Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

# 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: 2007
Responsible: Institute of Mathematics

# Contents

# The subject is divided into

# Content and Objectives of the Programme

No translation available.

# Abbreviations used

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

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

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

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

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

# Conventions

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

# Notes

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

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

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

# In accordance with

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

**ASPO2007**

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

**09-Dec-2008 (2008-31)**

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

(95 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Analysis** | | | 10-M-ANA-072-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)** | |
| 18 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 2 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. | |

**Contents**

Real numbers and completeness, basic topological notions, convergence and divergence of sequences and series, power series, Taylor series, fundamental calculus in one and several variables (including inverse and implicit function theorem); fundamental integral calculus in one variable (Riemann integral and improper integrals).

**Intended learning outcomes**

The student knows and masters the essential methods and notions of analysis. He/She is able to perform easy mathematical arguments and present them adequately in written and oral form. He/She is acquainted with the central proof methods and concepts in analysis, their analytic background and geometric interpretation.

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

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

- 10-M-ANA-1-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-ANA-2-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-ANA-P-072: M (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 10-M-ANA-1-072:** Analysis 1 Analysis 1

- 8 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Modules 10-M-VKM and 10-M-PPM are recommended.

**Assessment in module component 10-M-ANA-2-072:** Analysis 2 Analysis 2

- 8 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Modules 10-M-VKM and 10-M-PPM are recommended; in addition, module component 10-M-ANA-1 is recommended for module component 10-M-ANA-2.

**Assessment in module component 10-M-ANA-P-072:** Examination in Analysis

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: 10-M-ANA-1 or 10-M-ANL-1 or 10-M-ANA-2 or 10-M-ANL-2
- Other prerequisites: Modules 10-M-VKM and 10-M-PPM are recommended.

| **Allocation of places** |
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| **Additional information** |
| -- |
| **Workload** |
| -- |
| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Linear Algebra** | | | 10-M-LNA-072-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) |
|---|---|---|
| 18 | numerical grade | -- |

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

**Contents**

Sets, relations and maps; notions of groups, rings and fields (in particular, polynomial rings); vector spaces (subspaces, quotient spaces, linear independency, basis, dimension); linear maps (isomorphism theorem, image, kernel, rank); matrix calculus; systems of linear equations, determinants, eigenvalues, eigenvectors and eigenspaces, diagonalisability (including characteristic polynomial, minimal polynomial), normal forms, bilinear forms; Euclidean and unitary vector spaces (orthonormal bases, isometries, principal axis transformation).

**Intended learning outcomes**

The student knows and masters the basic notions and essential methods of linear algebra. He/She is able to perform easy mathematical arguments independently, and can present them adequately in written and oral form. He/She is able to apply the central proof methods and concepts of linear algebra and knows about their algebraic and geometric background.

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

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

- 10-M-LNA-1-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-2-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-P-072: M (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 10-M-LNA-1-072:** Linear Algebra 1 Linear Algebra 1

- 8 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Module 10-M-VKM is recommended.

**Assessment in module component 10-M-LNA-2-072:** Linear Algebra 2 Linear Algebra 2

- 8 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Module 10-M-VKM is recommended; in addition, module component 10-M-LNA-1 is recommended for module component 10-M-LNA-2.

**Assessment in module component 10-M-LNA-P-072:** Examination in Linear Algebra

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: 10-M-LNA-1 or 10-M-LNA-2
- Other prerequisites: Module 10-M-VKM is recommended.

| **Allocation of places** |
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| **Additional information** |
| -- |
| **Workload** |
| -- |
| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Advanced Analysis** | | | 10-M-VAN-072-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)** | |
| 7 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Lebesgue integral in several variables, including theorems on convergence and Fubini's theorem, L^p-spaces and elementary Fourier theory in L^2, Gauss's theorem.

**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)

a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Algebra, Geometry and Number Theory** | | | 10-M-AGZ-072-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) |
|---|---|---|
| 22 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 3 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. |

**Contents**

Introduction to algebra, number theory and geometry: basic algebraic structures (groups, rings, fields); arithmetic properties of integers and rational numbers (as well as algebraic extensions) relating to their algebraic structures (residue class rings and finite fields) and their geometry (quadratic forms); axiomatic introduction of projective spaces, coordinates, fundamental theorems, relations to linear algebra and algebra, curves and hypersurfaces in Euclidean spaces, curvature.

**Intended learning outcomes**

The student is acquainted with the fundamental concepts and methods in algebra, geometry and number theory.He/She is able to relate these concepts with one another, and realises the advantages of thinking across the borders of different branches in mathematics.

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

This module has 4 components; information on courses listed separately for each component.

- 10-M-AGZ-1-072: V + Ü (no information on language and number of weekly contact hours available)
- 10-M-AGZ-2-072: V + Ü + V + Ü (no information on language and number of weekly contact hours available)
- 10-M-AGZ-3-072: V + Ü (no information on language and number of weekly contact hours available)
- 10-M-AGZ-P-072: M (no information on language and number of weekly contact hours available)

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

This module has the following 4 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole.

**Assessment in module component 10-M-AGZ-1-072:** Einführung in die Algebra (Introduction to Algebra)

- 7 ECTS credits, pass / fail
- a) written examination (approx. 90 minutes, usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups of 2 candidates (approx. 30 minutes)
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: Module 10-M-LNA recommended.

**Assessment in module component 10-M-AGZ-2-072:** Einführung in die Geometrie (Introduction to Geometry)

- 8 ECTS credits, pass / fail
- a) written examination (approx. 90 minutes, usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups of 2 candidates (approx. 30 minutes)
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: Module 10-M-LNA recommended.

**Assessment in module component 10-M-AGZ-3-072:** Elementare Zahlentheorie (Elementary Number Theory)

- 5 ECTS credits, pass / fail
- a) written examination (approx. 90 minutes, usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups of 2 candidates (approx. 30 minutes)
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: Module 10-M-LNA recommended.

**Assessment in module component 10-M-AGZ-P-072:** Prüfung Algebra, Geometrie und Zahlentheorie (Assessment Algebra, Geometry and Number Theory)

- 2 ECTS credits, numerical grading

- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German; English if agreed upon with examiner(s)
- Only after successful completion of module components: Two out of the following three module components: 10-M-AGZ-1, 10-M-AGZ-2, 10-M-AGZ-3.
- Additional prerequisites: Module 10-M-LNA recommended.

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | Abbreviation |
|---|---|
| **Ordinary Differential Equations and Complex Analysis** | 10-M-DFT-072-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) |
|---|---|---|
| 14 | numerical grade | -- |

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

**Contents**

Existence and uniqueness theorems on solutions of ordinary differential equations, solution theorems on systems of linear diffferential equations, introduction to the problem of systems of nonlinear differential equations, basic notions in the qualitative theory of ordinary differential equations, basic properties of holomorphic functions, meromorphic functions and conformal maps, basic proof methods in differential equations and complex analysis, applications in computer science, physics, engineering science and other fields of mathematics.

**Intended learning outcomes**

The student is acquainted with the fundamental concepts and methods of the theory of ordinary differential equations and holomorphic functions. He/she is able to interconnect these concepts and realises the advantages of thinking across the borders of different branches in mathematics.

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

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

- 10-M-DFT-1-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-DFT-2-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-DFT-P-072: M (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 10-M-DFT-1-072:** Ordinary Differential Equations Ordinary Differential Equations

- 5 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner

**Assessment in module component 10-M-DFT-2-072:** Introduction to Complex Analysis Introduction to Complex Analysis

- 7 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner

**Assessment in module component 10-M-DFT-P-072:** Examination in Ordinary Differential Equations and Complex Analysis

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: 10-M-DFT-1 or 10-M-DFT-2

**Allocation of places**

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| **Additional information** |
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| **Workload** |
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| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
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| **Module appears in** |
| Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Numerical Mathematics 1** | | | 10-M-NM1-072-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)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

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

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

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

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

a) written examination (90 minutes; usually chosen) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups (groups of 2, 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Stochastics 1** | | | 10-M-ST1-072-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)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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.

**Intended learning outcomes**

The student is acquainted with fundamental concepts and methods in stochastics, applies these methods to practical problems and knows about the typical fields of application.

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

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

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

a) written examination (90 minutes; usually chosen) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups (groups of 2, 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2007)

# Compulsory Electives

(55 ECTS credits)

# Mathematics 1

(5 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Numerical Mathematics 2** | | | 10-M-NM2-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

The student is able to draw a distinction between the different concepts of numerical mathematics and knows about their advantages and limitations concerning the possibilities of application in different fields of natural and engineering sciences and economics.

**Courses** (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)

a) written examination (90 minutes) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups of 2 candidates (30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Stochastics 2** | | | 10-M-ST2-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Elements of data analysis, statistics of data in normal and other distributions, elements of multivariate statistics.

**Intended learning outcomes**

The student is acquainted with fundamental concepts and methods in statistics, applies these methods to practical problems and knows about the typical fields of application.

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

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

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

a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

# Mathematics 2

(5 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction to Discrete Mathematics** | | | 10-M-EDM-072-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) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | undergraduate | Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew. |

**Contents**

Techniques from combinatorics, introduction to graph theory (including applications), cryptographic methods, error-correcting codes.

**Intended learning outcomes**

The student is acquainted with the fundamental concepts and results in discrete mathematics, masters the relevant proof techniques, is able to apply methods from number theory and algebra to discrete mathematics and realises the scope of applications of discrete structures.

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

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

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

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

**Allocation of places**

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**Additional information**

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**Workload**

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)

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

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction to Functional Analysis** | | | 10-M-FAN-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew. | |

**Contents**

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

**Intended learning outcomes**

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

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

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

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

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

**Allocation of places**

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**Additional information**

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**Workload**

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

§ 73 (1) 1. Mathematik Analysis

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Technology of Functional Materials (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2010)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)

Bachelor' degree (1 major) Computational Mathematics (2009)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Technology of Functional Materials (2009)
Master's degree (1 major) Functional Materials (2012)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2006)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Operations Research** | | | 10-M-ORS-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew. | |

**Contents**

Linear programming, duality theory, transport problems, integral linear programming, graph theoretic problems.

**Intended learning outcomes**

The student is acquainted with the fundamental methods in operations research, as required as a central tool for solving many practical problems especially in economics. He/She is able to apply these methods to practical problems, both theoretically and numerically.

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

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

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

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

**Allocation of places**

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**Additional information**

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**Workload**

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)

Bachelor' degree (1 major) Computational Mathematics (2009)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Non-Linear Dynamics** | | | 10-M-NLD-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew. | |

**Contents**

Basic notions in stability theory, Lyapunov theory; stable manifolds, periodic solutions including Poincare-Bendixson, chaotic dynamics; applications in physics and biology (e. g. Hamiltonian systems, Volterra-Lotka).

**Intended learning outcomes**

The student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof methods. He/She is able to apply these methods to simple situations, e.g. in physics or biology.

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

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

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

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

**Allocation of places**

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**Additional information**

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**Workload**

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

§ 73 (1) 1. Mathematik Analysis

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2009)

Bachelor' degree (1 major) Aerospace Computer Science (2011)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

# Mathematics 3

(5 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Numerical Mathematics** | | | 10-M-RCN-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Advanced topics in numerical mathematics.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Stochastics** | | | 10-M-RCS-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Advanced topics in stochastics.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Discrete Mathematics** | | | 10-M-RCD-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Basics in discrete mathematics.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Functional Analysis** | | | 10-M-RCF-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Basics in functional analysis.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Operations Research** | | | 10-M-RCO-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Basics in operations research.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Dynamical Systems** | | | 10-M-RCY-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Basics in dynamical systems and nonlinear dynamics.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Reading Course Optimisation** | | | 10-M-RCP-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Basics in optimization.

**Intended learning outcomes**

The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature.

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

A (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) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

# Mathematics 4

(5 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Analysis** | | | 10-M-BSA-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in analysis.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

§ 73 (1) 1. Mathematik Analysis

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Linear Algebra** | | | 10-M-BSL-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in linear algebra.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Algebra** | | | 10-M-BSE-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in algebra.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Geometry** | | | 10-M-BSG-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in geometry or differential geometry.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

§ 73 (1) 4. Mathematik Geometrie

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Number Theory** | | | 10-M-BSZ-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in number theory.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | Abbreviation |
|---|---|
| **Seminar in Ordinary Differential Equations** | 10-M-BSW-072-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) |
|---|---|---|
| 5 | numerical grade | -- |

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

**Contents**

A selected topic in the theory of ordinary differential equations.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

§ 73 (1) 1. Mathematik Analysis

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Complex Analysis** | | | 10-M-BSC-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in complex analysis.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

§ 73 (1) 1. Mathematik Analysis

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Numerical Mathematics** | | | 10-M-BSN-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in numerical 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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

--

**Workload**

--

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Stochastics** | | | 10-M-BSS-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in stochastics.

**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 minutes)
Assessment offered: in the semester in which the course is offered
Language of assessment: German, English if agreed upon with the examiner

**Allocation of places**

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**Additional information**

--

**Workload**

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

§ 73 (1) 3. Mathematik Stochastik

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)
First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Functional Analysis** | | | 10-M-BSF-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in functional analysis.

**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 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Operation Research** | | | 10-M-BSO-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in operations research.

**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 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Seminar in Discrete Mathematics** | | | 10-M-BSD-072-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)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

A selected topic in discrete 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 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)

# Application-oriented Subject

(35 ECTS credits)

# Application-oriented Subject Biology

(35 ECTS credits)

# Application-oriented Subject Biology Compulsory Courses

(10 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Genetics, Neurobiology, Behaviour** | | | 07-2A2GNV-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Biologie (Biology) | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 6 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. | |

**Contents**

Fundamental principles of genetics, neurobiology and behavioural biology.

**Intended learning outcomes**

[Version 1: Students will understand that there are molecular, cellular and system biological mechanisms and processes involved in animal behaviour and will be able to relate animal behaviour to the molecular and formal bases of inheritance.] [Version 2: Students will understand that there are molecular, cellular and system biological mechanisms and processes involved in animal behaviour and will be able to relate animal behaviour to the molecular and formal bases of inheritance.]

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

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

- 07-2A2GNV-1G-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-2A2GNV-2N-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-2A2GNV-3V-072: 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)

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

**Assessment in module component 07-2A2GNV-1G-072:** Basic Genetics Basic Genetics

- 2 ECTS, Method of grading: numerical grade
- written examination (approx. 30 minutes)
- Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.

**Assessment in module component 07-2A2GNV-2N-072:** Basic Neurobiology Basic Neurobiology

- 2 ECTS, Method of grading: numerical grade
- written examination (approx. 30 minutes)
- Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.

**Assessment in module component 07-2A2GNV-3V-072:** Behavioural Biology Behavioural Biology

- 2 ECTS, Method of grading: numerical grade
- written examination (approx. 30 minutes, word problems and/or multiple choice questions)
- Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.

**Allocation of places**

Only as part of "spezielles Studienangebot": 10 places.

**Additional information**

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| **Workload** |
| --- |
| -- |
| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Biology (2011)<br>Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Biology (2010)<br>Bachelor' degree (1 major) Mathematics (2008)<br>Bachelor' degree (1 major) Mathematics (2012)<br>Bachelor' degree (1 major) Mathematics (2013)<br>Bachelor' degree (1 major) Mathematics (2007)<br>Bachelor' degree (1 major) Computational Mathematics (2009)<br>Bachelor' degree (1 major) Computational Mathematics (2012)<br>Bachelor' degree (1 major) Computational Mathematics (2013)<br>Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)<br>Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)<br>No final examination (2010) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Structure and Function of Cells** | | | 07-1A1Z-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 4 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course. | |

**Contents**

[Version 1: This module will discuss the cell, the smallest unit of life, starting with its macroscopic structure before moving on to its microscopic structure. It will point out differences and similarities between prokaryotic cells (bacteria, archaebacteria) and eukaryotic cells (animals, plants).] [Version 2: The first part of the module will acquaint students with the elementary building blocks of life as well as biological categories. Building on this knowledge, the course will then discuss the cell, the smallest unit of life, starting with its macroscopic structure before moving on to its microscopic structure. It will point out differences and similarities between prokaryotic cells (bacteria, archaebacteria) and eukaryotic cells (animals, plants).]

**Intended learning outcomes**

Knowledge of the structures of prokaryotic and eukaryotic cells and their (biological) macromolecules. Knowledge of the specific characteristics of the intracellular and extracellular structures of prokaryotes as well as animal and plant cells. Familiarity with the components and functioning of microscopes.

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

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

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

written examination (60 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

# Application-oriented Subject Biology Compulsory Electives

(25 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Bioinformatics** | | | 07-3A3BI-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Bioinformatics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 2 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Fundamental principles of bioinformatics.

**Intended learning outcomes**

Students are proficient in methods for the analysis of DNA and protein databases.

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

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

- 07-3A3BI-1B-072: V (no information on SWS (weekly contact hours) and course language available)
- 07-3A3BI-2B-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-3A3BI-1B-072:** Bioinformatics (Lecture)

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

**Assessment in module component 07-3A3BI-2B-072:** Bioinformatics (Seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- term paper (approx. 5 to 10 pages)

**Allocation of places**

Only as part of Biochemistry Master's: 5 places. Places will be allocated by lot.

**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Master's degree (1 major) Biochemistry (2012)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Ecology of plants and animals** | | | 07-3A3OE-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Biologie (Biology) | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 6 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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 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)

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

- 07-3A3OE-1T-072: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-3A3OE-2P-072: 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)

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

**Assessment in module component 07-3A3OE-1T-072:** Ecology of Animals (Lecture and Practice) Ecology of Animals (Lecture and Practice)

- 3 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 07-3A3OE-2P-072:** Ecology of Plant (Lecture and Practice) Ecology of Plant (Lecture and Practice)

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Developmental Biology for advanced students** | | | 07-4BFMZ1-092-m01 |
| **Module coordinator** | | | **Module offered by** |
| holder of the Chair of Cell Biology and Developmental Biology | | | 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**

This module will acquaint students with the fundamental principles of the molecular developmental biology of animals. Particular emphasis will be placed on providing students with an opportunity to become proficient in fundamental methods and applications, using the help of examples.

**Intended learning outcomes**

Students are able to use fundamental methods to approach simple problems in animal developmental biology.

**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)

a) written examination (approx. 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 (groups of up to 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Cell Biology for advanced students** | | | 07-4BFMZ2-092-m01 |
| **Module coordinator** | | | **Module offered by** |
| holder of the Chair of Cell Biology and Developmental Biology | | | 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**

This module will acquaint students with the fundamental principles of cell biology. Particular emphasis will be placed on providing students with an opportunity to become proficient in fundamental methods and applications in molecular and cell biology, using the help of examples.

**Intended learning outcomes**

Students are able to use fundamental methods to approach simple problems in cell biology.

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

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

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

written examination (60 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Microbiology for advanced students** | | | 07-4BFMZ3-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Microbiology | | 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**

This module will acquaint students with the fundamental principles of the physiology and molecular biology of microorganisms.

**Intended learning outcomes**

Students are able to use fundamental methods to approach simple problems in microbiology. They are familiar with topics in microbiology.

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

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

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

written examination (60 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Bioinformatics for advanced students** | | | 07-4BFMZ4-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Bioinformatics | | 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**

The module will introduce students to the practice of bioinformatics and will cover the following topics: sequence analysis, structure analysis, genome analysis, cellular and metabolic networks as well as gene regulation.

**Intended learning outcomes**

Students are able to use appropriate bioinformatic algorithms to address simple problems as well as to interpret their 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)

log (approx. 10 to 20 pages)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Biotechnology I** | | | 07-4BFMZ5-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Biotechnology and Biophysics | | 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**

During this practical course, students will acquire an insight into a variety of topics in biotechnology.

**Intended learning outcomes**

Students are able to apply advanced methods in biotechnology.

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

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

- 07-4BFMZ5-1BT-092: P (no information on SWS (weekly contact hours) and course language available)
- 07-4BFMZ5-2BT-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4BFMZ5-1BT-092:** Biotechnology 1 (Lecture and Laboratory Practice)

- 4 ECTS, Method of grading: numerical grade
- log (approx. 10 to 20 pages)
- Assessment offered: once a year, summer semester

**Assessment in module component 07-4BFMZ5-2BT-092:** Seminar to Advanced Biotechnology 1

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, summer semester

**Allocation of places**

--

**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Neurobiology for advanced students** | | | 07-4BFNV01-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Neurobiology and Genetics | | 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 neurobiology. How do the brain, neurons and genes control behaviour? Cellular and molecular foundations of the function of neurons. Synaptic transmission. Applications of neurobiology.

**Intended learning outcomes**

Students have acquired an advanced knowledge in the area of neurobiology and recognise the relevance research findings in neurobiology have to medicine.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Behavioural physiology and sociobiology for advanced students** | | | 07-4BFNV02-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Neurobiology and Genetics | | 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**

Specific and comparative animal physiology with a focus on neurophysiology as well as sensory and behavioural physiology.

**Intended learning outcomes**

Students have acquired knowledge and skills in the area of specific animal physiology. They are familiar with hypotheses and are proficient in methods used in research in this field.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Ecology of Animals for advanced students** | | | 07-4BFNV03-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology III | | 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**

Selected topics in autecology and synecology; experimental design, data collection and analysis in animal ecology.

**Intended learning outcomes**

Students have acquired an advanced knowledge in the area of animal ecology. They are able to design simple ecological lab and field experiments as well as to interpret and present their findings.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Specific Plant Physiology** | | | 07-4BFPS1-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | 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**

This module will equip students with the theoretical foundations of fundamental processes in plants, such as nitrogen and carbon metabolism. The methodological approaches in experimental plant physiology will be discussed and the molecular techniques for functional gene analysis (reverse genetics and other techniques) will be applied.

**Intended learning outcomes**

Students have acquired fundamental knowledge on plant nutrient cycles and are proficient in molecular and physiological methods in experimental plant physiology.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Biophysics - Basic course** | | | 07-4BFPS2-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | 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**

In this module, students will acquire the general fundamentals of plant membrane transport and the biophysical methods with which it can be characterised. For this purpose, students will be introduced to modern methods of molecular biology and imaging as well as data collection and analysis.

**Intended learning outcomes**

Students understand basic membrane transport processes and are able to use experimental methods in experiments with intact plants, isolated plant cells as well as animal expression systems.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Biochemistry - Basic course** | | | 07-4BFPS3-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | 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**

In this module, students will become acquainted with the most important plant, biological and microbial photoreceptors and will learn the fundamental principles of the biochemical and molecular biological methods for the expression, isolation and purification as well as the biophysical characterisation of receptors.

**Intended learning outcomes**

Students are familiar with the biochemistry, molecular biology and function of biological photoreceptors and are able to analyse these using appropriate 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 (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Basics plant Ecophysiology** | | | 07-4BFPS4-092-m01 |
| **Module coordinator** | | | **Module offered by** |
| holder of the Chair of Ecophysiology and Vegetation Ecology | | | 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**

Using the examples of selected systems, this module will introduce students to the theoretical fundamentals of the interaction between plants and their environment and will make students familiar with the molecular biological, chemical analytical as well as ecophysiological methods necessary to investigate this interaction.

**Intended learning outcomes**

Students will be able to recognise, describe and evaluate interactions between plants and their environment. They will be able to perform basic experiments to analyse these interactions.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Pharmaceutical bio analytics** | | | 07-4BFPS5-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Pharmaceutical Biology | | 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**

In this module, students will acquire the theoretical and methodological fundamentals of drug and metabolite analysis. It will include an introduction to chromatographic methods of analysis as well as modern methods in computational chemistry. Qualitative and quantitative analyses of active agents and metabolites will be performed on, for example, complex drug, plant and urine samples.

**Intended learning outcomes**

Students have developed fundamental knowledge and skills in the area of drug and metabolite analysis and are proficient in chromatographic methods.

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

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

- 07-4BFPS5-1BA-092: P (no information on SWS (weekly contact hours) and course language available)
- 07-4BFPS5-2BA-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4BFPS5-1BA-092:** Pharmaceutical Bioanalytics (practical course)

- 4 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 07-4BFPS5-2BA-092:** Seminar Pharmaceutical Bio Analytics

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, summer semester

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Human Genetics** | | | 03-4S1HG-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of of Human Genetics | | Faculty of Medicine | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. | |

**Contents**

Fundamentals of and analytical methods in human and vertebrate cytogenetics. Characterisation of the normal human karyotype and chromosome aberrations. Introduction to chromosome evolution.

**Intended learning outcomes**

Students who complete this module will acquire the theoretical basis of and practical experience in human cytogenetics. They will learn how to prepare and identify human chromosomes and critically interpret cytogenetic findings.

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

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

- 03-4S1HG-1HZ-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 03-4S1HG-2HZ-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 03-4S1HG-1HZ-092:** Human Genetics (Lecture and Laboratory Practice) Human Genetics (Lecture and Laboratory Practice)

- 3 ECTS, Method of grading: numerical grade
- 2 written examinations (multiple choice): mid-semester examination (15 minutes), end-of-semester examination (20 minutes)
- Other prerequisites: A basic knowledge of genetics is recommended.

**Assessment in module component 03-4S1HG-2HZ-092:** Human Genetics (Seminar)

- 2 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Other prerequisites: A basic knowledge of genetics is recommended.

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Immunology I** | | | 03-4S1IM-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Immunogenetics | | Faculty of Medicine | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module gives an introduction to immunology. The following questions will be addressed: How does the body recognise and eliminate pathogens and tumour cells? How can the immune system damage its own body (allergies, autoimmunity)? Organs, cells and molecules of the immune system will be presented with an emphasis on genetic and molecular mechanisms of recognition and elimination of foreign substances by the immune system. The most important immunological techniques will be introduced and applied.

**Intended learning outcomes**

The students acquire a practical knowledge of cellular and molecular techniques for the analysis of the immune system. The are familiar with the mechanisms of self and non-self discrimination by the adaptive and innate immune systems. They acquire a fundamental knowledge of lymphocyte development as well as major immune effector cell functions and molecules.

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

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

- 03-4S1IM-1IM-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 03-4S1IM-2IM-092: P (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 03-4S1IM-1IM-092:** Introduction into Immunology (Lecture and Practice) Introduction into Immunology (Lecture and Practice)

- 2 ECTS, Method of grading: numerical grade
- written examination (30 minutes)
- Language of assessment: German, English where required

**Assessment in module component 03-4S1IM-2IM-092:** Immunology (Laboratory Course)

- 3 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Language of assessment: German, English where required

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

| |
|---|
| Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Physiological Chemistry I** | | | 03-4S1PC-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Physiological Chemistry | | Faculty of Medicine | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

General anatomy, physiology and developmental biology of fishes. Special usefulness of the mainstream fish model systems (zebrafish, medaka, Xiphophorus) for biomedical research. Phenotyping of mutants. Microinjection of DNA and RNA in single-cell embryos. Fluorescent microscopy-based bioimaging techniques. Visualisation of selected tissues and organs (neural tissues, cartilage). In-situ hybridisation of mRNA. Immunhistochemical detection of proteins in-situ. Demonstration of basic techniques for electron microscopy. Behavioural analyses of locomotor activity.

**Intended learning outcomes**

Students are able to independently produce transient transgenic fish. They are able to delineate and describe temporal and spatial RNA and protein expression in situ, appraise expression patterns and recognise phenotypes of developmental mutants. They are able to evaluate fish models of biomedicine for their usefulness to answer specific questions.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Virology I** | | | 03-4S1VL-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Virology | | Faculty of Medicine | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Working safely in a BSL-2 laboratory; cell culture; virus production; virus titration; virus sequencing; phylogenetic analysis of a viral quasispecies.

**Intended learning outcomes**

Students have developed a fundamental knowledge in molecular virology concerning the structure and replication of viruses, virus-host cell interactions and mechanisms of action of antiviral compounds. They are able to apply cell and molecular techniques of virological basic science.

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

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

- 03-4S1VL-1VL-092: V (no information on SWS (weekly contact hours) and course language available)
- 03-4S1VL-3VL-092: P (no information on SWS (weekly contact hours) and course language available)
- 03-4S1VL-2VL-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 03-4S1VL-1VL-092:** Basic Virology (Lecture and Practice)

- 1 ECTS, Method of grading: numerical grade
- written examination (20 minutes)
- Language of assessment: German, English where required

**Assessment in module component 03-4S1VL-3VL-092:** Virology (Laboratory Course)

- 3 ECTS, Method of grading: numerical grade
- written examination (20 minutes) or oral examination (20 minutes)
- Language of assessment: German, English

**Assessment in module component 03-4S1VL-2VL-092:** Seminar on General Virology

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Language of assessment: German, English where required

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

| |
|---|
| Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Advanced Light- and Electron-Microscopy** | | | 07-4S1MZ1-092-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)** | |
| 3 | 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 (45 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Analysis of Chromosomes** | | | 07-4S1MZ2-092-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)** | |
| 3 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

Students are able to analyse chromosomal structures.

**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 (45 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Ecology and Developmental Biology of marine organisms** | | | 07-4S1MZ3-092-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 | By way of exception, additional prerequisites are listed in the section on assessments. | |

**Contents**

A combination of lab work and field trips, this module will provide students with an insight both into the organismal diversity of a marine ecosystem and into the biocenosis of the littoral of the island of Helgoland in the North Sea.

**Intended learning outcomes**

Students are familiar with the morphology, developmental biology, physiology and ecology of organisms in a marine ecosystem.

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

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

- 07-4S1MZ3-1MO-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-4S1MZ3-2MO-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1MZ3-1MO-092:** Ecology and Developmental Biology of Marine Organisms

- 4 ECTS, Method of grading: numerical grade
- log (approx. 10 to 20 pages)
- Assessment offered: once a year, summer semester
- Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.

**Assessment in module component 07-4S1MZ3-2MO-092:** Seminar on Marine Biology

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, summer semester

**Allocation of places**

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

- 07-4S1MZ3-1MO-092: 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 Biology (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.

- 07-4S1MZ3-2MO-092: --

**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)
First state examination for the teaching degree Grundschule Biology (2009)
First state examination for the teaching degree Hauptschule Biology (2009)
First state examination for the teaching degree Realschule Biology (2009)
First state examination for the teaching degree Gymnasium Biology (2009)
First state examination for the teaching degree Mittelschule Biology (2013)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Methods in Biotechnology** | | | 07-4S1MZ4-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Biotechnology and Biophysics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 2 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module will provide students with an overview of instrument-based methods in biotechnology and biomedicine. In particular, imaging methods as well as single-cell technologies will be discussed. Publications on the methodology of biotechnology will be analysed.

**Intended learning outcomes**

Students are able to select the instrument-based method in biotechnology and biomedicine that is appropriate to a particular problem.

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

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

- 07-4S1MZ4-1AB-092: V (no information on SWS (weekly contact hours) and course language available)
- 07-4S1MZ4-2AB-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1MZ4-1AB-092:** Methods in Biotechnology (Lecture)

- 1 ECTS, Method of grading: numerical grade
- written examination (20 minutes)

**Assessment in module component 07-4S1MZ4-2AB-092:** Seminar on Methods in Biotechnology

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, summer semester

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Aspects of modern Biotechnology** | | | 07-4S1MZ5-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Biotechnology and Biophysics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 2 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Theoretical aspects of modern molecular biotechnology.

**Intended learning outcomes**

Students have acquired knowledge and skills in the area of molecular biotechnology.

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

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

- 07-4S1MZ5-1MB-092: V (no information on SWS (weekly contact hours) and course language available)
- 07-4S1MZ5-2MB-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1MZ5-1MB-092:** Aspects of Modern Biotechnology (Lecture)

- 1 ECTS, Method of grading: numerical grade
- written examination (20 minutes)

**Assessment in module component 07-4S1MZ5-2MB-092:** Seminar on Molecular Biotechnology

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, summer semester

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Special Bioinformatics I** | | | 07-4S1MZ6-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Bioinformatics | | 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 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)

**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**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Neurobiology I** | | | 07-4S1NVO1-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Neurobiology and Genetics | | 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**

Neurobiology and methods in neurobiology, using Drosophila as a neurogenetic model system.

**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)

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)

log (approx. 10 to 20 pages)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Aspects of Integrative Behavioural Biology** | | | 07-4S1NVO2-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology II | | 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 | By way of exception, additional prerequisites are listed in the section on assessments. | |

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

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

- 07-4S1NVO2-1IV-092: V (no information on SWS (weekly contact hours) and course language available)
- 07-4S1NVO2-2IV-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1NVO2-1IV-092:** Aspects of Integrative Behavioural Biology 1 (Lecture and Practice)

- 2 ECTS, Method of grading: numerical grade
- written examination (30 minutes)
- Language of assessment: German or English
- Other prerequisites: A good command of the English language is recommended.

**Assessment in module component 07-4S1NVO2-2IV-092:** Current Topics in Behavioural Biology

- 3 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, summer semester
- Language of assessment: German or English
- Other prerequisites: A good command of the English language is recommended.

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

| |
|---|
| Bachelor' degree (1 major) Biology (2007) |
| Bachelor' degree (1 major) Mathematics (2007) |
| Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Functional Morphology of arthropods** | | | 07-4S1NV03-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology III | | 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 | Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course. | |

**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** (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)

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 Biology (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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Ecology of insects** | | | 07-4S1NVO4-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology III | | 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**

Taxonomy, ecology (synecology in particular) and behavioural biology of insects, including experimental field and lab work.

**Intended learning outcomes**

Students are proficient in insect diagnostics and are able to apply appropriate methods for experiments on insect ecology and behavioural biology.

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

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

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

written examination (60 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Ecology of populations** | | | 07-4S1NVO5-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology III | | 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**

More in-depth discussion of the structure and dynamics of human and animal populations; regulation of population density; management.

**Intended learning outcomes**

Students are able to interpret the structure and dynamics of populations and metapopulations on the basis of model concepts in population ecology and to apply more advanced methods of quantitative analysis to these.

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

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

- 07-4S1NVO5-1PO-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-4S1NVO5-2PO-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1NVO5-1PO-092:** Basic Ecology of Populations (Lecture, Practice) Basic Ecology of Populations (Lecture, Practice)

- 4 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 07-4S1NVO5-2PO-092:** Ecology of Populations (Seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Molecular modelling - From DNA to protein** | | | 07-4S1PS1-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | 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**

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** (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)

computerised practical examination (4 hours)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction Methods in Plant Ecophysiology** | | | 07-4S1PS2-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | 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)

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)

log (approx. 10 to 20 pages)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Pharmaceutical Drugs** | | | 07-4S1PS3-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Pharmaceutical Biology | | 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**

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)

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

- 07-4S1PS3-1PD-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-4S1PS3-2PD-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1PS3-1PD-092:** Pharmaceutical Drugs (Laboratory Course)

- 3 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 07-4S1PS3-2PD-092:** Seminar on Pharmaceutical Drugs

- 2 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Methods Pharmaceutical Biology - practical course** | | | 07-4S1PS4-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Pharmaceutical Biology | | 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**

This module will provide students with a theoretical and methodological introduction to fundamental techniques in molecular biology and drug analysis.

**Intended learning outcomes**

Students are able to analyse groups of drugs, using a variety of methods.

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

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

- 07-4S1PS4-1PB-092: P (no information on SWS (weekly contact hours) and course language available)
- 07-4S1PS4-2PB-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-4S1PS4-1PB-092:** Analytics and Molecular Biology of Pharmaceutical Drugs (Laboratory Course)

- 4 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 07-4S1PS4-2PB-092:** Seminar on Analytics and Molecular Biology of Pharmaceutical Drugs

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, winter semester

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Neurobiology II** | | | 07-5S2NVO1-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Neurobiology and Genetics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module will provide students with deeper insights into the following topics: the neuronal bases of cognition, sensory systems, learning and memory.

**Intended learning outcomes**

Students are able to acquaint themselves with and deliver presentations on advanced topics in neurobiology, taking into account current literature.

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

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

- 07-5S2NVO1-1NB-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2NVO1-2NB-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2NVO1-1NB-092:** Neurobiology 2 (lecture and practical course) Neurobiology 2 (lecture and practical course)

- 7 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2NVO1-2NB-092:** Neurobiology 2 (seminar)

- 3 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Integrative Behavioural Biology II** | | | 07-5S2NVO2-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology II | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

In this module, students will acquire an in-depth insight into behavioural physiology and sociobiology with a particular focus on the biology of social insects.

**Intended learning outcomes**

Students have acquired knowledge and skills in the areas of behavioural physiology and sociobiology. They are familiar with hypotheses and are proficient in methods used in research on social insects.

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

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

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

a) written examination (approx. 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 (groups of up to 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Ecology of animals II** | | | 07-5S2NVO3-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology III | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

In this module, students will acquire an in-depth insight into experiment design and the statistical analysis of data in animal ecology.

**Intended learning outcomes**

Students are able to design appropriate experiments to address a scientific issue as well as to analyse, present and interpret the results.

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

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

- 07-5S2NVO3-1OE-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2NVO3-2OE-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2NVO3-1OE-092:** Ecology of Animals 2 - Planning of experiments and Statistics (lecture and practice) Ecology of Animals 2 - Planning of experiments and Statistics (lecture and practice)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2NVO3-2OE-092:** Ecology of Animals 2 - Analysis of ecological data (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Assessment offered: once a year, winter semester

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

| |
|---|
| Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | Abbreviation |
|---|---|
| **Methods in molecular cell - and developmental Biology** | 07-5S2MZ1-092-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Zoology I | Faculty of Biology |

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

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

**Contents**

In this module, students will acquire an in-depth insight into approaches and methods in molecular and cell biology.

**Intended learning outcomes**

Students have acquired knowledge about general strategies and methods of molecular and cell biology. They are able to independently perform scientific laboratory work.

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

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

- 07-5S2MZ1-1ZE-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2MZ1-2ZE-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2MZ1-3ZE-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2MZ1-1ZE-092:** Methods in molecular cell - and developmental Biology - Data processing and computer skills (lecture and practice) Methods in molecular cell - and developmental Biology - Data processing and computer skills (lecture and practice)

- 3 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2MZ1-2ZE-092:** Methods in molecular cell - and developmental Biology (laboratory course)

- 6 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German, English

**Assessment in module component 07-5S2MZ1-3ZE-092:** Current topics in molecular cell - and developmental Biology (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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| **Workload** |
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| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Specific Microbiology II** | | | 07-5S2MZ2-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Microbiology | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

In this module, students will acquire an in-depth insight into approaches and methods in microbiology.

**Intended learning outcomes**

Students have acquired knowledge about general strategies and methods of microbiology. They are able to independently perform scientific laboratory work.

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

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

- 07-5S2MZ2-1MI-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2MZ2-2MI-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2MZ2-1MI-092:** Specific microbiology 2 - molecular microbiology (lecture and laboratory course) Specific microbiology 2 - molecular microbiology (lecture and laboratory course)

- 7 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2MZ2-2MI-092:** Advanced microbiology 2 - Seminar in molecular microbiology

- 3 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Specific Bioinformatics II** | | | 07-5S2MZ3-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Bioinformatics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

The module will cover two topics from the area of bioinformatics to be selected from the following list: - sequence analysis, phylogenetics and evolution - gene expression profiling - protein structure analysis - programming for bioinformatics - network analysis

**Intended learning outcomes**

Students have acquired knowledge about general strategies and methods of bioinformatics. They are able to independently perform scientific laboratory work.

**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)

a) written examination (approx. 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 (groups of up to 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Specific Biotechnology II** | | | 07-5S2MZ4-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Biotechnology and Biophysics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

In this module, students will acquire an in-depth insight into approaches and methods in biotechnology.

**Intended learning outcomes**

Students have acquired knowledge about general strategies and methods of biotechnology. They are able to independently perform scientific laboratory work.

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

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

- 07-5S2MZ4-1BT-092: P (no information on SWS (weekly contact hours) and course language available)
- 07-5S2MZ4-2BT-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2MZ4-1BT-092:** Specific Biotechnology 2 - Practical Biotechnology 2 (laboratory course)

- 8 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2MZ4-2BT-092:** Specific Biotechnology 2 - Seminar Biotechnology 2

- 2 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | Abbreviation |
|---|---|
| **Physiology of membrane transport mechanisms** | 07-5S2PS1-092-m01 |

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

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

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

**Contents**

The module will address topics in contemporary research on plant membrane transport with modern molecular biological and biophysical methods. On the basis of current scientific publications, different aspects of plant physiology will be presented and discussed in English.

**Intended learning outcomes**

Students are familiar with current research in the field of plant membrane transport as well as with the methods used. They are able to interpret and deliver presentations on scientific publications.

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

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

- 07-5S2PS1-1MT-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2PS1-2MT-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2PS1-1MT-092:** Physiology of membrane transport mechanisms (laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2PS1-2MT-092:** Physiology of membrane transport mechanisms - Progress in plant physiology (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | Abbreviation |
|---|---|
| **Molecular biology of plants** | 07-5S2PS2-092-m01 |

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

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

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

**Contents**

In this module, students will acquire advanced knowledge and skills in techniques of molecular biology for questions of plant physiology. Every student will perform a physiological experiment that will be analysed using the methods the students have learned. Current scientific publications in the field of plant physiology will be presented and discussed in English.

**Intended learning outcomes**

Students are able to perform advanced experiments in plant physiology as well as to interpret and deliver presentations on scientific publications.

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

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

- 07-5S2PS2-1MP-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2PS2-2MP-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2PS2-1MP-092:** Molecular Biology of plants (laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2PS2-2MP-092:** Molecular Biology of plants - Progress in plant physiology (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | Abbreviation |
|---|---|
| **Protein biochemistry and expression of recombinant proteins** | 07-5S2PS3-092-m01 |

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

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

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

**Contents**

In this module, students will acquire a knowledge of methods for recombinant protein expression, protein isolation and protein purification as well as the biophysical and biochemical analysis of proteins. Current scientific publications on these topics will be presented and discussed in English.

**Intended learning outcomes**

Students have acquired knowledge and skills in the areas of recombinant protein expression and subsequent purification as well as protein analysis. They are able to interpret and deliver presentations on scientific publications.

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

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

- 07-5S2PS3-1PP-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2PS3-2PP-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2PS3-1PP-092:** Protein biochemistry and expression of recombinant proteins (laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2PS3-2PP-092:** Protein biochemistry and expression of recombinant proteins - Progress in plant physiology (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Specific ecophysiology of plants** | | | 07-5S2PS4-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

In this module, students will learn to independently apply advanced molecular biological, chemical analytical or ecological methods. Experimental findings will be evaluated, interpreted and documented in the context of the current state of research.

**Intended learning outcomes**

Students are able to independently perform complex experiments in the field of plant ecophysiology, to interpret their findings in the context of the current state of research as well as to document these.

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

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

- 07-5S2PS4-1OP-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 07-5S2PS4-2OP-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2PS4-1OP-092:** Advanced ecophysiology of plants (laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2PS4-2OP-092:** Specific ecophysiology of plants (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Molecular biological methods in pharmaceutical biology** | | | 07-5S2PS5-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Pharmaceutical Biology | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Being involved in a current research project, students will become proficient in advanced methods in molecular plant physiology, molecular biology, biochemistry or cell culture.

**Intended learning outcomes**

Students are proficient in advanced methods in pharmaceutical biology with a focus on molecular biology and possess the skills necessary for conducting research in the context of research projects.

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

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

- 07-5S2PS5-1MB-092: P (no information on SWS (weekly contact hours) and course language available)
- 07-5S2PS5-2MB-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2PS5-1MB-092:** Molecular biological methods in pharmaceutical biology (Laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2PS5-2MB-092:** Molecular biological methods in pharmaceutical biology (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Biochemical methods in pharmaceutical Biology** | | | 07-5S2PS6-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Pharmaceutical Biology | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Being involved in a current research project, students will become proficient in advanced methods in molecular biochemistry, protein chemistry or metabolite analysis.

**Intended learning outcomes**

Students are proficient in advanced methods in pharmaceutical biology with a focus on molecular biochemistry and possess the skills necessary for conducting research in the context of research projects.

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

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

- 07-5S2PS6-1BC-092: P (no information on SWS (weekly contact hours) and course language available)
- 07-5S2PS6-2BC-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 07-5S2PS6-1BC-092:** Molecular biological methods in pharmaceutical biology (Laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German or English

**Assessment in module component 07-5S2PS6-2BC-092:** Biochemical methods in pharmaceutical Biology (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Immunology II** | | | 03-5S2IM-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Immunogenetics | | Faculty of Medicine | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Specific problems in immunology such as immune modulation, immunogenetics, infection immunology, signal transduction in immune cells.

**Intended learning outcomes**

The students acquire specific competence about the functional mechanisms of the immune system. They are qualified to plan and perform experiments under supervision and present the data, taking into account current literature.

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

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

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

a) written examination (approx. 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 (groups of up to 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Virology II** | | | 03-5S2VL-092-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Virology | | Faculty of Medicine | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module addresses special virological problems using selected examples such as viral pathogenesis, interaction of viruses with host cells or the complete host, new developments in molecular virology, prevention and treatment of viral infections and the pathogenesis of prion diseases.

**Intended learning outcomes**

The students have acquired a specific knowledge of molecular virology. They are able to plan and perform experiments under guidance as well as to present them, taking into account current literature.

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

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

- 03-5S2VL-1VL-092: V (no information on SWS (weekly contact hours) and course language available)
- 03-5S2VL-2VL-092: S (no information on SWS (weekly contact hours) and course language available)
- 03-5S2VL-3VL-092: P (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 03-5S2VL-1VL-092:** Virology 2 (lecture)

- 1 ECTS, Method of grading: numerical grade
- written examination (30 minutes)
- Language of assessment: German, English where required

**Assessment in module component 03-5S2VL-2VL-092:** Virology 2 (seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)
- Language of assessment: German, English

**Assessment in module component 03-5S2VL-3VL-092:** Virology 2 (laboratory course)

- 8 ECTS, Method of grading: numerical grade
- written examination (20 minutes) or oral examination (20 minutes)
- Language of assessment: German, English where required

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

| |
|---|
| Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | Abbreviation |
|---|---|
| **Physiological Chemistry II** | 03-5S2PC-092-m01 |

| Module coordinator | Module offered by |
|---|---|
| holders of the Chairs of Physiological Chemistry, Developmental Biochemistry, Biochemistry and Molecular Biology | Faculty of Medicine |

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

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

**Contents**

Fundamentals and analytical approaches of physiological chemistry are taught based on selected questions from human biochemistry. Physiological processes are compared with examples of pathological aberrations. Molecular genetic and functional biochemical networks are presented using examples from developmental biochemistry, pathobiochemistry and cellular biochemistry.

**Intended learning outcomes**

Students have developed the ability to approach, analyse and interpret general problems in physiological chemistry based on individually assigned tasks, using techniques of modern molecular biology and biochemistry. They also have developed skills in experimental design, bench work, data analysis and the presentation of scientific results.

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

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

- 03-5S2PC-1HB1-092: Ü (no information on SWS (weekly contact hours) and course language available)
- 03-5S2PC-2HB-092: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 03-5S2PC-1HB1-092:** Physiological chemistry 2 - Human biochemistry (laboratory course)

- 9 ECTS, Method of grading: numerical grade
- a) written examination (approx. 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 (groups of 2 or 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)
- Language of assessment: German, English

**Assessment in module component 03-5S2PC-2HB-092:** Physiological chemistry 2 - Seminar on human biochemistry 1

- 1 ECTS, Method of grading: (not) successfully completed
- presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| --- |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Biology (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **External Practical Course** | | | 07-5EP-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Coordinator BioCareers | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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) written examination (approx. 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 (groups of up to 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Practical Course as exchange student** | | | 07-5AP-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Coordinator BioCareers | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. Contents of the course should correspond to the contents of *Spezielle Biowissenschaften 2* (*Advanced Biosciences 2*); please consult with the competent coordinator in advance.

**Intended learning outcomes**

Students are familiar with working methods at universities in countries other than Germany. They have developed professional competencies as well as language and interpersonal skills.

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

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

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

a) written examination (approx. 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 (groups of up to 3 candidates, approx. 60 minutes) or e) presentation (approx. 20 to 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Evolution - Basics and Principles (Lecture and Practice)** | | | 07-1A1E-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Zoology II | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 1 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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.

**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.

**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)

written examination (30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **The Animal Kingdom** | | | 07-1A1T-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Zoology at the Department of Electronmicroscopy | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 4 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Admission prerequisite to assessment: regular attendance of and participation in exercises as well as successful completion of the respective exercises as specified at the beginning of the course. | |

**Contents**

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**

Familiarity with the concepts of phylogenetic relationships between 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 particular scientific issues. Familiarity with the components and functioning of microscopes. Fundamental skills in the interpretation of macroscopic and histologic 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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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **The Plant Kingdom** | | | 07-1A1P-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Plant Physiology and Biophysics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 4 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Admission prerequisite to assessment: regular attendance of exercises as well as successful completion of the respective exercises. | |

**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 particular scientific issues. Familiarity with the components and functioning of microscopes. Fundamental skills in the interpretation of macroscopic and histologic 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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Genetics** | | | 07-3A3GE-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Neurobiology and Genetics | | Faculty of Biology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 2 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Molecular and classical genetics.

**Intended learning outcomes**

Students are familiar with the mechanisms of inheritance that are essential for developing an understanding of biology as a whole.

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

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

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

written examination (30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Biochemistry** | | | 08-BC-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Biochemistry | | Chair of Biochemistry | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 6 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Registration for assessment: Yes, as specified. | |

**Contents**

Comprising lectures and exercises, this module acquaints students with the fundamental principles of biochemistry.

**Intended learning outcomes**

Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.

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

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

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

written examination (90 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Mathematics (2007)

# Application-oriented Subject Chemistry

(35 ECTS credits)

# Application-oriented Subject Chemistry Compulsory Courses

(26 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Organic Chemistry 1** | | | 08-OC1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Organic Chemistry | | Institute of Organic Chemistry | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Registration for assessment: Yes, as specified. | |

**Contents**

This module provides students with an overview of the fundamental principles of organic chemistry. It examines the bonding situation of carbon and introduces students to the nomenclature of simple and moderately complex organic compounds. The module also discusses the fundamental principles of stereochemistry, substitution, addition and elimination reactions as well as synthesis planning.

**Intended learning outcomes**

Students know important categories of substances in organic chemistry. They are able to use different systems of nomenclature to determine simple substance names. Students are able to analyse the stereochemistry of molecules. They are able to describe and formulate some of the most important reactions in organic chemistry. For that purpose, they can analyse and categorise the characteristic reaction conditions and can use them for simple syntheses.

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

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

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

written examination (90 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Principles of quantum mechanics and spectroscopy** | | | 08-PC1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| lecturer of lecture "Grundlagen der Quantenmechanik and Spektroskopie" (Principles of Quantum Mechanics and Spectroscopy) | | Institute of Physical and Theoretical Chemistry | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module introduces students to the fundamental principles of quantum mechanics. It analyses molecules on the basis of the following models: particle in a box, harmonic oscillator and rigid rotor. As regards spectroscopy, the module focuses on vibrational spectroscopy, angular momentum quantisation, microwave spectroscopy and UV-VIS spectroscopy. In addition, the module discusses linear operators, eigenvalue problems, matrix representation, differential equations, Fourier transform and orthogonal functions as mathematical bases of the topics listed above.

**Intended learning outcomes**

Students are able to explain key models of quantum mechanics and to apply them to molecules. They are able to describe different spectroscopic methods. In addition, students know how to apply the mathematical bases of quantum mechanics.

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

V + Ü + 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)

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction to Physics for Students of Non-physics-related Minor Subjects** | | | 11-EFNF-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 7 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 2 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

The students have knowledge of the principles of Physics.

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

V + 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. 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**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Geography (2008)
Bachelor' degree (1 major) Geography (2010)
Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2014)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Food Chemistry (2009)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2014)
Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Biomedicine (2009)
Bachelor' degree (1 major) Biomedicine (2013)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2014)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) FOKUS Chemistry (2011)

| Module title | | | Abbreviation |
|---|---|---|---|
| **General Chemistry for Mathematics Majors** | | | 08-CM1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| lecturer of lecture "Experimentalchemie" (Experimental Chemistry) | | Institute of Inorganic Chemistry | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 6 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module provides students with an overview of the fundamental principles of chemistry. It focuses on particles, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental models of chemistry and principles of inorganic chemistry.

**Intended learning outcomes**

Students are able to explain the principles of the periodic table and to extract information from it. They are able to explain basic models of the structure of matter. They have developed the ability to use the language of chemical formulas to describe chemical reactions and to interpret them by identifying the type of reaction. Students are able to describe the main quantitative and qualitative analytical methods and their application areas.

**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 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

# Application-oriented Subject Chemisty Compulsory Electives

(9 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Organic Chemistry 2** | | | 08-OC2-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Physically Organic Chemistry | | Institute of Organic Chemistry | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 9 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module introduces students to the rules of aromaticity and discusses specific reactions of aromatics. Using the example of carbonyl compounds, it extends the students' knowledge of substitution, elimination and addition reactions to complex reaction mechanisms. The course also focuses on oxidation and reduction reactions as well as rearrangement. In addition, it introduces students to the spectroscopic methods of infrared spectroscopy, mass spectrometry and NMR spectroscopy.

**Intended learning outcomes**

Students have become familiar with the criteria for aromaticity. They can analyse the varying reactivity of carbonyl compounds. They are able to describe specific reactions of carbonyls and aromatics. For that purpose, they can plan and formulate multi-stage syntheses with complex reaction mechanisms and can transfer them to unknown reactions. Students are able to describe important spectroscopic methods, to evaluate a spectrum and to draw conclusions regarding the molecular structure.

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

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

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

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Physical and Theoretical Chemistry 3: Symmetry and Quantum Chemistry** | | | 08-PC3-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| lecturer of lecture "Quantenchemie" | | Institute of Physical and Theoretical Chemistry | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 6 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Registration for assessment: Yes, as specified. | |

**Contents**

This module discusses the fundamental principles of quantum chemistry and symmetry in chemistry.

**Intended learning outcomes**

Students have become familiar with the fundamental principles of quantum chemistry and symmetry in chemistry and are able to apply the knowledge they have developed.

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

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

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

written examination (90 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical Models in Chemistry** | | | 08-TC-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| lecturer of lecture "Quantenchemie" | | 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**

This module provides students with deeper insights into advanced topics in quantum chemistry. It focuses on spin, the Pauli principle, Slater determinants, the Hartree-Fock method, correlation energy, configuration interaction and excited states, the Born-Oppenheimer approximation and bonding models of H2+.

**Intended learning outcomes**

Students are able to describe excited states of molecules with the help of key concepts and 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)

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Mathematics (2007)

# Application-oriented Subject Geography

(35 ECTS credits)

# Application-oriented Subject Geography Compulsory Electives 1

(15 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **General Human Geography** | | | 09-HG1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Economic Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 15 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to basic ideas and particular sub-areas of "Human Geography".

**Intended learning outcomes**

Students possess the following skills: basics and definitions to Human Geography, research institutions and technical conception to Human Geography. This includes Urban Geography, Geography of Rural Settlements, Economic Geography, Social Georgaphy, Population Geography and Civilisation Geographical Research.

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

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

- 09-HG1-1-072: V + T (no information on SWS (weekly contact hours) and course language available)
- 09-HG1-2-072: V + T (no information on SWS (weekly contact hours) and course language available)
- 09-HG1-3-072: 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)

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

**Assessment in module component 09-HG1-1-072:** Introduction to the Geography of cities, towns and villages Introduction to the Geography of cities, towns and villages

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 09-HG1-2-072:** Introduction to Economic Geography Introduction to Economic Geography

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 09-HG1-3-072:** Introduction to Social and Population Geography Introduction to Social and Population Geography

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **General Physical Geography** | | | 09-PG1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Physical Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 15 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. | |

**Contents**

Introduction to "Physical Geography": basics of exogenous dynamics, endogenous dynamics and climatology.

**Intended learning outcomes**

Students possess the following skills: basics of the system earth, i.e. the understanding of processes that are dominating the landscape on the Earth's surface and which are driven by the geological factors rocks, relief, climate, soil, water, flora and fauna. They are important for the understanding of the structure, function and dynamics of the natural space and its anthropogenic transformation (i.e. the environment, which has been shaped from humans by land using, settlements, transport routes etc.).

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

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

- 09-PG1-1-072: V + T (no information on SWS (weekly contact hours) and course language available)
- 09-PG1-2-072: V + T (no information on SWS (weekly contact hours) and course language available)
- 09-PG1-3-072: 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)

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

**Assessment in module component 09-PG1-1-072:** General Physical Geography 1 (Earth System: Endogenic Dynamics) General Physical Geography 1 (Earth System: Endogenic Dynamics)

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 09-PG1-2-072:** General Physical Geography 2 (Earth System: Climate System) General Physical Geography 2 (Earth System: Climate System)

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)
- Other prerequisites: Registration for assessment: Yes, as specified.

**Assessment in module component 09-PG1-3-072:** General Physical Geography 3 (Earth System: Endogenic Dynamics) General Physical Geography 3 (Earth System: Endogenic Dynamics)

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)
- Other prerequisites: Registration for assessment: Yes, as specified.

**Allocation of places**

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**Additional information**

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**Workload**

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| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| --- |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Geography (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

# Application-oriented Subject Geography Compulsory Electives 2

(10 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Cartography and Geoinformation** | | | 09-KART-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Cultural Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to "Cartography and to the Collection and Processing of Geodata", introduction to "Geographic Information Systems" (GIS).

**Intended learning outcomes**

Students possess the following skills: basics of Cartography and the use of geodata, acquisition of abilities concerning the dealing with geodata and Geographical Information Systems (GIS).

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

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

- 09-KART-1-072: V + T (no information on SWS (weekly contact hours) and course language available)
- 09-KART-2-072: 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)

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

**Assessment in module component 09-KART-1-072:** Cartography and Geodata Cartography and Geodata

- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 75 minutes) or practice work (creating approx. 3 maps or diagrams, approx. 30 hours total), weighted 1:1

**Assessment in module component 09-KART-2-072:** Geographical Information Systems (GIS)

- 5 ECTS, Method of grading: numerical grade
- practice work (approx. 5 pieces of practice work to be completed in approx. 30 hours)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Remote Sensing** | | | 09-FERN-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Remote Sensing | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to "Geographical Remote Sensing", applications of "Remote Sensing" to Geography.

**Intended learning outcomes**

Students possess the following skills: theoretical principles of the Remote Sensing System, knowledge of current geographical fields of application of cross-sectional methodology, remote sensing in the light of different sensor and platform specifications.

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

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

- 09-FERN-1-072: V + T (no information on SWS (weekly contact hours) and course language available)
- 09-FERN-2-072: 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)

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

**Assessment in module component 09-FERN-1-072:** Introduction to Geographical Remote Sensing Introduction to Geographical Remote Sensing

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Assessment in module component 09-FERN-2-072:** Application of Remote Sensing in Geography Application of Remote Sensing in Geography

- 5 ECTS, Method of grading: numerical grade
- written examination (45 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2007)

# Application-oriented Subject Geography Compulsory Electives 3

(10 ECTS credits)

| Module title | Abbreviation |
|---|---|
| **Special Problems of Physical Geography** | 09-PG2-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Physical Geography | Institute of Geography and Geology |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 10 | numerical grade | two module components of 09-PG1, 09-KART, 09-FERN, 09-STAT |

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

**Contents**

This module covers synthesis and networking of physical-geographical factors in the light of different methodical approaches and particularly on the basis of the human impact: geomorphology, climate, soil, hydro geography, global change and past global change incl. geo and ecosystem research and ecosystem prediction as well as the cycle of materials on Earth's surface.

**Intended learning outcomes**

Students are acquainted with the synthesis and interconnectedness of skills that have already been acquired concerning the processes on Earth's surface, which are dominating the landscape on Earth's surface and are driven by the geological factors rock, relief, climate, soil, water, flora and fauna. These processes determine structure, function and dynamics of the natural environment and its anthropogenic transformation (the environment that has been shaped from humans by land utilisation, settlements, transport routes etc.). Through the quantitative acquisition of current process structures, Physical Geography is not only able to derive predications for the capability and capacity of geological systems, but also to predict changes in future by analysing the development and change of geographical territories in the past. These important planning decision-making bases concerning the management as well as the sustainable use and development, are given weight to the task of Physical Geography in the practical area.

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

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

- 09-PG2-1-072: V (no information on SWS (weekly contact hours) and course language available)
- 09-PG2-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-PG2-1-072:** Special Problems of Physical Geography 1 (Earth System: Man and environment)

- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 45 minutes)

**Assessment in module component 09-PG2-2-072:** Special Problems of Physical Geography 2 (Earth System: Man and environment)

- 5 ECTS, Method of grading: numerical grade
- presentation (approx. 30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| --- |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Geography (2007)<br>Bachelor' degree (1 major) Mathematics (2007) |

| Module title | Abbreviation |
|---|---|
| **Applied Physical Geography** | 09-PG3-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Physical Geography | Institute of Geography and Geology |

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

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

**Contents**

Students will choose a topic of "Physical Geography" and attend a project seminar: data collection, data analysis and presentation of explored issues.

**Intended learning outcomes**

Students know how to use their skills, which they have already acquired in the area basics and methods, in order to implement them practically. Based on a specific issue, which is partly integrated in a current research project, process steps of geographical research and method will be undergone. Students are acquainted with the data collection in the field or the modelling at the computer, the application of statistical processes, the cartographic visualisation and presentation in form of lectures, posters, films, Internet or reports. They also possess the ability to work independently.

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

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

- 09-PG3-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 09-PG3-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-PG3-1-072:** Project Seminar: Establishing Current Status and Data Acquisition

- 5 ECTS, Method of grading: numerical grade
- presentation (30 minutes) with written elaboration (20 pages), weighted 1:1

**Assessment in module component 09-PG3-2-072:** Project Seminar: Data Evaluation, Data Visualisation and Presentation

- 5 ECTS, Method of grading: numerical grade
- project report (20 pages)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Data Acquisition and Processing in Physical Geography** | | | 09-MT1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Physical Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Consolidation of methodical knowledge concerning the collection and processing of data sets, which will be adduced in "Physical Geography" as a typical example in order to understand the natural environment; Advanced students can attend alternative seminars, in which applications from the areas ground climatology, climate modelling, geophysical methods, soil science of fields, remote sensing and GIS (geographic information system) will be offered optionally.

**Intended learning outcomes**

Students possess in-depth knowledge of the area Basic Course, Methodology, Cartography, Statistics and EDP which will be acquired through a specific task. Thus, each form of data collection in the field or the modelling at the computer with different stages of data processing in the lab or at the computer will be linked together in order to teach the practical dealing with geophysical measurement methods as well as the dealing with different software applications.

**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)

presentation (15 minutes) with written elaboration (15 pages), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | Abbreviation |
|---|---|
| **Working Methods: Solid Earth System** | 09-MT3-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Geodynamics and Geomaterials Research | Institute of Geography and Geology |

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

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

**Contents**

Basic observations on geological materials that can already be made in the field and which can lead to a first interpretation of geological processes, which took place, as well as the creation of value of geomaterials. Students will be provided with distinctive features and characteristics of the most important rock-forming and economically relevant minerals by means of chosen visuals. Subsequently, the classification of the most important sedimentary, igneous and metamorphic rock types will be elucidated and practised on the basis of their in the handpiece identifiable mineral existence and structure. In the following modular section, the understanding of two-dimensional display of three-dimensional display of geological phenomena like the geographical distribution of different rock types or tectonic structures will be developed in form of geological maps and sections as well as simple structural-geological diagrams.

**Intended learning outcomes**

Students are able to identify the most important mineral types and as far as possible, to outline and interpret the rock samples without analytical tools. Moreover, they are able to interpret geological maps correctly and to show geological field observations in map form, profiles and suitable diagrams.

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

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

- 09-MT3-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 09-MT3-2-072: 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)

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

**Assessment in module component 09-MT3-1-072:** Mineral an Rock Identification

- 5 ECTS, Method of grading: numerical grade
- written or oral examination of one candidate each (30 minutes each)

**Assessment in module component 09-MT3-2-072:** Geological Maps and Structures

- 5 ECTS, Method of grading: numerical grade
- written or oral examination of one candidate each (30 minutes each) or term paper (approx. 20 pages)

**Allocation of places**

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**Additional information**

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**Workload**

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

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| **Module appears in** |
| --- |
| Bachelor' degree (1 major) Geography (2007) |
| Bachelor' degree (1 major) Mathematics (2007) |

| Module title | Abbreviation |
|---|---|
| **Working Methods of Physical Geography** | 09-MT5-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Physical Geography | Institute of Geography and Geology |

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

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

**Contents**

Field course: basic principles of physical-geographical field, mapping and measuring method (geomorphology, soil geography, vegetation geography, hydro geography, climatology); 10 days of fieldwork. Practical exercise: data preparation, analysis and interpretation; Synthesis of partial results, visualisation and presentation of data with the help of the GIS discussion and the production of a final report.

**Intended learning outcomes**

Students possess the fundamental physical-geographical mapping, measurement and lab methods. They have skills of the difficulties of field, measurement and lab works and possess an overview of analysis and interpretation possibilities of the acquired field and lab data. They possess the visualisation and presentation of geodata and have the ability of networked considerations and of discussing the results scientifically.

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

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

- 09-MT5-1-072: P (no information on SWS (weekly contact hours) and course language available)
- 09-MT5-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-MT5-1-072:** Introduction to physiogeographical Fieldwork Skills, Field Mapping and Measuring

- 5 ECTS, Method of grading: numerical grade
- placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 15 pages)
- Other prerequisites: A basic knowledge of inorganic chemistry and physics is recommended.

**Assessment in module component 09-MT5-2-072:** Data management, -analysis and -interpretation

- 5 ECTS, Method of grading: numerical grade
- presentation of project (approx. 30 minutes) and written elaboration (approx. 20 pages); weighted 1:1
- Other prerequisites: A basic knowledge of inorganic chemistry and physics is recommended.

**Allocation of places**

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**Additional information**

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**Workload**

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

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| **Module appears in** |
| --- |
| Bachelor' degree (1 major) Geography (2007) |
| Bachelor' degree (1 major) Mathematics (2007) |

| Module title | Abbreviation |
|---|---|
| **Special Issues of Human Geography** | 09-HG2-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Professorship of Social Geography | Institute of Geography and Geology |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 10 | numerical grade | two module components of 09-HG1 |

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

**Contents**

This module deals with and consolidates chosen issues of "Theoretical and Applied Human Geography" from two different sub-areas of "Human Geography".

**Intended learning outcomes**

Students possess subject-specific theories and have solid knowledge of two sub-areas of Human Geography and their application-oriented implementation. They are able to issue a seminar paper on the basis of independent literary work as well as present the seminar papers in a presentation, which will be held freely.

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

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

- 09-HG2-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 09-HG2-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-HG2-1-072:** Special issues of Human Geography 1

- 5 ECTS, Method of grading: numerical grade
- presentation (approx. 30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Assessment in module component 09-HG2-2-072:** Special issues of Human Geography 2

- 5 ECTS, Method of grading: numerical grade
- presentation (approx. 30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | Abbreviation |
|---|---|
| **Applied Human Geography** | 09-HG3-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Professorship of Social Geography | Institute of Geography and Geology |

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

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

**Contents**

Students will choose a topic of "Human Geography" and attend a project seminar: data collection, data analysis and presentation of explored issues.

**Intended learning outcomes**

Students possess the following skills:
-Application of the already acquired technical and methodological basics of practice-oriented issues of geographical planning and development using empirical research methods;
-Elaboration of action-oriented solutions;
-Presentation of results;
-Knowledge concerning the use of empirical survey and analysis methodology, project work, team spirit, results-oriented methods, acquisition of communicative technique skills.

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

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

- 09-HG3-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 09-HG3-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-HG3-1-072:** Project oriented Seminar 1 for Applied Human Geography

- 5 ECTS, Method of grading: numerical grade
- presentation (approx. 30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Assessment in module component 09-HG3-2-072:** Project oriented Seminar 2 for Applied Human Geography

- 5 ECTS, Method of grading: numerical grade
- presentation (approx. 30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theories and Methodology in Human Geography** | | | 09-MT2-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Cultural Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This course will introduce students to general theory of science and geographical specific theory, discussion of different perspectives of research and methodologies, basics of empirical study in analytical and prescriptive sciences.

**Intended learning outcomes**

Students possess knowledge of theoretical and methodological basics. Students are acquainted with empirical research methods as well as models and modelling to Human Geography.

**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)

written examination (45 minutes) and presentation (approx. 20 minutes), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Quantitative and Qualitative Regional Analysis** | | | 09-MT4-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Social Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | 09-MT2 as well as one module component of modules 09-KART and 09-STAT each | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

This module includes processes of quantitative regional research, multivariate statistical processes, processes of geographical modelling and simulation. Processes of qualitative social and regional research. Presentation and discussion of methods, criticism of methods. Application of methods based on typical examples.

**Intended learning outcomes**

Students possess the following skills: The students' process-related skills will be applied to regional and analytical methods as well as the skills concerning the assessment and evaluation of the processes application and efficiency.

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

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

- 09-MT4-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 09-MT4-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-MT4-1-072:** Quantitative Regional Analysis

- 5 ECTS, Method of grading: numerical grade
- presentation (30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Assessment in module component 09-MT4-2-072:** Qualitative Regional Analysis

- 5 ECTS, Method of grading: numerical grade
- presentation (30 minutes) with written elaboration (approx. 20 pages), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Methods of Planning in Human Geography** | | | 09-MT6-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Professorship of Cultural Geography | | Institute of Geography and Geology | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | 09-MT2 as well as one module component of modules 09-KART and 09-STAT each | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Application of empirical research methods on practice-oriented issues on geographical planning and development, development of action-oriented problem solving, presentation of the results.

**Intended learning outcomes**

Students possess the following skills: Application of empirical survey and analysis methodology concerning regional development planning and regional or spatial development, project work, the ability to work in a team, result-oriented methods, communicative techniques.

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

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

- 09-MT6-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 09-MT6-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 09-MT6-1-072:** Methods of Planning in Human Geography 1

- 5 ECTS, Method of grading: numerical grade
- a) presentation (approx. 25 minutes) with written elaboration (approx. 12 pages), weighted 1:1 or b) term paper (approx. 20 pages) or c) several small assessments (total length/expenditure of time comparable to a) and/or b)), weighted 1:1

**Assessment in module component 09-MT6-2-072:** Methods of Planning in Human Geography 2

- 5 ECTS, Method of grading: numerical grade
- a) presentation (approx. 25 minutes) with written elaboration (approx. 12 pages), weighted 1:1 or b) term paper (approx. 20 pages) or c) several small assessments (total length/expenditure of time comparable to a) and/or b)), weighted 1:1

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2007)

# Application-oriented Subject Computer Science

(35 ECTS credits)

# Application-oriented Subject Computer Science Compulsory Electives

(35 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Information transmission** | | | 10-I-IÜ-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science III | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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 + 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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Digital computer systems** | | | 10-I-RAL-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science V | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to digital technologies, Boolean algebras, combinatory circuits, synchronous and asynchronous circuits, 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** (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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical informatics** | | | 10-I-TI-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Computability, decidability, countability, complexity of calculations, Boolean functions and circuits, finite automata and regular sets, generative grammars, context-free languages, context-sensitive languages.

**Intended learning outcomes**

The students possess fundamental and applicable knowledge in the area of computability, decidability, countability, complexity of calculations, Boolean functions and circuits, finite automata and regular sets, generative grammars, context free languages, context sensitive languages.

**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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Algorithm and data structures** | | | 10-I-ADS-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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**

[Version 1: The students are able to independently design algorithms as well as to precisely describe and analyse them. They are able to apply recursion in algorithms and data structures. The students are familiar with the three basic programming paradigms and are able to apply them in practical programs.] [Version 2: 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** (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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Automation and control technology** | | | 10-I-AR-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science VII | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Overview of control and automation systems, fundamental principles of control technology, Laplace transformation, transfer function, plant, controller types, basic feedback loop, fundamental principles of control engineering, automata, structure of Petri nets, Petri nets for automisation, machine-related structure of processing computation machines, communication between process computers and periphery devices, software for automation systems, process synchronisation, process communication, real-time operating systems, real-time planning.

**Intended learning outcomes**

The students master the fundamentals of automation and control.

**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 (80 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| Data bases | | | 10-I-DB-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

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

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Technology of Functional Materials (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2010)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2009)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2006)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Graphtheoretical concepts and algorithms** | | | 10-I-GT-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science I | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

[Version 1: Paths, cycles and components, colouring and matching, transitive hull and irreducible kernel, trees, forests and matroids, depth first search, breadth first search, shortest paths, flows and streams, matchings, network design and routing, planar graphs, graph transformations] [Version 2: On the one hand, we handle 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. On the other hand, we become familiar with new concepts, using the examples of graph problems, for example how we model problems as linear programs or how we show that they are fixed parameter computable.]

**Intended learning outcomes**

[Version 1: The students master the following topics: the most important graph theoretical concepts and algorithms: paths, cycles and components, colourings and matching, transitive hull and irreducible kernel, trees, forests, matroids, depth first search, breadth first search, shortest path, flows and streams, matching, network design and routing, planar graphs, graph transformations.] [Version 2: The students are able to model typical problems of computer science as graph problems. In addition, the participants are able to decide which tool from the lecture 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** (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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theory of complexity** | | | 10-I-KT-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science IV | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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**

[Version 1: 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.] [Version 2: The students possess a fundamental and applicable knowledge in the areas of complexity measurements and classes, memory consumption versus computation time, determinism versus indeterminism, P-NP problem, completeness problems, lower bounds, Boolean hierarchy, polynomial time hierarchy, complexity of parallel algorithms and complexity of probabilistic algorithms.]

**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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Logic for informatics** | | | 10-I-LOG-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Object oriented programming** | | | 10-I-OOP-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

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

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2009)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Practical course in programming** | | | 10-I-PP-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 9 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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 (expenditure of time as specified) and final examination: written examination (60 to 90 minutes) or oral examination (one candidate each: 10 to 15 minutes, groups of 2: 20 minutes, groups of 3: 30 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Computer architecture** | | | 10-I-RAK-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science V | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Computer networks and communication systems** | | | 10-I-RK-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science III | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Properties of computer and communication systems: data traffic in distributed systems. Performance analysis of computer networks and communication systems: problem statement and introduction to method architecture and structure of computer networks: network structure, network access, access methods, digital transfer hierarchies, dataflow control and traffic control, transfer network. Communication protocols: fundamental principles and ISO architecture models. Internet: structure and basic mechanism, TCP/IP, routing, network management. Mobile communication networks: fundamental concepts, GSM, UMTS. Future communication systems and networks.

**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** (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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Software technology** | | | 10-I-ST-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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), software development processes, unified process, agile software development, project management, quality assurance.

**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 + 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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Economathematics (2009)
Bachelor' degree (1 major) Economathematics (2008)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Practical course in software** | | | 10-I-SWP-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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)

periodic presentations on project progress with regard to detailing problem specifications, the corresponding solution components (software) and the documentation of these; if project is completed in groups, proof of contributions made by the individual student required; software and project documentation as specified in assignment, final presentation (10 to 15 minutes per group)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Knowledge management systems and data mining** | | | 10-I-WMS-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Computer Science VI | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

[Version 1: Foundations in the following areas: process and product-oriented knowledge management systems, basic knowledge representation and inference (rules, objects, constraints, probabilistic, non-monotonous, temporal closures), problem classes and solution methods (diagnostic, construction, simulation), knowledge acquisition and process models, data mining (data warehouse and OLAP, data preprocessing, data visualisation), learning algorithms with data mining (learning of decidability trees, rules, subgroups, clusters), semantic web.]
[Version 2: Foundations in the following areas: process and product-oriented knowledge management systems, basic knowledge representation and inference (rules, objects, constraints, probabilistic, non-monotonous, temporal closure), solution methods (diagnostic, construction), knowledge acquisition and process models, semantic web.]

**Intended learning outcomes**

The students possess the theoretical and practical knowledge necessary to understand and develop knowledge management systems and data mining systems including knowledge formalisation. The students also have acquired experience in a small project.

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

V + Ü + 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 (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2009)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor' degree (1 major) Computational Mathematics (2009)

# Application-oriented Subject Philosophy

(35 ECTS credits)

# Application-oriented Subject Philosophy Compulsory Courses

(20 ECTS credits)

| Module title | Abbreviation |
|---|---|
| **Principles of Philosophy** | 06-B-P1-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Practical Philosophy | Institute of Philosophy |

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

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

**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 (skills to be tested in assessments): - 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)

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

- 06-B-P1-1-072: Ü (no information on SWS (weekly contact hours) and course language available)
- 06-B-P1-2-072: Ü (no information on SWS (weekly contact hours) and course language available)
- 06-B-P1-3-072: Ü + 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)

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

**Assessment in module component 06-B-P1-1-072:** Introduction to academic working techniques

- 2 ECTS, Method of grading: (not) successfully completed
- 2 to 3 written assessments (approx. 1 page each) and/or oral assessments (approx. 5 minutes each)

**Assessment in module component 06-B-P1-2-072:** Formal Logic

- 3 ECTS, Method of grading: (not) successfully completed
- written examination (90 minutes)

**Assessment in module component 06-B-P1-3-072:** Principles of Philosophy: historical epochs, main works, authors Principles of Philosophy: historical epochs, main works, authors

- 5 ECTS, Method of grading: numerical grade
- oral examination (approx. 25 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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| **Module appears in** |
| --- |
| Bachelor' degree (1 major) Geography (2008) |
| Bachelor' degree (1 major) Mathematics (2008) |
| Bachelor' degree (1 major) Mathematics (2007) |
| Bachelor's degree (1 major, 1 minor) Philosophy (Minor, 2008) |
| Bachelor's degree (1 major, 1 minor) Philosophy (2008) |
| Bachelor's degree (2 majors) Philosophy (2008) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Philosophy and the sciences** | | | 06-B-P2-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Theoretical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to the theory of intellectual disciplines; philosophical bases of the humanities and the social sciences; 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** (type, number of weekly contact hours, language — if other than German)

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

- 06-B-P2-1-072: S (no information on SWS (weekly contact hours) and course language available)
- 06-B-P2-2-072: S (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 06-B-P2-1-072:** Philosophical principles of arts and humanities

- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 120 minutes)

**Assessment in module component 06-B-P2-2-072:** Philosophical principles of natural sciences and technology

- 5 ECTS, Method of grading: numerical grade
- written examination (approx. 120 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Geography (2008)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)

Bachelor' degree (1 major) Business Management and Economics (2009)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Management and Economics (2008)
Bachelor' degree (1 major) Business Management and Economics (2010)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2009)
Bachelor' degree (1 major) Business Information Systems (2008)
Bachelor's degree (1 major, 1 minor) Philosophy (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

# Application-oriented Subject Philosophy Compulsory Electives

(15 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical philosophy** | | | 06-B-P3-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Theoretical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

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

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

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

written examination (approx. 180 minutes)

**Allocation of places**

--

**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Practical Philosophy** | | | 06-B-P4-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Practical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

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

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

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

written examination (approx. 180 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **History of philosophy** | | | 06-B-P5-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of the History of Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

Intended learning outcomes: Content-related outcomes: - an overview of basic problems and positions in the history of philosophy - ability to use and distinguish between different methods of historiography - 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): - 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** (type, number of weekly contact hours, language — if other than German)

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

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

written examination (approx. 180 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Issue of research in philosophy** | | | 06-B-P6-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of the History of Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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 and present philosophical issues

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

V + S + 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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Text analysis: Ancient Philosophy** | | | 06-B-W1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of the History of Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Ancient philosophical texts.

**Intended learning outcomes**

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** (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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2009)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Management and Economics (2008)
Bachelor' degree (1 major) Business Management and Economics (2010)
Bachelor' degree (1 major) Political and Social Studies (2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Text Analysis: Medieval Philosophy** | | | 06-B-W2-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of the History of Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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 and present philosophical issues

**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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2009)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Management and Economics (2008)
Bachelor' degree (1 major) Business Management and Economics (2010)
Bachelor' degree (1 major) Political and Social Studies (2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Text analysis: modern philosophy** | | | 06-B-W3-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Practical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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**

--

**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2009)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Management and Economics (2008)
Bachelor' degree (1 major) Business Management and Economics (2010)
Bachelor' degree (1 major) Political and Social Studies (2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Text analysis: contemporary philosophy** | | | 06-B-W4-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Practical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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**

--

**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2009)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Management and Economics (2008)
Bachelor' degree (1 major) Business Management and Economics (2010)
Bachelor' degree (1 major) Political and Social Studies (2008)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)

| Module title | Abbreviation |
|---|---|
| **Basic disciplines of theoretical philosophy: metaphysics and epistemology** | 06-B-W5-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Theoretical Philosophy | Institute of Philosophy |

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

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

**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** (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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Specific disciplines of theoretical philosophy** | | | 06-B-W6-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Theoretical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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)

**Allocation of places**

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**Additional information**

--

**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | Abbreviation |
|---|---|
| **Basic disciplines of practical philosophy: ethics and theory of action** | 06-B-W7-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Practical Philosophy | Institute of Philosophy |

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

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

**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)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | Abbreviation |
|---|---|
| **Specific disciplines of practical philosophy** | 06-B-W8-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Practical Philosophy | Institute of Philosophy |

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

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

**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)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Problems of Older Philosophy: Ancient/Medieval** | | | 06-B-W9-072-m01 |
| **Module coordinator** | | | **Module offered by** |
| holder of the Chair of the History of Philosophy | | | Institute of Philosophy |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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)

oral examination (approx. 25 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Problems of Modern/Contemporary Philosophy** | | | 06-B-W10-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of the History of Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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)

oral examination (approx. 25 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)
Bachelor's degree (2 majors) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Problems of Theoretical Philosophy** | | | 06-B-W11-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Theoretical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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)

oral examination (approx. 25 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Problems of Practical Philosophy** | | | 06-B-W12-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Practical Philosophy | | Institute of Philosophy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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)

oral examination (approx. 25 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor's degree (1 major, 1 minor) Philosophy (2008)

# Application-oriented Subject Physics

(35 ECTS credits)

# Application-oriented Subject Physics Compulsory Courses

(16 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction to Physics Part 1 for students of Physics Related Minor Subjects** | | | 11-ENNF1-062-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 7 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Mechanics, vibration theory, thermodynamics.

**Intended learning outcomes**

The students have basic knowledge of physics for engineering students.

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

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

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

written examination (approx. 120 minutes)

**Allocation of places**

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

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2014)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Technology of Functional Materials (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2010)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2014)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2014)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Bachelor' degree (1 major) Functional Materials (2012)
Bachelor' degree (1 major) Technology of Functional Materials (2006)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction to Physics Part 2 for students of Physics Related Minor Subjects** | | | 11-ENNF2-062-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 7 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Science of electricity, magnetism, optics, Atomic Physics.

**Intended learning outcomes**

The students have basic knowledge of physics for engineering students.

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

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

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

written examination (approx. 120 minutes)

**Allocation of places**

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

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2014)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Technology of Functional Materials (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2010)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2014)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2014)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Bachelor' degree (1 major) Functional Materials (2012)
Bachelor' degree (1 major) Technology of Functional Materials (2006)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Measurements and Data Analysis** | | | 11-PFR-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 2 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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**

In this module, the students acquire subject-specific transferable skills. They have knowledge of practical experimental work, error propagation and the principles of statistics.

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

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

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

written examination (approx. 120 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Physics (2008)
Bachelor' degree (1 major) Nanostructure Technology (2008)
Bachelor' degree (1 major) Nanostructure Technology (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

# Application-oriented Subject Physics Compulsory Electives 1

(3 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Physics Laboratory Course for students of Physics Related Minor Subjects** | | | 11-PNNF-062-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 3 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

The students know the principles of Physics.

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

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

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

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

**Allocation of places**

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

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2014)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Technology of Functional Materials (2009)
Bachelor' degree (1 major) Technology of Functional Materials (2010)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2014)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Functional Materials (2012)
Bachelor' degree (1 major) Technology of Functional Materials (2006)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Practical Course** | | | 11-PG-IAF-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 4 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Module 11-PFR recommended. | |

**Contents**

Physical laws of mechanics, thermodynamics, optics, science of electricity, vibration and waves, Atomic and Nuclear Physics and wave optics. Basic measuring methods using computers and storage oscilloscopes.

**Intended learning outcomes**

The students have knowledge and skills of physical measuring instruments and experimental techniques. They are able to independently plan and conduct experiments in cooperation with others, and to document the results in a measurement protocol.

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

Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity, BAM): P (2 weekly contact hours)
Klassische Physik (Classical Physics, KLP): P (2 weekly contact hours)
Elektrizitätslehre und Schaltungen (Electricity and Circuits, ELS): P (2 weekly contact hours)
Wellenoptik (Physical Optics, WOP): P (2 weekly contact hours)
Atom- und Kernphysik (Atomic and Nuclear Physics, AKP): P (2 weekly contact hours)
Computer und Messtechnik (Computers and Measurement Technology, CMT): P (2 weekly contact hours)

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

This module has the following assessment components
1. Lab course in part 1: 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).
2. Lab course in part 2: 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).

Students must register for assessment components 1 and 2 online (registration deadline to be announced).
Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment component, they must pass both elements a) and b).
To pass this module, students must successfully complete two out of the six courses.
Students must attend BAM, KLP or ELS courses prior to attending WOP, AKP or CMT courses.
To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

| |
|---|
| Bachelor' degree (1 major) Mathematics (2008) |
| Bachelor' degree (1 major) Mathematics (2007) |
| Bachelor' degree (1 major) Computational Mathematics (2009) |

# Application-oriented Subject Physics Compulsory Electives 2

(16 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Experimental Physics 3 (Optics, Quantum Phenomena, Introduction Atomic Physics)** | | | 11-E3-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Physical laws of optics, quantum phenomena, introduction to Atomic Physics.

**Intended learning outcomes**

The students have knowledge of the basic contexts and principles of optics, quantum phenomena and Atomic Physics.

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

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

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

written examination (approx. 120 minutes)

**Allocation of places**

--

**Additional information**

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**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Physics (2008)
Bachelor' degree (1 major) Nanostructure Technology (2008)
Bachelor' degree (1 major) Nanostructure Technology (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Experimental Physics 4 (Introduction to Solid State Physics)** | | | 11-E4-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Applied Physics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

The students have knowledge of the basic contexts and principles of solids: Bonding and structure, lattice dynamics, thermal properties, principles of electronic properties (free electron gas).

**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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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Nanostructure Technology (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical Physics 1 (Theoretical Mechanics)** | | | 11-T1-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Newtonian mechanics, Lagrangian mechanics, Hamiltonian equation of motion, conservation laws.

**Intended learning outcomes**

The students have knowledge of the principles of classical theoretical 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**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Physics (2008)
Bachelor' degree (1 major) Nanostructure Technology (2008)
Bachelor' degree (1 major) Nanostructure Technology (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical Physics 2 (Theoretical Electrostatics and Electrodynamics)** | | | 11-T2-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Physics (2008)
Bachelor' degree (1 major) Nanostructure Technology (2008)
Bachelor' degree (1 major) Nanostructure Technology (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical Physics 3 (Theoretical Quantum Mechanics)** | | | 11-T3-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

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

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

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

written examination (approx. 120 minutes)

**Allocation of places**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Physics (2008)
Bachelor' degree (1 major) Nanostructure Technology (2008)
Bachelor' degree (1 major) Nanostructure Technology (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Theoretical Physics 4 (Theoretical Thermodynamics and Statistics)** | | | 11-T4-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | Faculty of Physics and Astronomy | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 8 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Physics (2009)
Bachelor' degree (1 major) Physics (2008)
Bachelor' degree (1 major) Nanostructure Technology (2008)
Bachelor' degree (1 major) Nanostructure Technology (2007)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

# Application-oriented Subject Business Management and Economics

(35 ECTS credits)

# Application-oriented Subject Business Management and Economics Compulsory Courses

(30 ECTS credits)

| Module title | Abbreviation |
|---|---|
| **Managerial Accounting** | 12-IntUR-G-072-m01 |

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

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

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

**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:
Coenenberg/Fischer/Günther: Kostenrechnung und Kostenanalyse, Stuttgart.
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**

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**Additional information**

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**Workload**

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| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| --- |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Chemistry (2007) |
| Bachelor' degree (1 major) Computer Science (2007) |
| Bachelor' degree (1 major) Mathematics (2008) |
| Bachelor' degree (1 major) Mathematics (2007) |
| Bachelor' degree (1 major) Business Management and Economics (2007) |
| Bachelor' degree (1 major) Business Information Systems (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Financial Accounting** | | | 12-ExtUR-G-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Business Taxation | | Faculty of Business Management and Economics | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **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 unterstanding 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**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Introduction to Business Administration** | | | 12-EBWL-G-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Human Resource Management and Organisation | | Faculty of Business Management and Economics | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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**

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**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Political and Social Studies (2007)

| Module title | Abbreviation |
|---|---|
| **Introduction to Economics** | 12-EVWL-G-072-m01 |

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

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

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

**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
10How do aggregate supply and demand come into equilibrium?
11.The role of fiscal policy
12How 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**

--

**Additional information**

--

**Workload**

--

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

--

**Module appears in**

Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Political and Social Studies (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Macroeconomics 1** | | | 12-Mak1-G-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of International Macroeconomics | | Faculty of Business Management and Economics | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** |
| -- |
| **Additional information** |
| -- |
| **Workload** |
| -- |
| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Mathematics (2008)<br>Bachelor' degree (1 major) Mathematics (2007)<br>Bachelor' degree (1 major) Business Management and Economics (2007)<br>Bachelor' degree (1 major) Business Information Systems (2007) |

| Module title | Abbreviation |
|---|---|
| **Microeconomics 1** | 12-Mik1-G-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Economics, Information and Contract Economics | Faculty of Business Management and Economics |

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

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

**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, studends 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**

--

**Additional information**

--

**Workload**

--

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

--

| **Module appears in** |
| --- |
| Bachelor' degree (1 major) Mathematics (2008) |
| Bachelor' degree (1 major) Mathematics (2007) |
| Bachelor' degree (1 major) Business Management and Economics (2007) |
| Bachelor' degree (1 major) Business Information Systems (2007) |

# Application-oriented Subject Business Management and Economics Compulsory Electives

(5 ECTS credits)

| Module title | Abbreviation |
|---|---|
| **Introduction to Market-Oriented Management** | 12-Mark-G-072-m01 |

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

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

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

**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:
Foscht, T. / Swoboda, B.: Käuferverhalten: Grundlagen -- Perspektiven -- Anwendungen, 4th revised and exp. ed., Wiesbaden 2011.
Homburg, Ch.: Grundlagen des Marketingmanagements: Einführung in Strategie, Instrumente, Umsetzung und Unternehmensführung, 4th revised and exp. ed., Wiesbaden 2012.
Homburg, Ch.: Grundlagen des Marketingmanagements: Einführung in Strategie, Instrumente, Umsetzung und Unternehmensführung, 3rd ed., Wiesbaden, 2012a.
Kroeber-Riel, W. /Weinberg, P.: Konsumentenverhalten, 9th ed., Munich 2009.
Meffert, H. / Burman, Ch / Kirchgeorg, M.: Marketing -- Grundlagen marktorientierter Unternehmensführung: Konzepte -- Instrumente -- Praxisbeispiele, 11th revised and exp. ed., Wiesbaden 2012.
Meffert, H. / Burman, Ch / Becker, Ch.: Internationales Marketing-Management -- Ein markenorientierter Ansatz, 4th ed., Stuttgart 2010.
Meyer, M.: Ökonomische Organisation der Industrie: Netzwerkarrangements zwischen Markt und Unternehmung, Wiesbaden 1995.
Porter, M. E.: Wettbewerbsvorteile -- Spitzenleistungen erreichen und behaupten, 8th ed., Campus Frankfurt / New York 2014. (Original: Porter, M.: Competitive Advantage, New York 1985.)
Simon, H. / Fassnacht, M.: Preismanagement, Strategie -- Analyse -- Entscheidung -- Umsetzung, 3rd ed., Wiesbaden 2009.

**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.

**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** |
| -- |
| **Additional information** |
| -- |
| **Workload** |
| -- |
| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Mathematics (2008)<br>Bachelor' degree (1 major) Mathematics (2007)<br>Bachelor' degree (1 major) Business Management and Economics (2007)<br>Bachelor' degree (1 major) Business Information Systems (2007) |

| Module title | | | Abbreviation |
|---|---|---|---|
| **Supply, Production and Operations Management. An Introduction** | | | 12-BPL-G-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Business Management and Industrial Management | | Faculty of Business Management and Economics | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)

| Module title | Abbreviation |
|---|---|
| **Investment and Finance. An Introduction** | 12-I&F-G-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Business Management, Banking and Finance | Faculty of Business Management and Economics |

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

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

**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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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)

Bachelor' degree (1 major) Business Information Systems (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Macroeconomics 2** | | | 12-Mak2-G-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Public Finance | | Faculty of Business Management and Economics | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Microeconomics 2** | | | 12-Mik2-G-072-m01 |
| **Module coordinator** | | **Module offered by** | |
| holder of the Chair of Industrial Economics | | Faculty of Business Management and Economics | |
| **ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**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** (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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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Business Management and Economics (2007)
Bachelor' degree (1 major) Business Information Systems (2007)

| Module title | Abbreviation |
|---|---|
| **Introduction to Economic Policy** | 12-WiPo-G-072-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Economic Order and Social Policy | Faculty of Business Management and Economics |

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

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

**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 ecnomoic 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 abilitiy 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** |
| -- |
| **Additional information** |
| -- |
| **Workload** |
| -- |
| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
| -- |
| **Module appears in** |
| Bachelor' degree (1 major) Mathematics (2008)<br>Bachelor' degree (1 major) Mathematics (2007)<br>Bachelor' degree (1 major) Business Management and Economics (2007)<br>Bachelor' degree (1 major) Business Information Systems (2007) |

# Thesis

(10 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Thesis Mathematics (Bachelor Thesis)** | | | 10-M-BAM-072-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)** | |
| 10 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | Registration for assessment: as specified. | |

**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**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2008)
Bachelor' degree (1 major) Mathematics (2007)

# Subject-specific Key Skills

(15 ECTS credits)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Preparatory Course Mathematics** | | | 10-M-VKM-072-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)** | |
| 2 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to the basic techniques in mathematics; approach to sets, propositions, propositional logic.

**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)

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)

completion of project assignments (to be specified at the beginning of the course)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Programming Course for Mathematics and other students** | | | 10-M-PRG-072-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)** | |
| 3 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

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

**Intended learning outcomes**

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

**Courses** (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 (expenditure of time as specified at the beginning of the course)

**Allocation of places**

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**Additional information**

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**Workload**

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

--

**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Computeroriented Mathematics** | | | 10-M-COM-072-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)** | |
| 3 | (not) successfully completed | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

Introduction to modern mathematical software for symobic 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 and 10-M-LNA). Computer-based solution of problems in linear algebra, geometry, analysis, in particular differential and integral calculus; visualisation of functions.

**Intended learning outcomes**

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

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

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

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

project in the form of programming exercises (expenditure of time as specified at the beginning of the course)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Physics (2007)
Bachelor' degree (1 major) Technology of Functional Materials (2006)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Defense of Bachelor Thesis in Mathematics** | | | 10-M-BAK-072-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)** | |
| 2 | numerical grade | -- | |
| **Duration** | **Module level** | **Other prerequisites** | |
| 1 semester | undergraduate | -- | |

**Contents**

The student prepares a scientific talk on the topic and results of his/her Bachelor's thesis and answers questions on his/her talk.

**Intended learning outcomes**

The student is able to prepare a presentation of his/her own scientific work. He/She is able to give a short and concise talk on his/her own scientific work, participate in a scientific debate and question the scientific activities of others.

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

A (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. 15 minutes) with subsequent discussion (approx. 15 minutes)

**Allocation of places**

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**Additional information**

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**Workload**

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

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**Module appears in**

Bachelor' degree (1 major) Mathematics (2007)