( B/NB = \) (not) successfully completed

Regulations: \( \text{LASPO} = \) general academic and examination regulations (for teaching-degree programmes), \( \text{FSB} = \) subject-specific provisions, \( \text{SFB} = \) 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:

\( \text{ASPO2009} \)

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

\( 24\text{-Mar-2014 (2014-4)} \)

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

(109 ECTS credits)
Compulsory Courses Analysis
(29 ECTS credits)
### Module Catalogue for the Subject Mathematics

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

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<td>Institute of Mathematics</td>
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### Contents

Real numbers and completeness, basic topological notions, convergence and divergence of sequences and series, differential and integral calculus in one variable.

### Intended learning outcomes

The student knows and masters the essential methods and notions of analysis. He/She is acquainted with the central proof methods in analysis and can employ them to solve easy problems. He/she is able to perform easy mathematical arguments independently and to express mathematical arguments precisely and clearly in written form.

### Courses

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

### Method of assessment

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<th>Language</th>
<th>Examination offered</th>
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<td>(approx. 90 to 180 minutes) and approx. 12 exercise sheets with approx. 4 exercises each</td>
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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)

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### Contents

Real numbers and completeness, basic topological notions, convergence and divergence of sequences and series, differential and integral calculus in one variable, further topological considerations, differential calculus with a focus on functions in several variables.

### Intended learning outcomes

The student knows and masters the essential methods and proof techniques of analysis and is able to apply them independently, He/She has an overview over the fundamental notions and concepts of analysis, their analytic background and geometric interpretation, and can interconnect them and express them adequately in written and oral form.

### Courses

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

### Method of assessment

oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-ANA-G and 10-M-ANA-Ü.

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

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<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Analysis</td>
<td>10-M-VAN-131-m01</td>
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</table>

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

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
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<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

**Contents**
Continuation of analysis in several variables, integration theorems.

**Intended learning outcomes**
The student is acquainted with advanced topics in analysis. Taking the example of the Lesbegue integral, he or she is able to understand the construction of a complex mathematical concept.

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (approx. 90 to 180 minutes); if announced by the lecturer at the beginning of the course, 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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Compulsory Courses Linear Algebra
(20 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals Linear Algebra</td>
<td>10-M-LNA-G-131-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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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tr>
</tbody>
</table>

**Contents**

Basic notions and structures; vector spaces, linear maps, systems of linear equations; theory of matrices and determinants.

**Intended learning outcomes**

The student knows and masters the basic notions and essential methods of linear algebra. He/She is acquainted with the central proof methods in linear algebra and can apply them to solve easy problems. He/She is able to perform simple mathematical arguments independently, and can present them adequately in written form.

**Courses**

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

**Method of assessment**

written examination (approx. 90 to 180 minutes) and approx. 12 exercise sheets with approx. 4 exercises each

Language of assessment: German, English

**Allocation of places**

--

**Additional information**

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

--
### Module title
Overview Linear Algebra

### Abbreviation
10-M-LNA-Ü-131-m01

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

### Module offered by
Institute of Mathematics

### ECTS
12

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Basic notions and structures; vector spaces, linear maps and systems of linear equations; theory of matrices and determinants; eigenvalue theory; bilinear forms and Euclidean/unitary vector spaces; diagonalisability and Jordan normal form.

### Intended learning outcomes
The student knows and masters the essential methods and proof techniques of linear algebra and is able to apply them independently. He/She has an overview over the fundamental notions and methods of linear algebra, knows about their algebraic and geometric background, is able to relate them to each other and can present them adequately in written and oral form.

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

### Method of assessment
oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-ANA-G and 10-M-ANA-Ü.

### Language of assessment
German, English

### Allocation of places
--

### Additional information
--

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

--
Compulsory Courses Applied Mathematics
(20 ECTS credits)
## Module Catalogue for the Subject Mathematics

**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>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

### Contents

One of the following topics in applied mathematics:

- **Numerical Mathematics 1** (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)

- **Numerical Mathematics 2** (Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems)

- **Stochastics 1** (Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem)

- **Stochastics 2** (Elements of data analysis, statistics of data in normal and other distributions, elements of multivariate statistics)

### Intended learning outcomes

The student knows and masters the fundamental methods and notions of some field in applied mathematics. He/She is acquainted with the central concepts and algorithms in this field, can apply them independently and knows about the possibilities and limitations of their applicability.

### Courses

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

### Method of assessment

- **written examination** (approx. 90 to 180 minutes); if announced by the lecturer at the beginning of the course, 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

### Allocation of places

- --

### Additional information

- --

### Referred to in LPO I

---

**Bachelor’s with 1 major Mathematics (2014)**

**JMU Würzburg • generated 21-Jan-2020 • exam. reg. data record Bachelor (180 ECTS) Mathematik - 2014**

**page 17 / 182**
# Module Catalogue for the Subject Mathematics

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

### Module title
Overview Applied Mathematics

### Abbreviation
10-M-ANW-Ü-131-m01

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

### Module offered by
Institute of Mathematics

### ECTS
12

### Method of grading
Numerical grade

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

### Duration
1 semester

### Module level
Undergraduate

### Other prerequisites
--

### Contents
Two of the following topics in applied mathematics:

**Numerical Mathematics 1** (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)

**Numerical Mathematics 2** (Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems)

**Stochastics 1** (Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem)

**Stochastics 2** (Elements of data analysis, statistics of data in normal and other distributions, elements of multivariate statistics)

### Intended learning outcomes
The student knows and masters the fundamental methods and notions of some field in applied mathematics. He/She is acquainted with the central concepts and algorithms in this field, can apply them independently and knows about the possibilities and limitations of their applicability.

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

### Method of assessment
Oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the sub-field dealt with in module 10-M-ANW-G as well as an additional sub-field of applied mathematics as selected by the candidate. Language of assessment: German, 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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Bachelor's with 1 major Mathematics (2014) • JMU Würzburg • generated 21-Jan-2020 • exam. reg. data record Bachelor (180 ECTS) Mathematik - 2014 • page 18 / 182
Compulsory Courses Pure Mathematics
(20 ECTS credits)
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<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Fundamentals Pure Mathematics</td>
<td>10-M-REI-G-131-m01</td>
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</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

### Contents

One of the following topics in pure mathematics:

- **Introduction to Algebra** (Fundamental algebraic structures: groups, rings, fields; Galois theory)
- **Introduction to Differential Geometry** (Curves in Euclidean spaces, curvature, Frenet equations, local classification, submanifolds in Euclidean spaces, hypersurfaces in particular, curvature of hypersurfaces, geodesics, isometries, main theorem on local surface theory, special classes of surfaces)
- **Ordinary Differential Equations** (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)
- **Introduction to Complex Analysis** (Complex differentiability and Cauchy-Riemann differential equations, path integrals and Cauchy integral theorems, isolated singularities, meromorphic functions and Laurent series, residue theorem and applications, Weierstraß product theorem and theorem of Mittag-Leffler, conformal maps)
- **Geometric Analysis** (Fundamentals in analysis on manifolds, submanifolds, calculus of differential forms, Stokes's theorem and applications in vector analysis and topology)
- **Introduction to Projective Geometry** (Projective and affine planes, projective and affine spaces, theorem of Desargues, fundamental theorems for projective spaces, dualities and polarities of projective spaces).

### Intended learning outcomes

The student knows and masters the essential methods and basic notions in one branch of pure mathematics. He/She is acquainted with the central concepts in this field, and is able to apply the fundamental proof methods independently.

### Courses

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

### Method of assessment

- **written examination** (approx. 90 to 180 minutes); if announced by the lecturer at the beginning of the course, 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
# Overview Pure Mathematics

<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Overview Pure Mathematics</td>
<td>10-M-REI-Ü-131-m01</td>
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## Module coordinator
Dean of Studies Mathematik (Mathematics)

## Module offered by
Institute of Mathematics

## ECTS Method of grading
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<th>Method of grading</th>
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## Duration Module level
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<th>Duration</th>
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<tbody>
<tr>
<td>1 semester</td>
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## Contents
Two of the following topics in pure mathematics:

**Introduction to Algebra** (Fundamental algebraic structures: groups, rings, fields; Galois theory)

**Introduction to Differential Geometry** (Curves in Euclidean spaces, curvature, Frenet equations, local classification, submanifolds in Euclidean spaces, hypersurfaces in particular, curvature of hypersurfaces, geodesics, isometries, main theorem on local surface theory, special classes of surfaces)

**Ordinary Differential Equations** (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)

**Introduction to Complex Analysis** (Complex differentiability and Cauchy-Riemann differential equations, path integrals and Cauchy integral theorems, isolated singularities, meromorphic functions and Laurent series, residue theorem and applications, Weierstraß product theorem and theorem of Mittag-Leffler, conformal maps)

**Geometric Analysis** (Fundamentals in analysis on manifolds, submanifolds, calculus of differential forms, Stoke's theorem and applications in vector analysis and topology)

**Introduction to Projective Geometry** (Projective and affine planes, projective and affine spaces, theorem of Desargues, fundamental theorems for projective spaces, dualities and polarities of projective spaces).

## Intended learning outcomes
The student knows and masters the essential methods and basic notions in two branches of pure mathematics. He/She has an overview over the central concepts and proof methods in these fields, and is able to present their interrelations and mathematical background adequately both orally and in written form.

## Courses

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

## Method of assessment

- Oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the sub-field dealt with in module 10-M-REI-G as well as an additional sub-field of pure mathematics as selected by the candidate.
- Language of assessment: German, English.
Compulsory Courses Specialisation Mathematics
(20 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Fundamentals Advanced Mathematics</td>
<td>10-M-SPZ-G-131-m01</td>
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<th>Duration</th>
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<tbody>
<tr>
<td>1 semester</td>
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</tbody>
</table>

### Contents

One of the following topics in pure or applied mathematics which has not been chosen as subject of assessment in module 10-M-ANW-Ü or 10-M-REI-Ü:

**Numerical Mathematics 1** (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)

**Numerical Mathematics 2** (Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems)

**Stochastics 1** (Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem)

**Stochastics 2** (Elements of data analysis, statistics of data in normal and other distributions, elements of multivariate statistics)

**Introduction to Algebra** (Fundamental algebraic structures: groups, rings, fields; Galois theory)

**Introduction to Differential Geometry** (Curves in Euclidean spaces, curvature, Frenet equations, local classification, submanifolds in Euclidean spaces, hypersurfaces in particular, curvature of hypersurfaces, geodesics, isometries, main theorem on local surface theory, special classes of surfaces)

**Ordinary Differential Equations** (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)

**Introduction to Complex Analysis** (Complex differentiability and Cauchy-Riemann differential equations, path integrals and Cauchy integral theorems, isolated singularities, meromorphic functions and Laurent series, residue theorem and applications, Weierstraß product theorem and theorem of Mittag-Leffler, conformal maps)

**Geometric Analysis** (Fundamentals in analysis on manifolds, submanifolds, calculus of differential forms, Stoke's theorem and applications in vector analysis and topology)

**Introduction to Projective Geometry** (Projective and affine planes, projective and affine spaces, theorem of Desargues, fundamental theorems for projective spaces, dualities and polarities of projective spaces)

**Introduction to partial differential equations** (Examples of partial differential equations and partial differential equations of first order, existence and uniqueness theorems, basic equations of mathematical physics, boundary value problems, maximum principle and Dirichlet problem.)

**Introduction to Discrete Mathematics** (Techniques from combinatorics, introduction to graph theory including applications, cryptographic methods, error-correcting codes)

**Introduction to Functional Analysis** (Banach spaces and Hilbert spaces, bounded operators, principles of functional analysis)

**Operations Research** (Linear programming, duality theory, transport problems, integral linear programming, graph theoretic problems)

**Introduction to Number Theory** (Elementary properties of divisibility, prime numbers and prime number factorisation, modular arithmetics, prime tests and methods for factorisation, structure of the residue class rings, theory of quadratic remainder, quadratic forms, diophantine approximation and diophantine equations).

### Intended learning outcomes

The student knows and masters the essential methods and basic notions in one branch of pure or applied mathematics. He/She is acquainted with the central concepts in this field, and is able to apply the fundamental proof methods independently.
<table>
<thead>
<tr>
<th>Courses (type, number of weekly contact hours, language — if other than German)</th>
<th>V + Ü (no information on SWS (weekly contact hours) and course language available)</th>
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<table>
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<th>Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</th>
<th>written examination (approx. 90 to 180 minutes); if announced by the lecturer at the beginning of the course, 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)</th>
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<table>
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<th>Allocation of places</th>
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</table>

<table>
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<tr>
<th>Additional information</th>
<th>---</th>
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</thead>
</table>

| Referred to in LPO I (examination regulations for teaching-degree programmes) | --- |
Module title | Abbreviation
--- | ---
Overview Advanced Mathematics | 10-M-SPZ-Ü-131-m01

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

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

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

Contents

Two of the following topics in pure or applied mathematics which have not been chosen as subject of assessment in module 10-M-ANW-Ü or 10-M-REI-Ü:

**Numerical Mathematics 1** (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)

**Numerical Mathematics 2** (Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems)

**Stochastics 1** (Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem)

**Stochastics 2** (Elements of data analysis, statistics of data in normal and other distributions, elements of multivariate statistics)

**Introduction to Algebra** (Fundamental algebraic structures: groups, rings, fields; Galois theory)

**Introduction to Differential Geometry** (Curves in Euclidean spaces, curvature, Frenet equations, local classification, submanifolds in Euclidean spaces, hypersurfaces in particular, curvature of hypersurfaces, geodesics, isometries, main theorem on local surface theory, special classes of surfaces)

**Ordinary Differential Equations** (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)

**Introduction to Complex Analysis** (Complex differentiability and Cauchy-Riemann differential equations, path integrals and Cauchy integral theorems, isolated singularities, meromorphic functions and Laurent series, residue theorem and applications, Weierstrass product theorem and theorem of Mittag-Leffler, conformal maps)

**Geometric Analysis** (Fundamentals in analysis on manifolds, submanifolds, calculus of differential forms, Stokes' theorem and applications in vector analysis and topology)

**Introduction to Projective Geometry** (Projective and affine planes, projective and affine spaces, theorem of Desargues, fundamental theorems for projective spaces, dualities and polarities of projective spaces)

**Introduction to partial differential equations** (Examples of partial differential equations and partial differential equations of first order, existence and uniqueness theorems, basic equations of mathematical physics, boundary value problems, maximum principle and Dirichlet problem.)

**Introduction to Discrete Mathematics** (Techniques from combinatorics, introduction to graph theory including applications, cryptographic methods, error-correcting codes)

**Introduction to Functional Analysis** (Banach spaces and Hilbert spaces, bounded operators, principles of functional analysis)

**Operations Research** (Linear programming, duality theory, transport problems, integral linear programming, graph theoretic problems)

**Introduction to Number Theory** (Elementary properties of divisibility, prime numbers and prime number factorisation, modular arithmetics, prime tests and methods for factorisation, structure of the residue class rings, theory of quadratic remainder, quadratic forms, diophantine approximation and diophantine equations).

**Intended learning outcomes**

The student knows and masters the essential methods and basic notions in two specialised fields of mathematics. He/She has an overview over the central concepts and fundamental proof methods in these fields, and is able to present their interrelations and mathematical background adequately both orally and in written form.
| Courses (type, number of weekly contact hours, language — if other than German) |
| V + Ü (no information on SWS (weekly contact hours) and course language available) |

| Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) |
| oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the sub-field dealt with in module 10-M-SPZ-G as well as an additional sub-field of the specialisation mathematics as selected by the candidate |
| Language of assessment: German, English |

<table>
<thead>
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<th>Allocation of places</th>
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<table>
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<tr>
<th>Referred to in LPO I (examination regulations for teaching-degree programmes)</th>
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</table>
Compulsory Electives

(40 ECTS credits)
Compulsory Electives Mathematics
(max. 10 ECTS credits)
### Module title
Introduction to Stochastics Financial Mathematics

### Abbreviation
10-M-EFM-131-m01

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

### Module offered by
Institute of Mathematics

### ECTS
9

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Arbitrage and no-arbitrage, annuities and bonds, valuation of deterministic cash flows, actuarial present value, term structures and yield curves, forwards, payout profiles of options and other derivates, fundamental theorem of asset pricing in the stochastic one-period model, risk neutral price measures, replication and completeness, stochastic multi-period models, valuation of European options in the binomial model, Black-Scholes formula.

### Intended learning outcomes
The student is acquainted with the fundamental concepts and methods of stochastic financial mathematics, can apply them to practical problems and knows about typical fields of application.

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

### Method of assessment
written examination (approx. 90 to 180 minutes); if announced by the lecturer at the beginning of the course, 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

### Allocation of places
--

### Additional information
--

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

--
Module Catalogue for the Subject Mathematics
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>Selected Topics from Mathematics</td>
<td>10-M-ERG-131-m01</td>
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</table>

Module coordinator: Dean of Studies Mathematik (Mathematics)

Module offered by: Institute of Mathematics

ECTS: 10

Method of grading: numerical grade

Duration: 1 semester

Module level: undergraduate

Other prerequisites: --

Contents:

One of the following topics in pure or applied mathematics which has not been chosen as subject of assessment in modules 10-M-REI-Ü, 10-M-ANW-Ü and 10-M-SPZ-Ü:

**Numerical Mathematics 1** (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)

**Numerical Mathematics 2** (Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems)

**Stochastics 1** (Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem)

**Stochastics 2** (Elements of data analysis, statistics of data in normal and other distributions, elements of multivariate statistics)

**Introduction to Algebra** (Fundamental algebraic structures: groups, rings, fields; Galois theory)

**Introduction to Differential Geometry** (Curves in Euclidean spaces, curvature, Frenet equations, local classification, submanifolds in Euclidean spaces, hypersurfaces in particular, curvature of hypersurfaces, geodesics, isometries, main theorem on local surface theory, special classes of surfaces)

**Ordinary Differential Equations** (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)

**Introduction to Complex Analysis** (Complex differentiability and Cauchy-Riemann differential equations, path integrals and Cauchy integral theorems, isolated singularities, meromorphic functions and Laurent series, residue theorem and applications, Weierstraß product theorem and theorem of Mittag-Leffler, conformal maps)

**Geometric Analysis** (Fundamentals in analysis on manifolds, submanifolds, calculus of differential forms, Stoke's theorem and applications in vector analysis and topology)

**Introduction to Projective Geometry** (Projective and affine planes, projective and affine spaces, theorem of Desargues, fundamental theorems for projective spaces, dualities and polarities of projective spaces)

**Introduction to partial differential equations** (Examples of partial differential equations and partial differential equations of first order, existence and uniqueness theorems, basic equations of mathematical physics, boundary value problems, maximum principle and Dirichlet problem.)

**Introduction to Discrete Mathematics** (Techniques from combinatorics, introduction to graph theory including applications, cryptographic methods, error-correcting codes)

**Introduction to Functional Analysis** (Banach spaces and Hilbert spaces, bounded operators, principles of functional analysis)

**Operations Research** (Linear programming, duality theory, transport problems, integral linear programming, graph theoretic problems)

**Introduction to Number Theory** (Elementary properties of divisibility, prime numbers and prime number factorisation, modular arithmetic, prime tests and methods for factorisation, structure of the residue class rings, theory of quadratic remainder, quadratic forms, diophantine approximation and diophantine equations).

Intended learning outcomes:

The student is acquainted with advanced concepts and methods of pure and/or applied mathematics. Based on these fundamental mathematical concepts and methods he/she is able to pursue further studies and interrelate these concepts, and he/she knows about interrelations of the acquired knowledge.
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<th>Courses</th>
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| Allocation of places  | --                                                                 |

| Additional information | --                                                                 |

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### Contents

Historical and cultural development as well as social relevance of mathematics; more in-depth discussion of the fundamentals of mathematics, in particular in its relation to other sciences and humanities as well as to the image of mathematics in modern society.

### Intended learning outcomes

Based on selected examples, the student has gained insight into the historical and cultural genesis of mathematical theories and their social relevance. He/she is able to present mathematical ideas and concepts to a general audience.

### Courses

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

### Method of assessment

project assignment (approx. 60 to 120 minutes)

Assessment offered: in the semester in which the course is offered and in the subsequent semester

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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### Module title
Mathematical Writing

### Abbreviation
10-M-MSC-131-m01

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

### Module offered by
Institute of Mathematics

### ECTS
4

### 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
Discussion of good and bad mathematical writing using practical exercises and case examples. The course covers the whole range of mathematical texts from short proofs and the formulation of theorems and definitions to comprehensive works such as Bachelor's or Master's theses. Important aspects include not only mathematical rigour and efficiency but also didactic questions.

### Intended learning outcomes
The student is able to formulate mathematical subject matter precisely and comprehensibly. He/She knows about the structures and conventions of mathematical literature and the requirements of scientific work.

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

### Method of assessment
project assignment (approx. 60 to 120 minutes)
Assessment offered: in the semester in which the course is offered and in the subsequent semester
Language of assessment: German, English

### Allocation of places
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### Additional information
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**Contents**

Selected basic topics in mathematics.

**Intended learning outcomes**

The student gains first experience with independent scientific work. He/She masters elaboration and structuring of a given topic using selected literature, and prepares a talk on the subject. He/She is able to participate actively in a scientific discussion.

**Courses**

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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)
Module title
School Mathematics from a Higher Perspective

Abbreviation
10-M-SCH-131-m01

Module coordinator
Dean of Studies Mathematik (Mathematics)

Module offered by
Institute of Mathematics

ECTS
4

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

Duration
1 semester

Module level
undergraduate

Other prerequisites
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Contents
Discussion of selected topics in school mathematics with respect to their integration into wider theories and their didactic implementation at both school and university levels.

Intended learning outcomes
By means of selected examples, the student gains insight into the interrelation between school mathematics and advanced mathematical theories. He/She is able to discuss these under mathematical, didactical and methodical aspect.

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

Method of assessment
project assignment (approx. 60 to 120 minutes)
Assessment offered: in the semester in which the course is offered and in the subsequent semester
Language of assessment: German, English

Allocation of places
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Additional information
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**Contents**

A selected topic in mathematics.

**Intended learning outcomes**

The student gains first experience with independent scientific work. He/She masters elaboration and structuring of a given topic using selected literature, and prepares a talk on the subject. He/She is able to participate actively in a scientific discussion.

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

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

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

talk (approx. 60 to 120 minutes)

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)

--
Application-oriented Subject

(30-40 ECTS credits)

Students must take one of the following application-oriented subjects, each with the specified mandatory courses and/or mandatory electives: Biologie (Biology), Chemie (Chemistry), Geographie (Geography), Informatik (Computer Science), Philosophie (Philosophy), Physik (Physics), Wirtschaftswissenschaft (Business Management and Economics).
Application-oriented Subject Biology
(30-40 ECTS credits)
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<tr>
<th>Module title</th>
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<td>The Plant Kingdom (AF)</td>
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<td>holder of the Chair of Plant Physiology and Biophysics</td>
<td>Faculty of Biology</td>
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**Contents**

Using the example of plants, students will be introduced to the phylogenetic diversity of eukaryotes. At the level of groups in the plant kingdom, students will acquire the fundamental knowledge necessary to understand the forms and functions of plant organisms, with morphology and cytology being discussed in an evolutionary and ecological context.

**Intended learning outcomes**

- Familiarity with the concepts of phylogenetic relationships between plants.
- Familiarity with the distinguishing characteristics and major representatives of groups in the plant kingdom.
- Ability to select those plant organisms that are most suitable for investigating particular scientific issues.
- Familiarity with the components and functioning of microscopes.
- Fundamental skills in the interpretation of macroscopic and histological preparations by light microscopy.
- Fundamental preparation skills.

**Courses**

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

**Method of assessment**

written examination (approx. 60 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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<table>
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<th>Module title</th>
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<td>Evolution and the Animal Kingdom (AF)</td>
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**Module coordinator**
holder of the Professorship of Zoology at the Department of Electronmicroscopy

**Module offered by**
Faculty of Biology

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**Contents**
This module will address one of the central issues of biology: evolution. Fundamental mechanisms and hypotheses will be discussed, and students will be introduced to major phylogenetic reconstruction methods. Using the example of animals, students will be introduced to the phylogenetic diversity of eukaryotes. At the level of groups in the animal kingdom, students will acquire the fundamental knowledge necessary to understand the forms and functions of animal organisms, with morphology and cytology being discussed in an evolutionary and ecological context.

**Intended learning outcomes**
- Ability to recognise evolution as the driving force behind the phylogeny of species. - Familiarity with the concepts of phylogenetic relationships between plants/animals. - Familiarity with the distinguishing characteristics and major representatives of groups in the animal kingdom. - Ability to select those animal organisms that are most suitable for investigating particular scientific issues. - Familiarity with the components and functioning of microscopes. - Fundamental skills in the interpretation of macroscopic and histological preparations by light microscopy. - Fundamental preparation skills.

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

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

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

written examination (approx. 60 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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## Plant Physiology (AF)

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### Contents

This module will acquaint students with the principles of general plant physiology and will provide them with an opportunity to develop the fundamental skills for working in a biological laboratory. The module will first address the biochemistry of the cell and will then move on to discuss the physiological processes that regulate the internal environment of plants in particular. Using the example of plants, the module will introduce students to the general principles of physiology. The module will also elaborate on the characteristic peculiarities of plants in comparison with animals and prokaryotes.

### Intended learning outcomes

- Familiarity with general physiological processes in plants and the regulation of these.
- Familiarity with the factors that distinguish plant physiology from animal and prokaryotic physiology.
- Fundamental knowledge and skills on how to perform, analyse and present scientific experiments.
- Essential lab skills.
- Familiarity with methods for the investigation of fundamental physiological processes in plants.

### Courses

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

### Method of assessment

written examination (approx. 60 minutes)

### 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**

This module will acquaint students with the principles of general and comparative animal physiology and will provide them with an opportunity to develop the fundamental skills for working in a physiological laboratory. The module will focus on neurophysiology and sensory physiology as well as aspects of metabolic physiology (respiration and excretion).

**Intended learning outcomes**

Students have developed an understanding of the physiological functions and regulation of organisms. They have acquired fundamental knowledge on planning, setup, interpretation and presentation of scientific results.

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

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

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

written examination (approx. 60 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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**Contents**

Fundamental principles of genetics, neurobiology and behavioural biology.

**Intended learning outcomes**

Students will understand that there are molecular, cellular and system biological mechanisms and processes involved in animal behaviour.

**Courses**

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**Allocation of places**

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**Additional information**

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**Contents**

Fundamental principles of the most important mathematical and statistical methods in biology.

**Intended learning outcomes**

Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.

**Courses**

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

**Method of assessment**

written examination (approx. 60 minutes)

**Allocation of places**

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<tr>
<td>Developmental Biology of Plants (AF)</td>
<td>07-3A3EBIOPF-AF-141-m01</td>
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**Module coordinator**
holder of the Chair of Plant Physiology and Biophysics

**Module offered by**
Faculty of Biology

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**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
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**Contents**
In this module, students will acquire an insight into the fundamental processes of plant developmental biology over a plant’s entire life cycle from germination to reproduction. The module will discuss the molecular determination and regulation of different developmental biological processes in plants as well as their plasticity.

**Intended learning outcomes**
1. Fundamental concepts in plant developmental biology. 2. Developmental biology of selected plant model organisms. 3. Developmental biological processes at specific stages in the life cycle of plants. 4. Molecular mechanisms underlying pattern formation, morphogenesis and organogenesis in plants. 5. Establishment of plant embryonic axes. 6. Physiological aspects of the developmental processes in plants that were discussed. 7. Plasticity of developmental biological processes: regulation by endogenous and environmental factors.

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

**Method of assessment**
written examination (approx. 60 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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<table>
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<th>Module title</th>
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<td>Plant and Animal Ecology</td>
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<td>Dean of Studies Biologie (Biology)</td>
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**Contents**

This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module will focus on the functional adaptation to environmental conditions as well as on the structure and dynamics of populations, communities and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental knowledge necessary to develop an understanding of current ecological problems.

**Intended learning outcomes**

Students are familiar with the fundamental principles of research in the field of ecology and with the most important abiotic and biotic factors that influence the distribution and frequency of occurrence of organisms in their environment. In addition, they understand the scientific relevance ecology has to the assessment of environmental issues.

**Courses**

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

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

**Method of assessment**

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

written examination (approx. 90 minutes)

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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### Module title
Genes, Molecules, Technologies

### Abbreviation
07-3A3GEMT-132-m01

### Module coordinator
Dean of Studies Biologie (Biology)

### Module offered by
Faculty of Biology

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### Contents
The module Gene, Moleküle, Technologien (Genes, Molecules, Technologies) will include lectures on the following topics: The section Spezielle Genetik (Special Genetics) will build on Einführung in die Genetik (Introduction to Genetics) and will deepen the students' knowledge of topics from the following areas: structure and evolution of the eukaryotic genome, regulatory RNA, epigenetically and evolutionarily significant genetic mechanisms. The section will also focus on methods of gene expression profiling, reverse genetics and modern methods of gene function and gene sequence analysis. In the lecture Einführung in die Bioinformatik (Introduction to Bioinformatics), students will acquire an overview of major areas in the field of bioinformatics: protein sequence and protein domain analysis, phylogeny and evolution of sequences, protein structure, RNA/DNA sequences and structures, cellular networks (regulation, metabolism) and systems biology. During the section Einführung in die Biotechnologie (Introduction to Biotechnology), students will acquire an overview of the following topics: history of biotechnology, DNA and RNA technologies, recombinant antibodies, molecular diagnostics, nanobiotechnology, biomaterials, bioprocess engineering, microbial biotechnology, transgenic animals and plants, microfluidics. The lecture Einführung in die Pharmakokinetik (Introduction to Pharmacokinetics) will provide students with an overview of the rational development of drugs and active agents. The module component will discuss an important aspect for biologists in more detail: the optimisation of the pharmacokinetics of small molecules and proteins. Pharmacokinetics describes the uptake, distribution, metabolism and elimination of a drug or xenobiotic in an organism.

### Intended learning outcomes
Students possess an advanced knowledge on genome evolution and the regulation of gene expression and are familiar with current methods in genetics as well as methods for the analysis of DNA and protein databases. They have acquired an overview of both traditional and modern methods in biotechnology and are familiar with fundamental topics in biotechnology. Students have acquired an overview of the fundamental principles of the development and review of active agents in research, clinical practice and the pharmaceutical industry. They are familiar with methods and technologies in biology and are able to evaluate potential applications of these in research and industry.

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

### Method of assessment
written examination (approx. 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)

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<td>holder of the Chair of Plant Physiology and Biophysics</td>
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### Contents

With the module component *Makromoleküle (Macromolecules)* as a starting point, the lecture will provide students with deeper insights into the molecular biology and biochemistry of prokaryotes and eukaryotes. Students will become familiar with fundamental principles of molecular biology (replication, transcription, splicing and translation) and the biochemistry of carbohydrates, lipids, proteins and nucleic acids. Experiments will be performed on selected topics that were discussed in the lecture. The exercise will cover practical aspects of lab work (PCR, DNA and protein gel electrophoresis, blot, enzyme kinetics and detection, protein isolation).

### Intended learning outcomes

Students are familiar with the fundamental principles of biochemistry.

### Courses

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

### Method of assessment

written examination (approx. 60 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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Module title | Abbreviation
---|---
The Fauna of Germany (AF) | 07-4A4FAU-AF-141-m01

Module coordinator | Module offered by
holder of the Chair of Animal Ecology and Tropical Biology | Faculty of Biology

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

Duration | Module level | Other prerequisites
1 semester | undergraduate | Admission prerequisite to assessment: regular attendance of field trips (minimum 80%).

Contents

In this module, students will acquire an overview of selected groups of animals to be found in Central Europe. They will acquire a fundamental knowledge of the systematics and taxonomy of these animals and will practise identifying species, using specimens of animals. Selection of specimens will be taxon-specific and will represent specific habitats or lifestyles. Exercises in a variety of habitats will provide students with an opportunity to consolidate the knowledge and skills they acquired in the lab by identifying living specimens including their ecology and behavioural biology.

Intended learning outcomes

Students possess species identification skills. They know how to taxonomically classify selected representatives of the indigenous fauna (vertebrates, invertebrates) and use identification keys. They are familiar with selected Central European habitats as well as their faunas and phenology. On the basis of the morphology and habitats of species, students are able to predict the biology and ecology of these species as well as, where applicable, to predict whether they function as indicators and are of conservation concern.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written assessment with practical components (approx. 90 minutes)
Assessment offered: once a year, summer semester

Allocation of places
--

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module title: Neurobiology 1
Abbreviation: 07-451NVO1-132-m01

Module coordinator: holder of the Chair of Neurobiology and Genetics
Module offered by: Faculty of Biology

ECTS: 5
Method of grading: numerical grade

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

Contents:
Neurobiology and methods in molecular neurobiology (neurogenetic model system Drosophila and humans) -- focus: sleep behaviour and endogenous clock.

Intended learning outcomes:
Students have acquired an advanced knowledge of the neurobiology of a model organism and are able to apply the relevant methods in neurobiology.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Allocation of places:
Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, pla-
ces will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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Module title | Abbreviation
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Integrative Behavioral Biology 1 | 07-4S1NVO2-132-m01

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<tr>
<td>holder of the Chair of Behavioral Physiology and Sociobiology</td>
<td>Faculty of Biology</td>
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Contents

Communication in the animal kingdom, neuroethology and behavioural development, perception and processing of olfactory signals, temporal organisation of behaviour, adaptive feeding behaviour, reproductive behaviour, social behaviour, orientation mechanisms.

Intended learning outcomes

Students have acquired an advanced knowledge in the area of behavioural biology and are able to deliver presentations on current studies on relevant topics.

Courses

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

Method of assessment

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Allocation of places

Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the
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Additional information

Referred to in LPO I (examination regulations for teaching-degree programmes)
Module title: Functional Morphology of Arthropods
Abbreviation: 07-4S1NVO3-132-m01

Module coordinator: holder of the Chair of Animal Ecology and Tropical Biology
Module offered by: Faculty of Biology

ECTS: 5
Method of grading: numerical grade
Duration: 1 semester
Module level: undergraduate
Other prerequisites: --

Contents:
Morphology, anatomy, phylogeny and ecology of arthropods.

Intended learning outcomes:
Students are able to explain arthropod radiations in a functional context as well as to explain the importance of arthropods to ecosystems.

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

Method of assessment:
term paper (approx. 5 to 10 pages)

Allocation of places:
Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.
### Additional information

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Module title | Abbreviation
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Basics in Light- and Electron-Microscopy | 07-4S1MZ1-132-m01

Module coordinator | Module offered by
head of the Department of Electronmicroscopy | Faculty of Biology

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

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

Contents
Fundamental principles of confocal laser scanning microscopy and electron microscopy.

Intended learning outcomes
Students have acquired theoretical knowledge and practical skills in the area of light and electron microscopy.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (approx. 30 to 60 minutes)

Allocation of places
Number of places: 18. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor’s degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor’s degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor’s degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor’s degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other ‘importing’ subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants’ previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants’ position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated accordingly to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
Module title: Analysis of Chromosomes

Abbreviation: 07-4S1MZ2-132-m01

Module coordinator: head of the Department of Electronmicroscopy

Module offered by: Faculty of Biology

ECTS: 5

Duration: 1 semester

Module level: undergraduate

Other prerequisites: --

Contents:
Overview of the structure of chromosomes of somatic and meiotic cells.

Intended learning outcomes:
Students are able to analyse chromosomal structures.

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

Method of assessment:
written examination (approx. 30 to 60 minutes)

Allocation of places:
Number of places: 18. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor’s degree subject Biologie (Biolog) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor’s degree subject Biologie (Biolog) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor’s degree subject Biologie (Biolog) with 60 ECTS credits and to students of the Bachelor’s degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other ‘importing’ subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants’ previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject Biologie (Biolog) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants’ position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biologie; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor’s degree subject Biologie (Biolog) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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</table>

**Contents**

Fundamental principles of the tree of life, fundamental principles of phylogenetics (methods and markers), fundamental principles of evolutionary biology (concepts), sequence analysis, RNA structure prediction, phylogenetic reconstruction.

**Intended learning outcomes**

Students are able to use software and databases for sequence analysis, RNA structure prediction and phylogenetic reconstruction.

**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)

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<th>(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</th>
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</thead>
<tbody>
<tr>
<td>log (approx. 10 to 20 pages)</td>
<td>Language of assessment: German or English</td>
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</table>

**Allocation of places**

Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor’s degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor’s degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor’s degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor’s degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other ‘importing’ subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants’ previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants’ position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of
places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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

-
Module title: Molecular modelling - From DNA to Protein
Abbreviation: 07-4S1PS1-132-m01

Module coordinator: holder of the Chair of Plant Physiology and Biophysics
Module offered by: Faculty of Biology

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

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

Contents:
This module will equip students with advanced knowledge on the structure and function of nucleic acids and proteins as well as on the search for and analysis and modelling of plant macromolecules using databases and specific software.

Intended learning outcomes:
Students have acquired a specialist knowledge of the structure-function relationships of macromolecules and are able to work with relevant databases and software.

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

Method of assessment:
Computerised practical examination (approx. 6 hours)

Allocation of places:
Number of places: 18. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biolog) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biolog) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biolog) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biolog) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biologie; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of
places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Additional information

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

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Module title | Abbreviation
---|---
Methods in Plant Ecophysiology | 07-451PS2-132-m01

Module coordinator
holder of the Chair of Plant Physiology and Biophysics

Module offered by
Faculty of Biology

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

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

Contents
Complex experiments to introduce students to the current state of research in plant ecophysiology as well as discussion of experimental findings in a comprehensive scientific context.

Intended learning outcomes
Students are able to use current methods in plant ecophysiology as well as to document experimental findings and put these in a scientific context.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
log (approx. 10 to 20 pages)

Allocation of places
Number of places: 15. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor’s degree subject Biologie (Biolog) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor’s degree subject Biologie (Biolog) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor’s degree subject Biologie (Biolog) with 60 ECTS credits and to students of the Bachelor’s degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (Biolog) (as well as potentially to students of other ‘importing’ subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants’ previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject Biologie (Biolog) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants’ position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biologie; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor’s degree subject Biologie (Biolog) with 180 ECTS credits, places will be allocated according to the selection process of group 1.
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<td>(examination regulations for teaching-degree programmes)</td>
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Module title | Abbreviation
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Pharmaceutical Drugs in Plants | 07-4S1PS3-132-m01

Module coordinator | Module offered by
holder of the Chair of Pharmaceutical Biology | Faculty of Biology

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</table>

Contents

This module will introduce students to the major active agent groups in medicinal plants and phytopharmaceuticals as well as to their application in pharmacy. Microscopic and phytochemical analyses will be performed and the requirements and analytical methods of the pharmacopoeia will be explained.

Intended learning outcomes

Students have acquired a specialist knowledge on active agents from medicinal plants and phytopharmaceuticals as well as on the requirements and analytical methods of the pharmacopoeia.

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

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

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

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Allocation of places

Number of places: 15. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biologie (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. 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. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module
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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 coordinator**
Coordinator BioCareers

**Module offered by**
Faculty of Biology

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**Contents**

This practical course is offered by an institution that is part of the University. Contents to be determined by the respective institution.

**Intended learning outcomes**

Students have developed skills which qualify them to work in their profession.

**Courses**

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

**Method of assessment**

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

**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**  
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**Module coordinator**  
Coordinator BioCareers

**Module offered by**  
Faculty of Biology

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**Duration**  
1 semester

**Module level**  
undergraduate

Please consult with academic advisory service in advance.

**Contents**  
Contents of the field trip to be determined by the respective institution.

**Intended learning outcomes**  
Students have developed skills which qualify them to work in their profession.

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

**Method of assessment**  
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)  
a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

**Allocation of places**  
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**Additional information**  
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**Referred to in LPO I**  
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**Contents**

Contents of the project to be determined by the competent coordinators; contents will vary according to topic.

**Intended learning outcomes**

Students have developed skills which qualify them to work in their profession.

**Courses**

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

**Method of assessment**

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

**Allocation of places**

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**Additional information**

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</table>

**Contents**

Students will complete a placement at an authority, a non-university research institution or a business. Contents to be determined by the respective institution.

**Intended learning outcomes**

Students are familiar with the structures of external institutions and businesses and have developed skills which qualify them to work in their profession.

**Courses**

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

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

**Method of assessment**

(a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

**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>Method of grading</th>
<th>Other prerequisites</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>Please consult with academic advisory service in advance.</td>
</tr>
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</table>

Contents

Contents of the field trip to be determined by the respective institution.

Intended learning outcomes

Students have developed skills which qualify them to work in their profession.

Courses

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

Method of assessment

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

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>Interdisciplinary Project II</td>
<td>07-S2-IP2-132-m01</td>
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<th>Module offered by</th>
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<tr>
<td>Coordinator BioCareers</td>
<td>Faculty of Biology</td>
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<tbody>
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<td>undergraduate</td>
<td>10</td>
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</tbody>
</table>

Other prerequisites:
Please consult with academic advisory service in advance.

Contents:
Contents of the project to be determined by the competent coordinators; contents will vary according to topic.

Intended learning outcomes:
Students have developed skills which qualify them to work in their profession.

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

Method of assessment:
a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Allocation of places:
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Additional information:
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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>Laboratory Practical Course II</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Please consult with academic advisory service in advance.</td>
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</table>

**Contents**

This practical course is offered by an institution that is part of the University. Contents to be determined by the respective institution.

**Intended learning outcomes**

Students are familiar with the structures of internal institutions and have developed skills which qualify them to work in their profession.

**Courses**

<table>
<thead>
<tr>
<th>(type, number of weekly contact hours, language — if other than German)</th>
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<tr>
<td>P (no information on SWS (weekly contact hours) and course language available)</td>
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**Method of assessment**

<table>
<thead>
<tr>
<th>(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</th>
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<tbody>
<tr>
<td>a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.</td>
</tr>
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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)
Application-oriented Subject Chemistry
(32-40 ECTS credits)
Application-oriented Subject Chemistry Compulsory Courses
(26 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Introduction to Inorganic Chemistry for Students of Mathematics and other Subjects</td>
<td>08-CM1-112-m01</td>
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<thead>
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<tr>
<td>lecturer of lecture “Experimentalchemie” (Experimental Chemistry)</td>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tr>
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</table>

**Contents**

Basics of general and anorganic chemistry.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Kenntnis der Grundlagen der Allgemeinen und Anorganischen Chemie

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

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

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

written examination (approx. 90 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
Module title: Organic Chemistry 1
Abbreviation: 08-OC1-141-m01

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

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (approx. 90 to 180 minutes) or oral examination of one candidate each (approx. 20 to 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
Language of assessment: German, English

Allocation of places:
--

Additional information:
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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>Physical Chemistry 1: Principles of quantum mechanics and spectroscopy</td>
<td>08-PC1-141-m01</td>
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<table>
<thead>
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<tbody>
<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**

<table>
<thead>
<tr>
<th>type</th>
<th>number of weekly contact hours</th>
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**Method of assessment**

<table>
<thead>
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<th>scope</th>
<th>language — if other than German</th>
<th>examination offered — if not every semester, information on whether module is creditable for bonus</th>
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written examination (approx. 90 to 180 minutes) or oral examination of one candidate each (approx. 20 to 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)

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>Introduction to Physics for Students of Non-physics-related Minor Subjects</td>
<td>11-EFNF-072-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**
V + V (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
written examination (approx. 120 minutes)

**Allocation of places**
Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
Application-oriented Subject Chemistry Compulsory Electives
(6-14 ECTS credits)
## Module title

Organic Chemistry 2

### Abbreviation

08-OC2-141-m01

<table>
<thead>
<tr>
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<td>holder of the Chair of Physically Organic Chemistry</td>
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<th>Duration</th>
<th>Module level</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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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)

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

### Method of assessment

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

written examination (approx. 180 to 240 minutes)
Language of assessment: German, English

### Allocation of places

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### Additional information

--

### 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>Physical and Theroretical Chemistry 3: Symmetry and Quantum Chemistry</td>
<td>08-PC3-141-m01</td>
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<tbody>
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<td>lecturer of lecture</td>
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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
</tr>
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</table>

**Contents**

This module deals with basics of quantum chemistry and symmetry in chemistry.

**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über Kenntnisse der Quantenchemie und der Symmetrie in der Chemie und kann diese gezielt anwenden.

**Courses**

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

**Method of assessment**

written examination (approx. 90 to 180 minutes) or oral examination of one candidate each (approx. 20 to 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
Module title | Theoretical Models in Chemistry
---|---
Abbreviation | 08-TC-141-m01

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

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

written examination (approx. 90 to 180 minutes) or oral examination of one candidate each (approx. 20 to 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)

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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Application-oriented Subject Geography
(30-40 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Introduction to the Geography of Cities, Towns</td>
<td>09-HG1SI-102-m01</td>
</tr>
<tr>
<td>and Villages</td>
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**Module coordinator**

| holder of the Professorship of Cultural Geography |
| Institute of Geography and Geology               |

**ECTS**

<table>
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<tr>
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<th>numerical grade</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
</table>

**Duration**

| 1 semester | undergraduate | -- |

**Contents**

Introduction to "Settlement Geography".

**Intended learning outcomes**

Students possess knowledge of Urban Geography as well as in Geography of Rural Settlements.

**Courses**

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

**Method of assessment**

written examination (approx. 45 minutes)

**Allocation of places**

--

**Additional information**

--

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

§ 47 (1) 1. Geographie Humangeographie
§ 66 (1) 1. Geographie Humangeographie
### Module title

**Introduction to Economic Geography**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>09-HG1WI-102-m01</td>
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### Module coordinator

holder of the Professorship of Economic Geography

### Module offered by

Institute of Geography and Geology

### ECTS

5

### Method of grading

numerical grade --

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

--

### Contents

Introduction to "Economic Geography".

### Intended learning outcomes

Students possess knowledge of Economic Geography. They are also acquainted with the geographical economic theory, location theory and development theory.

### Courses

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

### Method of assessment

written examination (approx. 45 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)

§ 47 (1) 1. Geographie Humangeographie

§ 66 (1) 1. Geographie Humangeographie
# Module Catalogue for the Subject Mathematics

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 Social and Population Geography</td>
<td>09-HG1SO-102-m01</td>
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<table>
<thead>
<tr>
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<th>Module offered by</th>
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</thead>
<tbody>
<tr>
<td>holder of the Professorship of Social Geography</td>
<td>Institute of Geography and Geology</td>
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<table>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

## Contents

Introduction to “Social and Population Geography”.

## Intended learning outcomes

Students possess knowledge of Social and Population Geography as well as Civilisation Geographical Research.

## Courses

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

## Method of assessment

written examination (approx. 45 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)

§ 47 (1) 1. Geographie Humangeographie  
§ 66 (1) 1. Geographie Humangeographie
### Module Title

**General Physical Geography 1 (Earth System: Exogeneous Dynamics - Geomorphology)**

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>General Physical Geography 1 (Earth System: Exogeneous Dynamics - Geomorphology)</td>
<td>09-PG1ExD-102-m01</td>
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### Module Coordinator

Holder of the Professorship of Physical Geography

### Module Offered by

Institute of Geography and Geology

### ECTS

<table>
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### Duration

<table>
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<th>Module level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

### Contents

Introduction to "Physical Geography": basics of exogenous dynamics and geomorphology. Erosion and accumulation processes and accumulation results: gravitative, fluvial, glacial and periglacial, Aeolian, marin, littoral, solution: monoprocessual large forms, e.g. endogenous/tectonic forms like volcanoes, break clod, fold mountains or Aeolian "Draas" (huge dunes), deflation (enclosed) basins; polyprocessual large forms, e.g. glacial series, shape of coastlines, escarpments.

### Intended Learning Outcomes

Students dispose over basic knowledge of exogenous dynamics and geomorphology.

### Courses

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

### Method of Assessment

Written examination (approx. 45 minutes)

### Allocation of Places

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### Additional Information

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### Referred to in LPO I

§ 47 (1) 1. Geographie Physiogeographie
§ 66 (1) 1. Geographie Physiogeographie
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>General Physical Geography 2 (Earth System: Climate System)</td>
<td>09-PG1KS-102-m01</td>
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<tbody>
<tr>
<td>holder of the Professorship of Climatology</td>
<td>Institute of Geography and Geology</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

### Contents

Introduction to "Physical Geography": basics of the climate system: Earth and celestial mechanical basics; radiation and energy; vertical and horizontal movement processes; data sources and appearance of the terrestrial climate system

### Intended learning outcomes

Students will gain a basic physical understanding of the Earth's climate system.

### Courses

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

### Method of assessment

written examination (approx. 45 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)

§ 47 (1) 1. Geographie Physiogeographie

§ 66 (1) 1. Geographie Physiogeographie
**Module title**

General Physical Geography 3 (Earth System: Endogenic Dynamics)

**Abbreviation**

09-PG1EnD-102-m01

**Module coordinator**

holder of the Professorship of Geodynamics and Geomaterials Research

**Module offered by**

Institute of Geography and Geology

**ECTS**

5

**Method of grading**

numerical grade

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

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**Duration**

1 semester

**Module level**

undergraduate

**Other prerequisites**

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**Contents**

Introduction to "Physical Geography": basics of endogenous dynamics: formation/structure of the Earth, features of important rock forming, ecologically important minerals, volcanism/igneous rocks, plutonism/magma genesis, sediments/sedimentary rocks, metamorphosis; geological structures, ocean floor, plate tectonics, earthquakes, orogenesis, continental crust, distribution of mineral raw materials

**Intended learning outcomes**

Students dispose over basic knowledge of endogenous dynamics

**Courses**

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

**Method of assessment**

written examination (approx. 45 minutes)

**Allocation of places**

--

**Additional information**

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

§ 47 (1) 1. Geographie Physiogeographie

§ 66 (1) 1. Geographie Physiogeographie

Bachelor's with 1 major Mathematics (2014)
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**Module coordinator**

holder of the Chair of Remote Sensing

**Module offered by**

Institute of Geography and Geology

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**Duration**

1 semester

**Module level**

undergraduate

**Other prerequisites**

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**Contents**

Introduction to "Geographical Remote Sensing".

**Intended learning outcomes**

Students possess the following skills: Theoretical basics of the Remote Sensing System, Remote Sensing against the background of different sensor and platform specifications.

**Courses**

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

**Method of assessment**

written examination (approx. 45 minutes)

**Allocation of places**

--

**Additional information**

--

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

§ 66 (1) 2. Geographie Methoden der Geographie
Module title
Remote Sensing 2

Abbreviation
09-FERN2-102-m01

Module coordinator
holder of the Chair of Remote Sensing

Module offered by
Institute of Geography and Geology

ECTS
5

Method of grading
numerical grade

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

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
Application of Remote Sensing to Geography.

Intended learning outcomes
Students have skills of current geographical fields of application concerning the cross-sectional methodology, consolidation of application possibilities of different sensor and platform specifications.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (approx. 45 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)
--
Application-oriented Subject Computer Science
(30-40 ECTS credits)
## Module Catalogue for the Subject
### Mathematics

<table>
<thead>
<tr>
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<td>Algorithm and data structures</td>
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<tbody>
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</table>

### Contents
Design and analysis of algorithms, recursion vs. iteration, sort and search methods, data structures, abstract data types, lists, trees, graphs, basic graph algorithms, programming in Java.

### Intended learning outcomes
The students are able to independently design algorithms as well as to precisely describe and analyse them. The students are familiar with the basic paradigms of the design of algorithms and are able to apply them in practical programs. The students are able to estimate the run-time behaviour of algorithms and to prove their correctness.

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

### Method of assessment
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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)

### Allocation of places
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### Additional information
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**Contents**

Design and analysis of algorithms, recursion vs. iteration, sort and search methods, data structures, abstract data types, lists, trees, graphs, basic graph algorithms, programming in Java.

**Intended learning outcomes**

The students are able to independently design algorithms as well as to precisely describe and analyse them. The students are familiar with the basic paradigms of the design of algorithms and are able to apply them in practical programs. The students are able to estimate the run-time behaviour of algorithms and to prove their correctness.

**Courses**

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

**Method of assessment**

(a) completion of approx. 11 exercise sheets with approx. 4 exercises per sheet (50% of exercises to be completed correctly) or b) written examination (approx. 180 to 240 minutes). Method of assessment to be selected by the candidate.

**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**  
Algorithmic Graph Theory  

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**Module coordinator**  
holder of the Chair of Computer Science I  

**Module offered by**  
Institute of Computer Science  

**ECTS**  
5  

**Method of grading**  
numerical grade  

**Duration**  
1 semester  

**Module level**  
undergraduate  

**Other prerequisites**  
--  

**Contents**  
We discuss typical graph problems: We solve round trip problems, calculate maximal flows, find matchings and colourings, work with planar graphs and find out how the ranking algorithm of Google works. Using the examples of graph problems, we also become familiar with new concepts, for example how we model problems as linear programs or how we show that they are fixed parameter computable.  

**Intended learning outcomes**  
The students are able to model typical problems in computer science as graph problems. In addition, the participants are able to decide which tool from the course helps solve a given graph problem algorithmically. In this course, students learn in detail how to estimate the run time of given graph algorithms.  

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

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<th>Type</th>
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<th>Language</th>
<th>Examination offered</th>
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**Method of assessment**  
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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  

**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 | 3D Poiting Cloud Processing
---|---
Abbreviation | 10-I-3D-141-m01

Module coordinator |(holder of the Chair of Computer Science VII)
Module offered by | Institute of Computer Science

ECTS | 5
Method of grading | numerical grade
Duration | 1 semester
Module level | undergraduate
Other prerequisites | --

Contents
Laser scanning, Kinect and camera models, basic data structures (lists, arrays, oct-trees), calculating normals, k-d trees, registration, features, segmentation, tracking, applications for airborne mapping, applications to mobile mapping.

Intended learning outcomes
Students understand the fundamental principles of all aspects of 3D point cloud processing and are able to communicate with engineers / surveyors / CV people / etc. Students are able to solve problems of modern sensor data processing and have experienced that real application scenarios are challenging in terms of computational requirements, in terms of memory requirements and in terms of implementation issues.

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

Method of assessment
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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

Allocation of places
--

Additional information
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Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
Module title: Data Bases

Abbreviation: 10-I-DB-141-m01

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: --

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. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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

Allocation of places:
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Additional information:
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<td>1 semester</td>
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</table>

**Contents**

Introduction to probability calculus, coding theory, coding for fault detection and fault correction, information theory, spectrum and Fourier transform, modulation technique, structure of digital transmission systems, introduction to the structure of computer networks, communication protocols.

**Intended learning outcomes**

The students possess a technical, theoretical and practical knowledge of the structure of systems for information transmission, a knowledge that is necessary to understand these systems.

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

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

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

written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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)

**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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### Tutorial Information Transmission

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#### Contents

- Introduction to probability calculus, coding theory, coding for fault detection and fault correction, information theory, spectrum and Fourier transform, modulation technique, structure of digital transmission systems, introduction to the structure of computer networks, communication protocols.

#### Intended learning outcomes

The students possess a technical, theoretical and practical knowledge of the structure of systems for information transmission, a knowledge that is necessary to understand these systems.

#### Courses

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

#### Method of assessment

a) completion of approx. 11 exercise sheets with approx. 4 exercises per sheet (50% of exercises to be completed correctly) or b) written examination (approx. 180 to 240 minutes). Method of assessment to be selected by the candidate.

#### 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>Computational Complexity</td>
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**Module coordinator**

Dean of Studies Informatik (Computer Science)

**Module offered by**

Institute of Computer Science

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**Duration**

1 semester

**Module level**

undergraduate

**Other prerequisites**

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**Contents**

Complexity measurements and classes, general relationships between space and time classes, memory consumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.

**Intended learning outcomes**

The students possess a fundamental and applicable knowledge in the areas of complexity measurements and classes, general relationships between space and time classes, memory consumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.

**Courses**

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

**Method of assessment**

written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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

**Allocation of places**

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**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)
## Logic for informatics

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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

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infinite formula sets, syntax and semantics of predicate logic.

### Intended learning outcomes
The students are proficient in the following areas: syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infinite formula sets, syntax and semantics of predicate logic.

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

### Method of assessment
- 
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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)

### Allocation of places
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### Additional information
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**Contents**

Polymorphism, generic programming, meta programming, web programming, templates, document management.

**Intended learning outcomes**

The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use.

**Courses**

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

**Method of assessment**

written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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

**Allocation of places**

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**Additional information**

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**Contents**
The programming language Java. Independent creation of small to middle-sized, high-quality Java programs.

**Intended learning outcomes**
The students are able to independently develop small to middle-sized, high-quality Java programs.

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

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

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

Completion of programming exercises (approx. 240 hours) and written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, 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).

**Allocation of places**

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**Additional information**

Additional information on module duration: 1 to 2 semesters.

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

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**Module coordinator**
holder of the Chair of Computer Science V

**Module offered by**
Institute of Computer Science

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**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
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**Contents**
Instruction set architectures, command processing through pipelining, statical and dynamic instruction scheduling, caches, vector processors, multi-core processors.

**Intended learning outcomes**
The students master the most important techniques to design fast computers as well as their interaction with compilers and operating systems.

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

**Method of assessment**
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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

**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>Digital computer systems</td>
<td>10-I-RALV-141-m01</td>
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**Module coordinator**
- holder of the Chair of Computer Science V

**Module offered by**
- Institute of Computer Science

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<tbody>
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**Duration**
- 1 semester
- undergraduate
- --

**Contents**
Introduction to digital technologies, Boolean algebras, combinatory circuits, synchronous and asynchronous circuit hardware description languages, structure of a simple processor, machine programming, memory hierarchy.

**Intended learning outcomes**
The students possess a knowledge of the fundamentals of digital technologies up to the design and programming of easy microprocessors as well as knowledge for the application of hardware description languages for the design of digital systems.

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

**Method of assessment**
- written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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)

**Allocation of places**
- --

**Additional information**
- --

**Referred to in LPO I**
- (examination regulations for teaching-degree programmes)
- --
### Module title
Tutorial Digital computer systems

### Abbreviation
10-I-RALT-141-m01

### Module coordinator
holder of the Chair of Computer Science V

### Module offered by
Institute of Computer Science

### ECTS
5

### Method of grading
(only after successfully completed module(s))

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

## Contents
Introduction to digital technologies, Boolean algebras, combinatorial circuits, synchronous and asynchronous circuit hardware description languages, structure of a simple processor, machine programming, memory hierarchy.

## Intended learning outcomes
The students possess a knowledge of the fundamentals of digital technologies up to the design and programming of easy microprocessors as well as knowledge for the application of hardware description languages for the design of digital systems.

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

### Ü

## Method of assessment
(a) completion of approx. 11 exercise sheets with approx. 4 exercises per sheet (50% of exercises to be completed correctly) or (b) written examination (approx. 180 to 240 minutes). Method of assessment to be selected by the candidate.

## Allocation of places
--

## Additional information
--

## 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>Computer Networks</td>
<td>10-I-RK-141-m01</td>
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<tr>
<td>holder of the Chair of Computer Science III</td>
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## Contents


## Intended learning outcomes

The students possess an intricate knowledge of the structure of computer networks and communication systems as well as fundamental principles to rate these systems.

## Courses

<table>
<thead>
<tr>
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<tbody>
<tr>
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## Method of assessment

written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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

## 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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<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Software Technology</td>
<td>10-I-STV-141-m01</td>
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**Module coordinator**  
Dean of Studies Informatik (Computer Science)  
**Module offered by**  
Institute of Computer Science

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

**Contents**  
Object-oriented software development with UML, development of graphical user interfaces, foundations of databases and object-relational mapping, foundations of web programming (HTML, XML, scripting languages, web frameworks).

**Intended learning outcomes**  
The students possess a fundamental theoretical and practical knowledge on the design and development of software systems, in particular for the web.

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)  
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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)

**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**

Object-oriented software development with UML, development of graphical user interfaces, foundations of databases and object-relational mapping, foundations of web programming (HTML, XML, scripting languages, web frameworks).

**Intended learning outcomes**

The students possess a fundamental theoretical and practical knowledge on the design and development of software systems, in particular for the web.

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

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

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

a) completion of approx. 11 exercise sheets with approx. 4 exercises per sheet (50% of exercises to be completed correctly) or b) written examination (approx. 180 to 240 minutes). Method of assessment to be selected by the candidate.

**Allocation of places**

--

**Additional information**

--

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

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### Module Catalogue for the Subject
Mathematics
Bachelor’s with 1 major, 180 ECTS credits

<table>
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<th>Module title</th>
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<tr>
<td>Practical course in software</td>
<td>10-I-SWP-141-m01</td>
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<td>The learning outcomes of modules 10-I-ADSV, 10-I-ADST, 10-I-SST are required. Prior completion of these modules is highly recommended.</td>
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### Contents
Completion of a project assignment in groups, problem analysis, creation of requirements specifications, specification of solution components (e.g. UML) and milestones, user manual, programming documentation, presentation and delivery of the runnable software product in a colloquium.

### Intended learning outcomes
The students possess the practical skills for the design, development and execution of a software project in small teams.

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

### Method of assessment
completion of a larger software project in groups (approx. 300 hours per person) and final presentation (approx. 10 minutes per group)

### 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>Theoretical Informatics</td>
<td>10-I-TIV-141-m01</td>
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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
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</table>

**Contents**
Computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of calculations, P-NP problem, NP completeness.

**Intended learning outcomes**
The students possess a fundamental and applicable knowledge in the areas of computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of computations, P-NP problem, NP completeness.

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

**Method of assessment**
written examination (approx. 60 to 120 minutes); if announced by the lecturer at the beginning of the course, 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)

**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: Tutorial Theoretical Informatics

<table>
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<tr>
<th>Abbreviation</th>
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<thead>
<tr>
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<th>Module Offered by</th>
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#### Contents
Computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of calculations, P-NP problem, NP completeness.

#### Intended Learning Outcomes
The students possess a fundamental and applicable knowledge in the areas of computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of computations, P-NP problem, NP completeness.

#### Courses
(No information on SWS (weekly contact hours) and course language available)

<table>
<thead>
<tr>
<th>Method of Assessment</th>
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<tbody>
<tr>
<td>a) completion of approx. 11 exercise sheets with approx. 4 exercises per sheet (50% of exercises to be completed correctly) or b) written examination (approx. 180 to 240 minutes). Method of assessment to be selected by the candidate.</td>
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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)
--
Application-oriented Subject Philosophy
(30-40 ECTS credits)
Application-oriented Subject Philosophy Compulsory Courses  
(15 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Principles of Philosophy: historical epochs, main works, authors</td>
<td>06-B-P1G-141-m01</td>
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<tr>
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<tbody>
<tr>
<td>holder of the Chair of Practical Philosophy</td>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

Introduction to the systems and the history of philosophy; introduction to academic writing and research in philosophy; introduction to formal logic; insight into a period in the history of philosophy.

**Intended learning outcomes**

Intended learning outcomes: Content-related outcomes: Insight into basic problems and positions in philosophy; knowledge of, and ability to apply, methods in philosophy and ability to follow the rules of scholarly work; mastery of the fundamentals of formal logic; insight into a period in the history of philosophy. Formal outcomes: Ability to apply the principles of logic to argumentation; ability to apply general principles of argumentation such as transparency, consistency, discursivity, completeness, and generalisability; ability to present philosophical issues in a structured and linguistically and rhetorically appropriate way.

**Courses**

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

**Method of assessment**

oral examination (approx. 25 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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<table>
<thead>
<tr>
<th>Module title</th>
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<tr>
<td>Philosophical principles of arts and humanities</td>
<td>06-B-P2G1-141-m01</td>
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<td>holder of the Chair of Theoretical Philosophy</td>
<td>Institute of Philosophy</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

Introduction to the theory of intellectual disciplines; philosophical bases of the humanities and the social sciences.

**Intended learning outcomes**

Intended learning outcomes: Content-related outcomes: Insight into the relationship of philosophy to individual intellectual disciplines; ability to reflect on the historical and intellectual origins of our knowledge culture; ability to organise topics into overarching historical, social, and political schemata; insight into the scope and limits of various intellectual disciplines; knowledge of, and ability to criticise, basic assumptions in systems of thought, culture, and knowledge. Formal outcomes (skills to be tested in assessments): Ability to analyse philosophical texts and issues; ability to organise concepts and philosophical positions into overarching intellectual schemata; ability to present philosophical positions in a structured and linguistically appropriate manner.

**Courses**

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

**Method of assessment**

written examination (approx. 90 minutes)

**Allocation of places**

Only as part of pool of general key skills (ASQ): maximum 20 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.

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
Module title
Philosophical principles of natural sciences and technology

Abbreviation
06-B-P2G2-141-m01

Module coordinator
holder of the Chair of Theoretical Philosophy

Module offered by
Institute of Philosophy

ECTS
5

Method of grading
numerical grade

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

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
Introduction to the theory of intellectual disciplines; philosophical bases of the natural sciences and engineering.

Intended learning outcomes
Intended learning outcomes: Content-related outcomes: Insight into the relationship of philosophy to individual intellectual disciplines; ability to reflect on the historical and intellectual origins of our knowledge culture; ability to organise topics into overarching historical, social, and political schemata; insight into the scope and limits of various intellectual disciplines; knowledge of, and ability to criticise, basic assumptions in systems of thought, culture, and knowledge. Formal outcomes (skills to be tested in assessments): Ability to analyse philosophical texts and issues; ability to organise concepts and philosophical positions into overarching intellectual schemata; ability to present philosophical positions in a structured and linguistically appropriate manner.

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

Method of assessment
written examination (approx. 90 minutes)

Allocation of places
Only as part of pool of general key skills (ASQ): maximum 20 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.

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

--
Application-oriented Subject Philosophy Compulsory Electives
(15-25 ECTS credits)
### Module title
Theoretical Philosophy

### Abbreviation
06-B-P3-141-m01

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</thead>
<tbody>
<tr>
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<td>undergraduate</td>
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</table>

### Contents
Introduction to theoretical philosophy, using basic problems and paradigmatic texts.

### Intended learning outcomes

Content-related outcomes: An overview of basic problems and positions in theoretical philosophy; an overview of systems and disciplines in theoretical philosophy; ability to use and distinguish between different methods in theoretical philosophy; familiarity with, and ability to evaluate, methods of argumentation and justification within theoretical philosophy; ability to reflect on the factors involved in the process of theoretical opinion formation. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to organise concepts and philosophical positions into overarching intellectual schemata; ability to present philosophical positions in a structured and linguistically appropriate manner.

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

### Method of assessment
oral examination (approx. 25 minutes) in one of the seminars (seminar to be selected by students)

### 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 Catalogue for the Subject Mathematics

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

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
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<td>Practical Philosophy</td>
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### Contents

Introduction to practical philosophy, using basic problems and paradigmatic texts.

### Intended learning outcomes

Intended learning outcomes: Content-related outcomes: An overview of basic problems and positions in practical philosophy; an overview of systems and disciplines in practical philosophy; ability to use and distinguish between different methods in practical philosophy; knowledge of, and ability to evaluate, methods of argumentation and justification within practical philosophy; ability to reflect on the factors involved in the process of moral opinion formation. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to organise concepts and philosophical positions into overarching intellectual schemata; ability to present philosophical positions in a structured and linguistically appropriate manner.

### Courses

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

### Method of assessment

written examination (approx. 90 minutes) in one of the seminars (seminar to be selected by students)

### Allocation of places

--

### Additional information

--

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

--
### Module title

**History of Philosophy**

### Abbreviation

06-B-P5-141-m01

### Module coordinator

holder of the Chair of the History of Philosophy

### Module offered by

Institute of Philosophy

### ECTS

10

### Method of grading

Only after succ. compl. of module(s)

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

--

### Contents

Introduction to the history of philosophy, using basic problems and paradigmatic texts.

### Intended learning outcomes

Intended learning outcomes: Content-related outcomes: 1. an overview of basic problems and positions in the history of philosophy 2. ability to use and distinguish between different methods of historiography 3. familiarity with, understanding of, and ability to evaluate methods and questions of scholarly inquiry with respect to the history of philosophy Formal outcomes (skills to be tested in the assessment): 4. ability to analyse philosophical texts and positions 5. ability to organise concepts and philosophical positions into overarching intellectual schemata 6. ability to present philosophical positions in a structured and linguistically appropriate manner

### Courses

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

### Method of assessment

written examination (approx. 90 minutes) in one of the seminars (seminar to be selected by students)

### 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 Catalogue for the Subject

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

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#### Contents

Selected research issues in philosophy.

#### Intended learning outcomes

Intended learning outcomes: Content-related outcomes: Knowledge and understanding of scholarly inquiry in philosophy. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in an appropriate manner.

#### Courses

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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)

--
Module title: Text Analysis: Ancient Philosophy  
Abbreviation: 06-B-W1-141-m01

Module coordinator: holder of the Chair of the History of Philosophy  
Module offered by: Institute of Philosophy

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

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

Contents:  
Ancient philosophical texts.

Intended learning outcomes: Content-related outcomes: - ability to analyse texts of ancient philosophy while taking into account the historical and intellectual context of their origin - knowledge of, and ability to criticise, basic assumptions in ancient systems of thought, culture, and knowledge Formal outcomes (skills to be tested in the assessment): - ability to analyse philosophical texts and issues - ability to follow the rules of scholarly work (when writing a term paper) - ability to organise historical concepts and philosophical positions into overarching intellectual schemata - ability to independently develop and present philosophical issues

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

Method of assessment: written examination (approx. 90 minutes) or term paper (approx. 12 pages)

Allocation of places: --

Additional information: --

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

Bachelor's with 1 major Mathematics (2014)
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### Contents

Medieval philosophical texts.

### Intended learning outcomes

Intended learning outcomes: Content-related outcomes: Ability to analyse texts of medieval philosophy while taking into account the historical and intellectual context of their origin; knowledge of, and ability to criticise, basic assumptions in pre-modern systems of thought, culture, and knowledge. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in an appropriate manner.

### Courses

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

### Method of assessment

written examination (approx. 90 minutes) or term paper (approx. 12 pages)

### 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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# Text Analysis: Modern Philosophy

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**Module coordinator**
holder of the Chair of Practical Philosophy

**Module offered by**
Institute of Philosophy

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**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

## Contents
Modern philosophical texts.

### Intended learning outcomes

Intended learning outcomes: Content-related outcomes: Ability to analyse texts of modern philosophy; knowledge of, and ability to criticise, basic assumptions of systems of thought, culture, and knowledge of modernity. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in a linguistically appropriate manner.

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

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

**Allocation of places**
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**Additional information**
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## Contents

Contemporary philosophical texts.

### Intended learning outcomes

Intended learning outcomes: Content-related outcomes: Ability to analyse texts of contemporary philosophy; knowledge of, and ability to criticise, basic assumptions of systems of thought, culture, and knowledge of the contemporary world. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in a linguistically appropriate manner.

### Courses

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

### Method of assessment

written examination (approx. 90 minutes)

### Allocation of places

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**Module coordinator**
holder of the Chair of Theoretical Philosophy  
**Module offered by**  
Institute of Philosophy

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**Contents**
Problems in and theoretical models of basic disciplines of theoretical philosophy.

**Intended learning outcomes**
Intended learning outcomes: Content-related outcomes: Insight into the fundamental disciplines of theoretical philosophy. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in a linguistically appropriate manner.

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

**Method of assessment**
term paper (approx. 12 pages) or oral examination (approx. 25 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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**Contents**

Problems in and theoretical models of special disciplines of theoretical philosophy.

**Intended learning outcomes**

Intended learning outcomes: Content-related outcomes: Insight into special disciplines of theoretical philosophy. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in a linguistically appropriate manner.

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

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

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

term paper (approx. 12 pages) or oral examination (approx. 25 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)

--
Module title
Basic disciplines of practical philosophy

Abbreviation
06-B-W7-141-m01

Module coordinator
holder of the Chair of Practical Philosophy

Module offered by
Institute of Philosophy

ECTS
5

Method of grading
numerical grade

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

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
Problems in and theoretical models of basic disciplines of practical philosophy.

Intended learning outcomes
Intended learning outcomes: Content-related outcomes: Insight into the fundamental disciplines of practical philosophy. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in a linguistically appropriate manner.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
term paper (approx. 12 pages) or oral examination (approx. 25 minutes)

Allocation of places
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Additional information
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## Contents
Problems in and theoretical models of special disciplines of practical philosophy.

## Intended learning outcomes
Intended learning outcomes: Content-related outcomes: Insight into special disciplines of practical philosophy. Formal outcomes (skills to be tested in the assessment): Ability to analyse philosophical texts and issues; ability to follow the rules of scholarly work; ability to independently develop philosophical issues and to present them in a linguistically appropriate manner.

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

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

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

term paper (approx. 12 pages) or oral examination (approx. 25 minutes)

## Allocation of places
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## Additional information
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(examination regulations for teaching-degree programmes)
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**Contents**

Problems in ancient and medieval philosophy.

**Intended learning outcomes**

Intended learning outcomes: Content-related outcomes: Ability to analyse philosophical problems of older philosophy (ancient/medieval); in-depth knowledge of the history of philosophical concepts, arguments, and theories. Formal outcomes (skills to be tested in the assessment): Ability to apply the principles of logic to argumentation; ability to apply general principles of argumentation such as transparency, consistency, discursivity, completeness, and generalisability; ability to present philosophical issues in a structured and linguistically and rhetorically appropriate way.

**Courses**

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

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

**Method of assessment**

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

term paper (approx. 12 pages)

**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**
Problems in early modern and contemporary philosophy.

**Intended learning outcomes**
Intended learning outcomes: Content-related outcomes: Ability to analyse philosophical problems of modern philosophy (early modern to contemporary); in-depth knowledge of the history of philosophical concepts, arguments, and theories. Formal outcomes (skills to be tested in the assessment): Ability to apply the principles of logic to argumentation; ability to apply general principles of argumentation such as transparency, consistency, discursivity, completeness, and generalisability; ability to present philosophical issues in a structured and linguistically and rhetorically appropriate way.

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

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
term paper (approx. 12 pages)

**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 | Problems of Theoretical Philosophy
---|---
Abbreviation | 06-B-W11-141-m01

Module coordinator | holder of the Chair of Theoretical Philosophy
Module offered by | Institute of Philosophy
ECTS | 5
Method of grading | numerical grade
Only after succ. compl. of module(s) | --
Duration | 1 semester
Module level | undergraduate
Other prerequisites | --

Contents

Problems in theoretical philosophy.

Intended learning outcomes

Intended learning outcomes: Content-related outcomes: Advanced knowledge of problems in theoretical philosophy. Formal outcomes (skills to be tested in the assessment): Ability to apply the principles of logic to argumentation; ability to apply general principles of argumentation such as transparency, consistency, discursivity, completeness, and generalisability; ability to present philosophical issues in a structured and linguistically and rhetorically appropriate way.

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

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

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

term paper (approx. 12 pages)

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 coordinator**
holder of the Chair of Practical Philosophy

**Module offered by**
Institute of Philosophy

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**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
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### Contents
Problems in practical philosophy.

### Intended learning outcomes
Intended learning outcomes: Content-related outcomes: Advanced knowledge of problems in practical philosophy. Formal outcomes (skills to be tested in the assessment): Ability to apply the principles of logic to argumentation; ability to apply general principles of argumentation such as transparency, consistency, discursivity, completeness, and generalisability; ability to present philosophical issues in a structured and linguistically and rhetorically appropriate way.

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

### Method of assessment
(term paper (approx. 12 pages))

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

Application-oriented Subject Physics
(33-40 ECTS credits)
Application-oriented Subject Physics Compulsory Courses: Basics
(14 ECTS credits)
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

**Contents**
Mechanics, vibration theory, thermodynamics.

**Intended learning outcomes**
The students have basic knowledge of physics for engineering students.

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

**Method of assessment**
written examination (approx. 120 minutes)

**Allocation of places**
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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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Introduction to Physics Part 2 for students of Physics Related Minor Subjects</td>
<td>11-ENNF2-062-m01</td>
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<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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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>

### Contents

Science of electricity, magnetism, optics, Atomic Physics.

### Intended learning outcomes

The students have basic knowledge of physics for engineering students.

### Courses

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

### Method of assessment

written examination (approx. 120 minutes)

### Allocation of places

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)

--
Application-oriented Subject Physics Compulsory Electives 1: Lab Course
(3-9 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Physics Laboratory Course for students of Physics Related Minor Subjects</td>
<td>11-PNNF-062-m01</td>
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### Module coordinator
Managing Director of the Institute of Applied Physics

### Module offered by
Faculty of Physics and Astronomy

### ECTS
3

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

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

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

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

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

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

### Additional information
--

### Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
Module title: Practical Course A
Abbreviation: 11-P-PA-092-m01

Module coordinator: Managing Director of the Institute of Applied Physics
Module offered by: Faculty of Physics and Astronomy

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

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

Contents:
Physical laws of mechanics, thermodynamics, science of electricity, types of error, error approximation and propagation, graphs, linear regression, average values and standard deviation, distribution functions, significance tests, writing of lab reports and publications.

Intended learning outcomes:
The students know and have mastered physical measuring methods and experimenting techniques. They are able to independently plan and conduct experiments, to cooperate with others, and to document the results in a measuring protocol. They are able to evaluate the measuring results on the basis of error propagation and of the principles of statistics and to draw, present and discuss the conclusions.

Courses:
Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis): V (1 weekly contact hour) + Ü (1 weekly contact hour), once a year (winter semester)
Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity, BAM): P (2 weekly contact hours)

Method of assessment:
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 120 minutes)
2. Lab course: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students’ understanding of the physics-related contents of the course (approx. 30 minutes).

Successful completion of approx. 50% of practice work is a prerequisite for admission to assessment component 1.
To pass assessment component 2, students must pass both elements a) and b). Students will be offered one opportunity to retake element a) and/or element b).
Students must register for assessment components 1 and 2 online (details to be announced).

Allocation of places:
--

Additional information:
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Referred to in LPO I (examination regulations for teaching-degree programmes):
§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie
§ 53 (1) 1. c) Physik physikalische Grundpraktika
§ 77 (1) 1. d) Physik "physikalische Praktika"
Module title: Basic Practical Course B (Minor Studies)
Abbreviation: 11-P-NFB-122-m01

Module coordinator:
Managing Director of the Institute of Applied Physics

Module offered by:
Faculty of Physics and Astronomy

ECTS: 4
Method of grading: Only after succ. compl. of module(s)

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

Contents:
Physical laws of optics, vibrations and waves, science of electricity and circuits with electric components.

Intended learning outcomes:
The students know and have mastered physical measuring methods and experimenting techniques. They are able to independently plan and conduct experiments, to cooperate with others, and to document the results in a measuring protocol. They are able to evaluate the measuring results on the basis of error propagation and of the principles of statistics and to draw, present and discuss the conclusions.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) Preparing, performing and evaluating (lab report) the experiments will be considered successfully completed if a Testat (exam) is passed. Experiments that were not successfully completed can be repeated once. And b) talk (with discussion; approx. 30 minutes) to test the candidate’s understanding of the physics-related contents of the module component. Talks that were not successfully completed can be repeated once. Both components of the assessment have to be successfully completed.

Allocation of places:
--

Additional information:
Additional information on module duration: 1 to 2 semesters.

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Application-oriented Subject Physics Compulsory Electives 2
(16-24 ECTS credits)

Out of several module components covering the same contents, students may only use one each. This means that the following combinations are not permitted:
- 11-KM may neither be combined with 11-QAM nor with 11-FKP.
- 11-STE may neither be combined with 11-ST nor with 11-ED.
- 11-TQM may neither be combined with 11-TM nor with 11-QM.
<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Theoretical Electrodynamics</td>
<td>11-ED-141-m01</td>
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**Module coordinator**

Managing Director of the Institute of Theoretical Physics and Astrophysics

**Module offered by**

Faculty of Physics and Astronomy

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</table>

**Duration**

1 semester

**Module level**

undergraduate

**Other prerequisites**

--

**Contents**

Principles of electrostatics, magnetostatics, Maxwell equations, covariant formulation, electrodynamics and matter

**Intended learning outcomes**

The students have knowledge of the principles of classical electrodynamics and the required calculation methods.

**Courses**

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

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

**Method of assessment**

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

written examination (approx. 120 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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<table>
<thead>
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<td>Solid State Physics 1</td>
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</table>

**Contents**

Physical laws of solids: Bonding and structure, lattice dynamics, thermal properties, principles of electronic properties (free electron gas)

**Intended learning outcomes**

The students understand the basic contexts and principles of solids (bonding and structure, lattice dynamics, thermal properties, principles of electronic properties (free electron gas).

**Courses**

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

**Method of assessment**

written examination (approx. 120 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
### Module title
Quanta, Atoms, Molecules

### Abbreviation
11-QAM-141-m01

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

### Module offered by
Faculty of Physics and Astronomy

### ECTS
8

### Method of grading
Numerical grade

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

### Duration
1 semester

### Module level
Undergraduate

### Other prerequisites
--

## Contents
Physical laws of Atomic, Quantum and Molecular Physics.

## Intended learning outcomes
The students have knowledge of the basic contexts and principles of Atomic and Molecular Physics (atoms: Quantum mechanical atom model, one/multi-electron atoms, electronic dipole transitions, atoms in B field as well as molecules: Bonding models and elementary excitations: rotations, vibrations, electronic excitations)

## Courses

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

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<tbody>
<tr>
<td>Written examination (approx. 120 minutes)</td>
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## Allocation of places
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## Additional information
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<td>Quantum Mechanics</td>
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</table>

**Contents**

Limits of classical physics, Schrödinger equation, mathematical foundations of quantum mechanics, harmonic oscillator, angular momentum and spin, hydrogen atom, many-particle systems

**Intended learning outcomes**

The students have knowledge of the principles of quantum mechanics and the required calculation methods.

**Courses**

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

**Method of assessment**

written examination (approx. 120 minutes)

**Allocation of places**

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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>Statistical Mechanics and Thermodynamics</td>
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**Contents**

Principles of thermodynamics, fundamental theorems, thermodynamic potentials, principles of statistical mechanics.

**Intended learning outcomes**

The students have knowledge of the principles of thermodynamics and statistical mechanics and the required calculation methods.

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

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

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

written examination (approx. 120 minutes)

**Allocation of places**

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**Additional information**

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<td>Theoretical Mechanics</td>
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### Contents

Newtonian mechanics, Lagrangian and Hamiltonian formalism, conservation laws, limits of classical physics.

### Intended learning outcomes

The students have knowledge of the principles of classical theoretical mechanics and the required calculation methods.

### Courses

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

### Method of assessment

written examination (approx. 120 minutes)

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)
Application-oriented Subject Business Management and Economics
(30-40 ECTS credits)
Application-oriented Subject Business Management and Economics Compulsory Courses

(30 ECTS credits)
Module title | Abbreviation
---|---
Introduction to Business Administration | 12-EBWL-G-132-m01

Module coordinator | Module offered by
holder of the Chair of Human Resource Management and Organisation | Faculty of Business Management and Economics

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Contents

This course will introduce students to relevant subject areas of business administration. Students will acquire an overview of the different perspectives and main points of view from which a theoretical examination of business enterprise may take place. The course will focus on what companies or other organisations are, how they behave and in what form they are organised. For this purpose, a study will be made of the economic subject's decision-making behaviour.

Reading list to be provided during lecture.

Intended learning outcomes

The aim of the lectures is to familiarise the students with the basic problem issues and perspectives within the field of business administration.

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

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

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

written examination (approx. 60 minutes)

Allocation of places

Number of places: 840. No restrictions with regard to available places for Bachelor's students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor's students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardized procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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

--
Module title: Introduction to Economics
Abbreviation: 12-EVWL-G-132-m01

Module coordinator: holder of the Chair of Monetary Policy and International Economics
Module offered by: Faculty of Business Management and Economics

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

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

Contents:
The course deals with the following topics:
1. Economics shows how markets function
2. The division of labour is the basis of our wealth
3. The market in action
4. Monopolies and cartels endanger market economies
5. The labour market and the role of unions
6. The government's role in a social market economy
7. Governmental redistribution guarantees the social balance in a market economy
8. Environmental policy and the government’s allocation function
9. Objectives and agents in the macro economy
10. How do aggregate supply and demand come into equilibrium?
11. The role of fiscal policy
12. How does a central bank stabilise aggregate demand by setting interest rates?

Intended learning outcomes:
By completing this course, students receive a fundamental understanding of economics. Students are able to grasp microeconomic as well as macroeconomic subjects and to analyze them in theoretical models.

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

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

Allocation of places:
Number of places: 840. No restrictions with regard to available places for Bachelor’s students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor’s students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.

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

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Module title | Abbreviation
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Financial Accounting | 12-ExtUR-G-132-m01

Module coordinator | Module offered by
holder of the Chair of Business Taxation | Faculty of Business Management and Economics

<table>
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<tr>
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</table>

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

Contents
This course offers an introduction to the fundamentals of financial accounting, including the technique of double-entry book-keeping as well as the fundamentals of recognition, valuation and presentation of assets, liabilities and equity according to German commercial law.

Intended learning outcomes
Students acquire a basic understanding of the fundamentals of financial accounting. They are able to arrange, reproduce and apply this knowledge, i.e. they are able to solve simple accounting problems.

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

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

Allocation of places
Number of places: 840. No restrictions with regard to available places for Bachelor’s students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor’s students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
--- | ---
Managerial Accounting | 12-IntUR-G-132-m01

Module coordinator | Module offered by
holder of the Chair of Business Management and Accounting | Faculty of Business Management and Economics

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<th>ECTS</th>
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Contents

Content:
This course offers an introduction to aims and methods of managerial accounting (cost accounting).

Outline of syllabus:
1. Managerial accounting and financial accounting
2. Managerial accounting: basic terms
3. Different types of costs
4. Cost centre accounting based on total costs
5. Job costing based on total costs
6. Cost centre accounting and job costing based on direct/variable costs
7. Budgeting and cost-variance analysis
8. Cost-volume-profit analysis
9. Cost information and operating decisions

Reading:
Friedl/Hofmann/Pedell: Kostenrechnung. Eine entscheidungsorientierte Einführung. (most recent editions)

Intended learning outcomes

After completing the course "Management Accounting and Control", the students will be able to
(i) set out the responsibilities of the company's internal accounting and control;
(ii) define the central concepts of internal enterprise computing restriction and control and assign case studies the terms;
(iii) apply the basic methods of internal corporate accounting and control on a full and cost base to idealized case studies of medium difficulty that calculate relevant costs and benefits and take on this basis a reasoned decision.

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

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

Allocation of places

Number of places: 840. No restrictions with regard to available places for Bachelor's students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor's students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among appli-
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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: Macroeconomics 1
Abbreviation: 12-Mak1-G-132-m01

Module coordinator: holder of the Chair of International Macroeconomics
Module offered by: Faculty of Business Management and Economics

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

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

Contents

Description:
This module covers basic macroeconomic relationships, the declaration of employment, production, interest, current and capital account, nominal and real exchange rate, prices and inflation - in the long run (with flexible wages and prices) and in the short term (with fixed wages and prices). The course will familiarise students with concepts which are of central importance in a globalised environment (e. g. interest rate arbitrage, foreign exchange risk, purchasing power parity). The explanations will be applied to current issues (e. g. current account balances in the global economy; questions related to the European monetary union and the global financial crisis).

Outline of syllabus:
1. Macroeconomic issues and characteristics
   - Issues of macroeconomics
   - The measurement of economic activity
2. Long-term relationships
   - The classic long-term model of the closed economy
   - Money and Inflation
   - The classic long-term model of a small open economy
   - Unemployment
3. Short and medium-term relationships
   - Fluctuations of economic activity: an introduction
   - The IS-LM model of a closed economy
   - The IS-LM model of an open economy
   - Aggregate supply and Phillips curve
   - Conclusion and outlook

Reading:
The latest editions of the following textbooks:
N. Gregory Mankiw: Macroeconomics [students are recommended to read the original English edition; they may also read the German translation]
Olivier Blanchard and David H. Johnson, Macroeconomics Prentice Hall; [a German-language edition of the book by Oliver Blanchard and Gerhard Illing is available from Pearson Studium].
Michael Burda and Charles Wyplosz: Macroeconomics. A European text.

To illustrate the lecture, case studies in particular will be developed in which more current sources are used.

Intended learning outcomes
This expertise enables the students to penetrate economically-intuitively and analytically macroeconomic interactions and problems in the course of advancing globalization and to deal with these arguments. Students learn to interpret on a scientific basis the impact of macroeconomic developments in individual economic actors (businesses, households, the state).

Courses (type, number of weekly contact hours, language — if other than German)
V + Ü (no information on SWS (weekly contact hours) and course language available)
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 minutes)

Allocation of places

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Additional information

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

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Module title | Microeconomics 1
---|---
Abbreviation | 12-Mik1-G-132-m01

Module coordinator: holder of the Chair of Economics, Information and Contract Economics

Module offered by: Faculty of Business Management and Economics

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Contents

The lecture covers the following topics:

Theory of the household:
1. Utility maximisation under constraints
2. Comparative statics
3. Income and substitution effects
4. Labour supply
5. Intertemporal consumption / savings decisions

Theory of the firm:
6. Production functions (technology)
7. Profit maximisation
8. Long run versus short run cost minimisation
9. Supply of goods

Intended learning outcomes

Students are systematically trained in microeconomic methods relevant in household and firm theory. Accordingly, they will know how to solve optimization problems under constraints. These scientific methods will serve as useful in many fields of specialization in economics and business administration. In particular, students know analytically how to analyze the impact of changes in the economic environment, e.g., wages, interest rates, income on individual decision making.

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

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

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

written examination (approx. 60 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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Application-oriented Subject Business Management and Economics
Compulsory Electives
(max. 10 ECTS credits)
<table>
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<tr>
<td>Supply, Production and Operations Management. An Introduction</td>
<td>12-BPL-G-132-m01</td>
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**Module coordinator**
holder of the Chair of Business Management and Industrial Management

**Module offered by**
Faculty of Business Management and Economics

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**Contents**

This course will provide students with an overview of fundamental processes in procurement, production and logistics and the related corporate functions as well as a model-based introduction to related planning procedures.

**Intended learning outcomes**

The students will be able to describe and discuss the objectives and major processes in the domains of corporate procurement, production and logistics as well as their interdependencies. Furthermore, they are capable of developing and applying basic planning models in these fields.

**Courses**

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

**Method of assessment**

written examination (approx. 60 minutes)

**Allocation of places**

Number of places: 620. No restrictions with regard to available places for Bachelor’s students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor’s students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.

**Additional information**

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

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Module title | Abbreviation
---|---
Investment and Finance. An Introduction | 12-I&F-G-132-m01

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<td>holder of the Chair of Business Management, Banking and Finance</td>
<td>Faculty of Business Management and Economics</td>
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Contents

Content:
This course offers an introduction to principles of financial mathematics, several methods of capital budgeting and principles of financial economics.

Outline of syllabus:
1. Principles of financial mathematics
2. Fundamental concepts
3. Problems of investment and finance in one commodity world under certainty
4. Problems of investment and finance in one commodity world under uncertainty
5. Problems of investment and finance in many commodities world under uncertainty
6. Capital market and corporate financing in Germany

Intended learning outcomes

After completing the course "Principles of Investments and Finance", the students will be able
(i) to understand the fundamentals in financial mathematics and solve several problems, e.g. via the PV approach;
(ii) to address the central problems in intertemporal allocation given different capital market scenarios;
(iii) to budget and calculate the optimal useful life given static and dynamic investment approaches under the consideration of several other investment opportunities and the capital market scenario, especially the influence of taxes.

Courses

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

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

Method of assessment

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

written examination (approx. 60 minutes)

Allocation of places

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
Module title | Abbreviation
---|---
Macroeconomics 2 | 12-Mak2-G-132-m01

Module coordinator | Module offered by
holder of the Chair of Public Finance | Faculty of Business Management and Economics

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**Contents**

Description:
The lecture provides an introduction to long run or dynamic issues of macroeconomic theory and policy.

Contents:
1. Phillips curve and dynamic model
2. Growth theory and policy
3. Microeconomic foundations of macroeconomics
4. Macroeconomic policy

Lecture notes to be provided by Chair.

**Intended learning outcomes**

After completing the course "Makroökonomie 2" students are familiar with the most important concepts of growth theory, they know the microeconomic foundations of modern macroeconomic theory and understand the intertemporal budget constraint of the government. Therefore they are able to discuss the growth and distributional consequences of policy reforms by applying simple economic models.

**Courses**

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

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

**Method of assessment**

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

written examination (approx. 60 minutes)

**Allocation of places**

Number of places: 620. No restrictions with regard to available places for Bachelor's students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor's students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardized procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.

**Additional information**

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

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### Contents

**Description**

In this module, students will acquire the theoretical foundations of market-oriented management.

**Content:**

With the stakeholder approach as a starting point, the basic design of market-oriented management will be explained and exemplified in the 5 classical steps: situation analysis, objectives, strategies, tools and controlling. The course will focus not only on the behavioural approaches of consumer behaviour but also on industrial purchasing behaviour. A case study introducing students to the fundamental principles of market research based on a conjoint analysis will provide students with deeper insights into the topic.

**Outline of syllabus:**
1. Marketing, entrepreneurship and business management
2. Explanations of consumer behaviour
3. Fundamentals of market research
4. Strategic marketing; marketing tools
5. Corporate social responsibility versus creating shared value

**Reading:**

**Intended learning outcomes**

The students have a basic understanding of business management and are able to classify the knowledge systematically. In addition, they can use the acquired knowledge solve and identify the conventional problem fields of business management.
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Module title: Microeconomics 2
Abbreviation: 12-Mik2-G-132-m01

Module coordinator:
holder of the Chair of Industrial Economics

Module offered by:
Faculty of Business Management and Economics

ECTS: 5

Method of grading: numerical grade

Duration: 1 semester

Module level: undergraduate

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

Contents:

Outline of syllabus:
1. Cost minimisation
2. Profit maximisation and the supply function
3. Short-run market equilibrium
4. Long-run market equilibrium
5. Government interventions
6. Monopoly
7. Pricing strategies with market power
8. Introduction to game theory
9. Strategic interaction and oligopoly

Intended learning outcomes:
The aim of the course is to understand how markets work. We will investigate the behavior of a company in different market structures; namely perfectly competitive markets, monopoly markets and all forms in between, the so-called oligopoly markets. Ultimately, we are interested in whether the market results from a social point of view is desirable. Using our models, we will also try to analyze the consequences of different government interventions. The knowledge that students gain in this course will be in their future course of studies of benefits to them. In almost all business and economics lectures markets play a role. It also discussed in detail how economic actors make their decisions. Students will thus learn the important building blocks of economic thought. This knowledge will also be useful in the workplace and even in their private lives.

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

Method of assessment:
written examination (approx. 60 minutes)
Language of assessment: German, English

Allocation of places:
Number of places: 620. No restrictions with regard to available places for Bachelor’s students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor’s students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.
Additional information

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

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Principles of Economic Policy

Module title
Abbreviation
Principles of Economic Policy 12-WiPo-G-132-m01

Module coordinator
holder of the Chair of Economic Order and Social Policy

Module offered by
Faculty of Business Management and Economics

ECTS
5

Method of grading
numerical grade

Duration
1 semester

Module level
undergraduate

Other prerequisites
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Contents

Description:
The course consists of six chapters. The first chapter illustrates what economists have in mind when referring to the term "economic policy" and discusses its objectives, means and institutions. The following chapters deal with the objectives that are set out in the German "Gesetz zur Förderung der Stabilität und des Wachstums der Wirtschaft" ("Law for Promoting Stability and Growth of the Economy") of 1967. Each chapter uses current macroeconomic data to evaluate the degree to which the particular objective is achieved, discusses the reasons of possible problems and demonstrates actions the government may take to cure the problems.

Outline of syllabus:
1. Introduction
   - What is "Economic Policy"?
   - Objectives of economic policy
   - Instruments of economic policy
   - Institutions of economic policy
2. Full employment
   - Empirics: The status quo of the labour market
   - Reasons for unemployment
   - Cure for labour market problems
3. Price level stability
   - Empirics: inflation, deflation or price stability?
   - Reasons for inflation and deflation
   - Cure for price instability
   - The contradicting relationship between full employment and stable prices
4. Business cycles and economic growth
   - Empirics: current situation of the world economy and long-term economic growth
   - Reasons for cyclical fluctuations and determinants of economic growth
   - Cure for macroeconomic instabilities and means to facilitate economic growth
5. Balance in foreign trade
   - Empirics: balances of payments of Germany, Europe and the World
   - Reasons for macroeconomic imbalances
   - Cure for instabilities in foreign trade
6. Income distribution
   - Empirics: the distribution of incomes and its historical development
   - Reasons for an increase in income inequality
   - Cure for inequality and redistribution

Intended learning outcomes

The students gain a basic understanding of the role of the state in national and international economies. Based on a number of macroeconomic models (AS/AD, IS/LM, phillips curve, labor market equilibria, Solow model, Beveridge curve, etc.), students study the ability of the state to influence national and global economies. Students learn to assess in which situations such influence can be welfare-enhancing and under which circumstances governmental interventions may be harmful. After successful completion of the course, students are able to analyze concrete economic situations and to develop policy options of the state. In addition, students have learned to...
assess the situation of a country on the basis of empirical macroeconomic data and to explain the particular problems based on different models.

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

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

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

written examination (approx. 60 minutes)

**Allocation of places**

Number of places: 620. No restrictions with regard to available places for Bachelor’s students of Wirtschaftswissenschaft (Business Management and Economics) (BSc with 180 ECTS credits), Wirtschaftsmathematik (Mathematics for Economics) (BSc with 180 ECTS credits), Wirtschaftsinformatik (Business Information Systems) (BSc with 180 ECTS credits) as well as Bachelor’s students with the minor Wirtschaftswissenschaft (Business Management and Economics) (60 ECTS credits). The remaining places will be allocated to students of other subjects. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. Places on all courses of the module component with a restricted number of places will be allocated in the same procedure. A waiting list will be maintained and places re-allocated as they become available.

**Additional information**

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

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Thesis

(11 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Thesis Mathematics (Bachelor Thesis)</td>
<td>10-M-BAM-122-m01</td>
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**Module coordinator**
Dean of Studies Mathematik (Mathematics)

**Module offered by**
Institute of Mathematics

<table>
<thead>
<tr>
<th>ECTS</th>
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<th>Only after succ. compl. of module(s)</th>
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<tbody>
<tr>
<td>11</td>
<td>numerical grade</td>
<td>Where applicable, specific modules/module components as specified by supervisor.</td>
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</tbody>
</table>

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
--

### Contents
Independently researching and writing on a topic in mathematics selected in consultation with the supervisor.

**Intended learning outcomes**
The student is able to work independently on a given mathematical topic and apply the skills and methods obtained during his/her studies in the bachelor programme. He/She can write down the result of his/her work in a suitable form.

**Courses**
(type, number of weekly contact hours, language — if other than German)
no courses assigned

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written thesis
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**
--

**Additional information**
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**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
--
Subject-specific Key Skills

(16 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Computational Mathematics</td>
<td>10-M-COM-131-m01</td>
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<table>
<thead>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</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-G and 10-M-LNA-G). Computer-based solution of problems in linear algebra, geometry, analysis, in particular differential and integral calculus; visualisation of functions.

**Intended learning outcomes**

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

**Courses**

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

**Method of assessment**

project in the form of programming exercises (approx. 60 to 120 minutes)

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)
<table>
<thead>
<tr>
<th>Module title</th>
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<td>Programming course for students of Mathematics and other subjects</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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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 is creditable for bonus)
project in the form of programming exercises (approx. 60 to 120 minutes)
Language of assessment: German, English

**Allocation of places**
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**Additional information**
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**Contents**

Introduction to the basic notions and proof techniques in mathematics: approach to sets, formal logic and maps.

**Intended learning outcomes**

The student gets acquainted with the basic working techniques which are prerequisites for the further courses in the Bachelor’s degree study programme.

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

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

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**Allocation of places**

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**Additional information**

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**Contents**

Introduction to fundamental methods of thinking and proving, basic techniques in mathematics as well as mathematical writing; insight into examples of abstracts concepts in mathematics; approach to axiomatic and deduction.

**Intended learning outcomes**

The student is acquainted with the basic proof methods and techniques in mathematics. He/She is able to perform easy mathematical arguments independently and present them adequately and reasonably in written and oral form.

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

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

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

project assignment (approx. 60 to 120 minutes)
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>
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<td>Seminar Mathematics</td>
<td>10-M-SEM-131-m01</td>
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**Contents**

A selected topic in mathematics.

**Intended learning outcomes**

The student gains first experience with independent scientific work. He/She masters elaboration and structuring of a given topic using selected literature, and prepares a talk on the subject. He/She is able to participate actively in a scientific discussion.

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

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

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

Talk (approx. 60 to 120 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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