



Wintersemester 24/25

# Module Guide

for the study of

## Mathematics Master

Master of Science

valid in connection with the examination regulations MPO 2022

According to the Subject-Specific Examination Regulation for the **Option without an Application Subject** of the Master's Program Mathematics (Single Major Subject) dated February 9, 2022.

Generated: October 12, 2024

**Curriculum - Master Mathematics\***  
**(without an Application Subject)**

<b>Sem.</b>	<b>Specialization**</b>		<b>Diversification**</b>		<b>Compulsory Elective Modules**</b>	<b>Free Choice</b>
<b>1</b>	Specialization A 9 CP	Advanced Communications A 9 CP (2 x 4,5 CP)	Diversification A 9 CP	Advanced Communications B 9 CP (2 x 4,5 CP)	Specialization C 9 CP	courses offered by the Faculty 3 or from General Studies 9 CP
<b>2</b>	Specialization B 9 CP		Diversification B 9 CP		or	
<b>3</b>	Reading Course A 9 CP	Reading Course B 9 CP	Diversification C 9 CP			
<b>4</b>	Master Thesis 30 CP					

Credit Points (short CP) indicate the average workload for a course or module, where 1 CP = 30 hours

\* According to the Examination Regulation with an Application Subject dated February 9, 2022 including any amendments and corrections

\*\* Composed of modules according to one of the four areas of specialization (Algebra, Analysis, Numerical Analysis or Statistics/Stochastics), which is indicated by specialization stated in brackets. The areas that are not selected for specialization together form the area of diversification.

## Index by areas of study

### 1) Mathematics

One of the following four areas of specialization (Algebra, Analysis, Numerical Analysis or Statistics/Stochastics) must be chosen and for each of these areas, the compulsory and compulsory elective modules for the option without an Application Subject totalling 81 CP are listed according to the curriculum.

#### a) Area of Specialization - Algebra (81 CP)

##### aa) Compulsory Modules (72 CP)

03-MAT-MA-SP-A-ALG: Specialization A (Algebra) (9 CP).....	5
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03-MAT-MA-SP-B-ALG: Specialization B (Algebra) (9 CP).....	21
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03-MAT-MA-AC-A-ALG: Advanced Communications A (Algebra) (9 CP).....	37
03-MAT-MA-AC-B-ALG: Advanced Communications B (Algebra) (9 CP).....	45
03-MAT-MA-RC-A-ALG: Reading Course A (Algebra) (9 CP).....	57
03-MAT-MA-RC-B-ALG: Reading Course B (Algebra) (9 CP).....	65

##### bb) Compulsory Elective Modules (9 CP)

One of the modules, so either in the area of specialization or from the area of diversification, is taken.

03-MAT-MA-SP-C-ALG: Specialization C (Algebra) (9 CP).....	73
03-MAT-MA-D-C-ALG: Diversification C (Algebra) (9 CP).....	81

#### b) Area of Specialization - Analysis (81 CP)

##### aa) Compulsory Modules (72 CP)

03-MAT-MA-SP-A-ANA: Specialization A (Analysis) (9 CP).....	7
03-MAT-MA-D-A-ANA: Diversification A (Analysis) (9 CP).....	15
03-MAT-MA-SP-B-ANA: Specialization B (Analysis) (9 CP).....	23
03-MAT-MA-D-B-ANA: Diversification B (Analysis) (9 CP).....	31
03-MAT-MA-AC-A-ANA: Advanced Communications A (Analysis) (9 CP).....	39
03-MAT-MA-AC-B-ANA: Advanced Communications A (Analysis) (9 CP).....	48
03-MAT-MA-RC-A-ANA: Reading Course A (Analysis) (9 CP).....	59

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03-MAT-MA-RC-B-ANA: Reading Course B (Analysis) (9 CP).....	67
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**bb) Compulsory Elective Modules (9 CP)**

One of the modules, so either in the area of specialization or from the area of diversification, is taken.

03-MAT-MA-SP-C-ANA: Specialization C (Analysis) (9 CP).....	75
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03-MAT-MA-D-C-ANA: Diversification C (Analysis) (9 CP).....	83
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**c) Area of Specialization - Numerical Analysis (81 CP)****aa) Compulsory Modules (72 CP)**

03-MAT-MA-SP-A-NUM: Specialization A (Numerical Analysis) (9 CP).....	9
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03-MAT-MA-D-A-NUM: Diversification A (Numerical Analysis) (9 CP).....	17
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03-MAT-MA-SP-B-NUM: Specialization B (Numerical Analysis) (9 CP).....	25
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03-MAT-MA-D-B-NUM: Diversification B (Numerical Analysis) (9 CP).....	33
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03-MAT-MA-AC-A-NUM: Advanced Communications A (Numerical Analysis) (9 CP).....	41
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03-MAT-MA-AC-B-NUM: Advanced Communications B (Numerical Analysis) (9 CP).....	51
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03-MAT-MA-RC-A-NUM: Reading Course A (Numerical Analysis) (9 CP).....	61
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03-MAT-MA-RC-B-NUM: Reading Course B (Numerical Analysis) (9 CP).....	69
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**bb) Compulsory Elective Modules (9 CP)**

One of the modules, so either in the area of specialization or from the area of diversification, is taken.

03-MAT-MA-SP-C-NUM: Specialization C (Numerical Analysis) (9 CP).....	77
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03-MAT-MA-D-C-NUM: Diversification C (Numerical Analysis) (9 CP).....	85
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**d) Area of Specialization - Statistics/Stochastics (81 CP)****aa) Compulsory Modules (72 CP)**

03-MAT-MA-SP-A-STS: Specialization A (Statistics/Stochastic) (9 CP).....	11
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03-MAT-MA-D-A-STS: Diversification A (Statistics/Stochastics) (9 CP).....	19
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03-MAT-MA-SP-B-STS: Specialization B (Statistics/Stochastic) (9 CP).....	27
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03-MAT-MA-D-B-STS: Diversification B (Statistics/Stochastics) (9 CP).....	35
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03-MAT-MA-AC-A-STS: Advanced Communications A (Statistics/Stochastics) (9 CP).....	43
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03-MAT-MA-AC-B-STS: Advanced Communications B (Statistics/Stochastics) (9 CP).....	54
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03-MAT-MA-RC-A-STS: Reading Course A (Statistics/Stochastics) (9 CP).....	63
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03-MAT-MA-RC-B-STS: Reading Course B (Statistics/Stochastics) (9 CP).....	71
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**bb) Compulsory Elective Modules (9 CP)**

One of the modules, so either in the area of specialization or from the area of diversification, is taken.

03-MAT-MA-SP-C-STS: Specialization C (Statistics/Stochastic) (9 CP)..... 79  
03-MAT-MA-D-C-STS: Diversification C (Statistics/Stochastics) (9 CP)..... 87

**2) Free Choice (9 CP)**

Elective area totalling 9 CP. Students choose from the courses offered by the Faculty 3 and that are not yet completed or from the General Studies of the University of Bremen.

FS-SB: Study and work (45 CP)..... 89  
FS-SG: General Studies (45 CP)..... 91  
FS-SK: Key competencies (45 CP)..... 93  
FS-SP: Languages (45 CP)..... 95

**3) Master Thesis (30 CP)**

The topic of the Master's thesis must belong to the chosen area of specialization. Required for registration are at least 81 CP.

03-MAT-MA-MTM: Module Master Thesis (30 CP)..... 100

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## Module 03-MAT-MA-SP-A-ALG: Specialization A (Algebra)

### Specialization A (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Algebra. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Algebra, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

## Module 03-MAT-MA-SP-A-ANA: Specialization A (Analysis)

### Specialization A (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Analysis, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours

32 h Exam preparation

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-SP-A-NUM: Specialization A (Numerical Analysis)

### Specialization A (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Numerical Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Numerical Analysis, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
84 h SWS / presence time / working hours  
32 h Exam preparation

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algorithms and Uncertainty** ()

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

## Module 03-MAT-MA-SP-A-STS: Specialization A (Statistics/Stochastic)

### Specialization A (Statistics/Stochastic)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Statistics/Stochastics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours

32 h Exam preparation

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

## Module 03-MAT-MA-D-A-ALG: Diversification A (Algebra)

### Diversification A (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Analysis, Numerical Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Analysis, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-D-A-ANA: Diversification A (Analysis)

### Diversification A (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Numerical Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours

32 h Exam preparation

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

## Module 03-MAT-MA-D-A-NUM: Diversification A (Numerical Analysis)

### Diversification A (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-D-A-STS: Diversification A (Statistics/Stochastics)

### Diversification A (Statistics/Stochastics)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Analysis and Numerical Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
32 h Exam preparation  
84 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Analysis or Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-SP-B-ALG: Specialization B (Algebra)

### Specialization B (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Algebra. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Algebra, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours

32 h Exam preparation

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

## Module 03-MAT-MA-SP-B-ANA: Specialization B (Analysis)

### Specialization B (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Analysis, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours

32 h Exam preparation

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-SP-B-NUM: Specialization B (Numerical Analysis)

### Specialization B (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Numerical Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Numerical Analysis, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algorithms and Uncertainty** ()

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

## Module 03-MAT-MA-SP-B-STS: Specialization B (Statistics/Stochastic)

### Specialization B (Statistics/Stochastic)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Statistics/Stochastics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
32 h Exam preparation  
84 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Module 03-MAT-MA-D-B-ALG: Diversification B (Algebra)**  
 Diversification B (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Analysis, Numerical Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation  
 84 h SWS / presence time / working hours  
 154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Analysis, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-D-B-ANA: Diversification B (Analysis)

### Diversification B (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Numerical Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

## Module 03-MAT-MA-D-B-NUM: Diversification B (Numerical Analysis)

### Diversification B (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
84 h SWS / presence time / working hours  
32 h Exam preparation

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

**Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-D-B-STS: Diversification B (Statistics/Stochastics)

### Diversification B (Statistics/Stochastics)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Analysis and Numerical Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
84 h SWS / presence time / working hours  
32 h Exam preparation

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Analysis or Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-AC-A-ALG: Advanced Communications A (Algebra)

### Advanced Communications A (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Algebra will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:**

114 h Preparation / follow-up work

100 h Exam preparation

56 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

In total, two seminars must be taken to complete this module. A list of the offered Algebra Seminars can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**  
 Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

<b>Form of examination:</b> Presentation and written assignment	<b>The examination is ungraded?</b> no
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**Number of graded components / ungraded components / prerequisites of the examination:**  
 1 / - / -

**Language(s) of instruction:**  
 Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

## Module courses

**Course:** 1. Seminar from the Area of Algebra

<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
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<b>Contact hours:</b> 2,00	<b>University teacher:</b> Lecturers from Mathematics
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<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar
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### Associated module courses

**Geometry of Polynomials (Seminar)**

**Course:** 2. Seminar from the Area of Algebra

<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
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<b>Contact hours:</b> 2,00	<b>University teacher:</b> Lecturers from Mathematics
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<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar
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### Associated module courses

**Geometry of Polynomials (Seminar)**

## Module 03-MAT-MA-AC-A-ANA: Advanced Communications A (Analysis)

### Advanced Communications A (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Analysis will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:**

100 h Exam preparation

56 h SWS / presence time / working hours

1114 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

In total, two seminars must be taken to complete this module. A list of the offered Analysis Seminars can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -



**Language(s) of instruction:**  
 Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

<b>Form of examination:</b> Presentation and written assignment	<b>The examination is ungraded?</b> no
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**Number of graded components / ungraded components / prerequisites of the examination:**  
 1 / - / -

**Language(s) of instruction:**  
 Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

### Module courses

**Course:** 1. Seminar from the Area of Analysis

<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
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<b>Contact hours:</b> 2,00	<b>University teacher:</b> Lecturers from Mathematics
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<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar
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**Associated module courses**

- Advanced Communication Analysis** (Seminar)
- Analysis/Stochastics/Statistics** (Seminar)
- Mathematical Methods in Machine Learning** (Seminar)

**Course:** 2. Seminar from the Area of Analysis

<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
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<b>Contact hours:</b> 2,00	<b>University teacher:</b> Lecturers from Mathematics
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<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar
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**Associated module courses**

- Advanced Communication Analysis** (Seminar)
- Analysis/Stochastics/Statistics** (Seminar)
- Mathematical Methods in Machine Learning** (Seminar)

## Module 03-MAT-MA-AC-A-NUM: Advanced Communications A (Numerical Analysis)

### Advanced Communications A (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Numerical Analysis will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:**
**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

German

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**
**Duration:**

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:**
**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / - / -

**Language(s) of instruction:**

Deutsch

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:**
**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / - / -

**Language(s) of instruction:**

Deutsch

## Module courses

**Course:** 1. Seminar from the Area of Numerical Analysis

**Frequency:**

**Language(s) of instruction:**

Deutsch

**Contact hours:**

2,00

**University teacher:**

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

### Associated module courses

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()

**Course:** 2. Seminar from the Area of Numerical Analysis

**Frequency:**

**Language(s) of instruction:**

Deutsch

**Contact hours:**

2,00

**University teacher:**

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

### Associated module courses

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()

**Module 03-MAT-MA-AC-A-STS: Advanced Communications A (Statistics/Stochastics)****Advanced Communications A (Statistics/Stochastics)****Assignment to areas of study:**

- Mathematics / Area of Specialization - Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Statistics/Stochastics will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:****Are there optional courses in the modules?**

no

**Language(s) of instruction:**

German

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:****Duration:**

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:****Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / - / -

**Language(s) of instruction:**

Deutsch

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:**

<b>Form of examination:</b> Announcement at the beginning of the semester	<b>The examination is ungraded?</b> no
<b>Number of graded components / ungraded components / prerequisites of the examination:</b> - / - / -	
<b>Language(s) of instruction:</b> Deutsch	

### Module courses

<b>Course:</b> 1. Seminar from the Area of Statistics/Stochastics	
<b>Frequency:</b>	<b>Language(s) of instruction:</b> Deutsch
<b>Contact hours:</b> 2,00	<b>University teacher:</b>
<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar
<b>Associated module courses</b>	
Analysis/Stochastics/Statistics (Seminar)	
Exponential Families (Seminar)	

<b>Course:</b> 2. Seminar from the Area of Statistics/Stochastics	
<b>Frequency:</b>	<b>Language(s) of instruction:</b> Deutsch
<b>Contact hours:</b> 2,00	<b>University teacher:</b>
<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar
<b>Associated module courses</b>	
Analysis/Stochastics/Statistics (Seminar)	
Exponential Families (Seminar)	

## Module 03-MAT-MA-AC-B-ALG: Advanced Communications B (Algebra)

### Advanced Communications B (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Analysis, Numerical Analysis and Statistics/Stochastics will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:**

100 h Exam preparation

114 h Preparation / follow-up work

56 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

In total, two seminars must be taken to complete this module. A list of the offered Seminars can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**  
 Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

<b>Form of examination:</b> Presentation and written assignment	<b>The examination is ungraded?</b> no
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**Number of graded components / ungraded components / prerequisites of the examination:**  
 1 / - / -

**Language(s) of instruction:**  
 Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

## Module courses

**Course:** 1. Seminar from the Area of Analysis, Numerical Analysis or Statistics/Stochastics

<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
<b>Contact hours:</b> 2,00	<b>University teacher:</b> Lecturers from Mathematics
<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar

### Associated module courses

**Advanced Communication Analysis** (Seminar)  
**Advanced Numerical Methods for Partial Differential Equations** (Seminar)  
**Analysis/Stochastics/Statistics** (Seminar)  
**Challenges in Inverse Problems** (Seminar)  
**Exponential Families** (Seminar)  
**High-Performance-Visualisierung** (Seminar)  
**Introduction to Robust Control** (Seminar)  
**Mathematical Methods in Machine Learning** (Seminar)  
**Recent Trends in Algorithm Theory** ()

**Course:** 2. Seminar from the Area of Analysis, Numerical Analysis or Statistics/Stochastics

<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
<b>Contact hours:</b> 2,00	<b>University teacher:</b> Lecturers from Mathematics
<b>Teaching method(s):</b> Seminar	<b>Associated module examination:</b> Partial Examination on a selected Seminar

**Associated module courses**

**Advanced Communication Analysis** (Seminar)

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**Exponential Families** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()



## Module 03-MAT-MA-AC-B-ANA: Advanced Communications B (Analysis) Advanced Communications A (Analysis)

### Assignment to areas of study:

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

### Content-related prior knowledge or skills:

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

### Learning content:

A variety of topics from Algebra, Numerical Analysis and Statistics/Stochastics will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

### Learning outcomes / competencies / targeted competencies:

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

### Calculation of student workload:

100 h Exam preparation

56 h SWS / presence time / working hours

114 h Preparation / follow-up work

### Are there optional courses in the modules?

yes

In total, two seminars must be taken to complete this module. A list of the offered Seminars can be found in the Course Catalogs, which will be released prior to the start of each semester.

### Language(s) of instruction:

English

### Responsible for the module:

Dr. Ingolf Schäfer

### Frequency:

each semester

### Duration:

1 semester[s]

### The module is valid since / The module is valid until:

WiSe 23/24 / -

### Credit points / Workload:

9 / 270 hours

## Module examinations

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

### Form of examination:

Presentation and written assignment

### The examination is ungraded?

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

## Module courses

**Course:** 1. Seminar from the Area of Algebra, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

2,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

### Associated module courses

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**Exponential Families** (Seminar)

**Geometry of Polynomials** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()

**Course:** 2. Seminar from the Area of Algebra, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

2,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

**Associated module courses**

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**Exponential Families** (Seminar)

**Geometry of Polynomials** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()

## Module 03-MAT-MA-AC-B-NUM: Advanced Communications B (Numerical Analysis)

### Advanced Communications B (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Analysis, Algebra and Statistics/Stochastics will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:**

114 h Preparation / follow-up work  
56 h SWS / presence time / working hours  
100 h Exam preparation

**Are there optional courses in the modules?**

yes

In total, two seminars must be taken to complete this module. A list of the offered Seminars can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

## Module courses

**Course:** 1. Seminar from the Area of Algebra, Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

2,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

### Associated module courses

**Advanced Communication Analysis** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Exponential Families** (Seminar)

**Geometry of Polynomials** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Course:** 2. Seminar from the Area of Algebra, Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

2,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

### Associated module courses

**Advanced Communication Analysis** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Exponential Families** (Seminar)

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**Geometry of Polynomials** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Module 03-MAT-MA-AC-B-STS: Advanced Communications B (Statistics/Stochastics)****Advanced Communications B (Statistics/Stochastics)****Assignment to areas of study:**

- Mathematics / Area of Specialization - Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the Seminar chosen and will be communicated by the lecturer at the start of the semester.

**Learning content:**

A variety of topics from Analysis, Algebra and Numerical Analysis will be available, which typically building upon previous lectures offered in the Master's program. The specific content will depend on the student's choice of Seminar.

**Learning outcomes / competencies / targeted competencies:**

Students deepen their experience in and knowledge of independent scientific work by

- Familiarizing themselves and learning about an advanced mathematical topic through literature, expanding on this with their own literature research.
- Preparing and giving a talk.
- Writing a mathematical text according to the corresponding universal and citing standards.

**Calculation of student workload:**

100 h Exam preparation

114 h Preparation / follow-up work

56 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

In total, two seminars must be taken to complete this module. A list of the offered Seminars can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module examination:** Partial Examination on a selected Seminar

**Type of examination:** partial exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

## Module courses

**Course:** 1. Seminar from the Area of Algebra, Analysis or Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

2,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar

### Associated module courses

**Advanced Communication Analysis** (Seminar)

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**Geometry of Polynomials** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()

**Course:** 2. Seminar from the Area of Algebra, Analysis or Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

2,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

Seminar

**Associated module examination:**

Partial Examination on a selected Seminar



**Associated module courses**

**Advanced Communication Analysis** (Seminar)

**Advanced Numerical Methods for Partial Differential Equations** (Seminar)

**Analysis/Stochastics/Statistics** (Seminar)

**Challenges in Inverse Problems** (Seminar)

**Geometry of Polynomials** (Seminar)

**High-Performance-Visualisierung** (Seminar)

**Introduction to Robust Control** (Seminar)

**Mathematical Methods in Machine Learning** (Seminar)

**Recent Trends in Algorithm Theory** ()

**Module 03-MAT-MA-RC-A-ALG: Reading Course A (Algebra)**

## Reading Course A (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) needs to be within the field of Algebra and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic from the area of Algebra. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

30 h SWS / presence time / working hours

240 h Preparation / follow-up work

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Dmitry Feichtner-Kozlov

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Final examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module courses****Course:** Reading Course from the Area of Algebra**Frequency:**  
each semester**Language(s) of instruction:**  
Englisch**Contact hours:**  
-**University teacher:**  
Lecturers from Mathematics**Teaching method(s):****Associated module examination:**  
Final Examination**Associated module courses****Reading Course Algebra** (Seminar)

**Module 03-MAT-MA-RC-A-ANA: Reading Course A (Analysis)****Reading Course A (Analysis)****Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) needs to be within the field of Analysis and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic from the area of Analysis. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

240 h Preparation / follow-up work  
30 h SWS / presence time / working hours

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Anke Dorothea Pohl

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Module Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module courses****Course:** Reading Course from the Area of Analysis**Frequency:**  
each semester**Language(s) of instruction:**  
Englisch**Contact hours:**  
-**University teacher:**  
Lecturers from Mathematics**Teaching method(s):****Associated module examination:**  
Final Examination**Associated module courses****Reading Course Analysis (Seminar)**

**Module 03-MAT-MA-RC-A-NUM: Reading Course A (Numerical Analysis)**

## Reading Course A (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) needs to be within the field of Numerical Analysis and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic from the area of Numerical Analysis. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

240 h Preparation / follow-up work  
30 h SWS / presence time / working hours

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Andreas Rademacher

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Module Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module courses**

<b>Course:</b> Reading Course from the Area of Numerical Analysis	
<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
<b>Contact hours:</b> -	<b>University teacher:</b> Lecturers from Mathematics
<b>Teaching method(s):</b>	<b>Associated module examination:</b> Final Examination
<b>Associated module courses</b> Reading Course Numerical Analysis (Seminar)	

**Module 03-MAT-MA-RC-A-STS: Reading Course A (Statistics/Stochastics)**

## Reading Course A (Statistics/Stochastics)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) needs to be within the field of Statistics/Stochastics and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic from the area of Statistics/Stochastics. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

240 h Preparation / follow-up work  
30 h SWS / presence time / working hours

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Thorsten-Ingo Dickhaus

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Module Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Module courses****Course:** Reading Course from the Area of Statistics/Stochastics**Frequency:**  
each semester**Language(s) of instruction:**  
Englisch**Contact hours:**  
-**University teacher:**  
Lecturers from Mathematics**Teaching method(s):****Associated module examination:**  
Final Examination**Associated module courses****Reading Course Statistics/Stochastics** (Seminar)

**Module 03-MAT-MA-RC-B-ALG: Reading Course B (Algebra)**

## Reading Course B (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) can come from any of the four mathematical specialty fields (Algebra, Analysis, Numerical Analysis and Statistics/Stochastics) and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

240 h Preparation / follow-up work

30 h SWS / presence time / working hours

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Dmitry Feichtner-Kozlov

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Combination Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module courses**

<b>Course:</b> Reading Course from the Area of Algebra	
<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
<b>Contact hours:</b> -	<b>University teacher:</b> Lecturers from Mathematics
<b>Teaching method(s):</b>	<b>Associated module examination:</b> Final Examination
<b>Associated module courses</b> Reading Course Algebra (Seminar)	

**Module 03-MAT-MA-RC-B-ANA: Reading Course B (Analysis)****Reading Course B (Analysis)****Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) can come from any of the four mathematical specialty fields (Algebra, Analysis, Numerical Analysis and Statistics/Stochastics) and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

30 h SWS / presence time / working hours

240 h Preparation / follow-up work

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Anke Dorothea Pohl

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Module Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module courses**

<b>Course:</b> Reading Course from the Area of Analysis	
<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
<b>Contact hours:</b> -	<b>University teacher:</b> Lecturers from Mathematics
<b>Teaching method(s):</b>	<b>Associated module examination:</b> Final Examination
<b>Associated module courses</b> Reading Course Analysis (Seminar)	

**Module 03-MAT-MA-RC-B-NUM: Reading Course B (Numerical Analysis)**

## Reading Course B (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) can come from any of the four mathematical specialty fields (Algebra, Analysis, Numerical Analysis and Statistics/Stochastics) and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

240 h Preparation / follow-up work

30 h SWS / presence time / working hours

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Andreas Rademacher

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Module Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Module courses**

<b>Course:</b> Reading Course from the Area of Numerical Analysis	
<b>Frequency:</b> each semester	<b>Language(s) of instruction:</b> Englisch
<b>Contact hours:</b> -	<b>University teacher:</b> Lecturers from Mathematics
<b>Teaching method(s):</b>	<b>Associated module examination:</b> Final Examination
<b>Associated module courses</b> Reading Course Numerical Analysis (Seminar)	

**Module 03-MAT-MA-RC-B-ST5: Reading Course B (Statistics/Stochastics)**

## Reading Course B (Statistics/Stochastics)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Modules

**Content-related prior knowledge or skills:**

The required knowledge will be discussed with the lecturer at the start of the semester.

**Learning content:**

The individual topic of this Reading Course (RC) can come from any of the four mathematical specialty fields (Algebra, Analysis, Numerical Analysis and Statistics/Stochastics) and will be determined through discussions with and the approval of a supervisor. The student will register for the RC after such discussions and the selection of a topic.

**Learning outcomes / competencies / targeted competencies:**

The goal of the course is to gain experience with the intensive, self-driven study of a selected topic. The process is guided and supervised by a staff member from the mathematics faculty. The Reading Course can also be used to become acquainted with topics or subjects that can then form the basis for a later Masters thesis.

**Calculation of student workload:**

30 h SWS / presence time / working hours

240 h Preparation / follow-up work

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Prof. Dr. Thorsten-Ingo Dickhaus

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

**Module examinations**

**Module examination:** Module Examination

**Type of examination:** module exam

**Form of examination:**

Presentation and written assignment

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Module courses****Course:** Reading Course from the Area of Statistics/Stochastics**Frequency:**  
each semester**Language(s) of instruction:**  
Englisch**Contact hours:**  
-**University teacher:**  
Lecturers from Mathematics**Teaching method(s):****Associated module examination:**  
Final Examination**Associated module courses****Reading Course Statistics/Stochastics** (Seminar)

## Module 03-MAT-MA-SP-C-ALG: Specialization C (Algebra)

### Specialization C (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Algebra. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Algebra, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

## Module 03-MAT-MA-SP-C-ANA: Specialization C (Analysis)

### Specialization C (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Analysis, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
32 h Exam preparation  
84 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-SP-C-NUM: Specialization C (Numerical Analysis)

### Specialization C (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Numerical Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Numerical Analysis, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
32 h Exam preparation  
84 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algorithms and Uncertainty** ()

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

## Module 03-MAT-MA-SP-C-STS: Specialization C (Statistics/Stochastic)

### Specialization C (Statistics/Stochastic)

**Assignment to areas of study:**

- Mathematics / Area of Specialization -  
Statistics/Stochastics / Compulsory Elective  
Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of mathematical topics from the field of Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized subject from the field of Statistics/Stochastics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours  
32 h Exam preparation  
154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose from a wide-variety of subjects offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Combination Examination

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

**Associated module examination:**

Examination(s) on the selected course

**Associated module courses**

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

## Module 03-MAT-MA-D-C-ALG: Diversification C (Algebra)

### Diversification C (Algebra)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Algebra / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Analysis, Numerical Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

154 h Preparation / follow-up work  
32 h Exam preparation  
84 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Analysis, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

**Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-D-C-ANA: Diversification C (Analysis)

### Diversification C (Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Analysis / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Numerical Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

84 h SWS / presence time / working hours  
32 h Exam preparation  
154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Numerical Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

## Module 03-MAT-MA-D-C-NUM: Diversification C (Numerical Analysis)

### Diversification C (Numerical Analysis)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Numerical Analysis / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Analysis and Statistics/Stochastics. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation

84 h SWS / presence time / working hours

154 h Preparation / follow-up work

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)

**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Analysis or Statistics/Stochastics

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Basics of Mathematical Statistics (Statistics I)** (Lecture)

**Mathematical Concepts of Risk Management (Statistics III)** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

## Module 03-MAT-MA-D-C-STS: Diversification C (Statistics/Stochastics)

### Diversification C (Statistics/Stochastics)

**Assignment to areas of study:**

- Mathematics / Area of Specialization - Statistics/Stochastics / Compulsory Elective Modules

**Content-related prior knowledge or skills:**

The required knowledge will depend on the chosen course and will be communicated by the lecturer at the start of the semester.

**Learning content:**

The students choose from a variety of topics from Algebra, Analysis and Numerical Analysis. The specific content will depend on the student's choice of course.

**Learning outcomes / competencies / targeted competencies:**

Students are introduced to a specialized area of mathematics, gaining knowledge of the topic along with current open research questions and its applications in other scientific areas, where appropriate. They familiarize themselves with the methods involved in scientific work and reflect critically on the limits of applicability of the covered procedures.

**Calculation of student workload:**

32 h Exam preparation  
154 h Preparation / follow-up work  
84 h SWS / presence time / working hours

**Are there optional courses in the modules?**

yes

Students are able to choose a course from a wide-variety of topics offered each semester; the offered courses can be found in the Course Catalogs, which will be released prior to the start of each semester.

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

9 / 270 hours

## Module examinations

**Module examination:** Examination(s) on the selected Course

**Type of examination:** combination exam

**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / 1 / -

**Language(s) of instruction:**

Englisch / German (Examinations are usually conducted in English, but can also be taken in another language after consultation with the examiner.)



**Description:**

Type of Examination: Scientific Paper or Oral/Written Exam.

The (Graded or Ungraded) Coursework requirements will be decided upon by the Lecturer at the beginning of the course (Weekly Worksheets, Midterm Exam, etc.).

**Module courses**

**Course:** Lecture and Exercise from the Area of Algebra, Analysis or Numerical Analysis

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

6,00

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):****Associated module examination:**

Examination(s) on the selected Course

**Associated module courses**

**Advanced Topics in Image Processing - The Beauty of Variational Calculus** (Lecture)

**Algebraic Topology** (Lecture)

**Algorithms and Uncertainty** ()

**Convex Analysis and Optimization** (Lecture)

**Finite Elements - Selected Chapters** (Lecture)

**Mathematical Methods for Data Analysis and Image Processing** (Lecture)

**Numerical Methods for Partial Differential Equations** (Lecture)

**Spectral Geometry of Hyperbolic Surfaces** (Lecture)

**Module FS-SB: Studium und Beruf**

## Study and work

**Assignment to areas of study:**

- Free Choice

**Content-related prior knowledge or skills:**

none

**Learning content:**

Im Bereich Studium und Beruf sind berufsorientierende und vorbereitende Veranstaltungen enthalten.

**Learning outcomes / competencies / targeted competencies:**

Die Fachergänzenden Studien sind ein Bereich, in dem Studierende eigene Schwerpunkte setzen und Veranstaltungen wählen, die ihr individuelles Profil schärfen. Darüber hinaus können Veranstaltungen besucht werden, um Kenntnisse und Kompetenzen passend zu individuellen und heterogenen Lernvoraussetzungen zu erwerben.

**Calculation of student workload:****Are there optional courses in the modules?**

yes

Die studiengangsspezifischen Vorgaben in den Prüfungsordnungen können die Wahlmöglichkeiten einschränken.

Die Angabe zu ECTS-Punkten / Arbeitsaufwand ist die Maximalangabe, der tatsächliche Arbeitsaufwand und die vergebenen ECTS-Punkte hängen von der persönlichen Veranstaltungsauswahl ab.

**Language(s) of instruction:**

German / English

**Responsible for the module:**

N. &lt;Kein Modulverantwortlicher gewählt&gt;

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 24/25 / -

**Credit points / Workload:**

45 / 1350 hours

**This module is ungraded!****Module examinations****Module examination:** Prüfung zum Lehrangebot im Bereich Studium und Beruf**Type of examination:** partial exam**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

yes

**Number of graded components / ungraded components / prerequisites of the examination:**

- / - / -

**Language(s) of instruction:**

Deutsch / English (Die Sprache ist abhängig von der angebotenen Veranstaltung und kann ggf. individuell abgestimmt werden.)

**Description:**

Details zur Prüfung (Form und Umfang) werden durch die Veranstalter festgelegt und bekannt gegeben. Prüfungen in den Fachergänzenden Studien sind i.d.R. unbenotet, im Einzelfall legen aber die Anbieter fest, ob die Prüfung benotet oder unbenotet ist.

**Module courses**

**Course:** Veranstaltung im Bereich Studium und Beruf (Fachergänzende Studien)

**Frequency:**

each semester

**Language(s) of instruction:**

Deutsch / English (Die Sprache ist abhängig von der angebotenen Veranstaltung.)

**Contact hours:**

0,00

**University teacher:**

**Additional comments:**

Detaillierte Informationen zu den Lehrveranstaltungen sind in Stud.IP hinterlegt.

**Teaching method(s):**

**Associated module examination:**

Prüfung zum Lehrangebot im Bereich Studium und Beruf

## Module FS-SG: Studium Generale

### General Studies

#### Assignment to areas of study:

- Free Choice

#### Content-related prior knowledge or skills:

none

#### Learning content:

Im Bereich Studium Generale ermöglicht den Zugang zu anderen wissenschaftlichen Disziplinen, u.a. zur Förderung von Interdisziplinarität. Er enthält Veranstaltungen aus Studiengängen, die für Studierende anderer Studiengänge freigegeben wurden. Außerdem sind Veranstaltungen enthalten, die sich den profilgebenden Themen der Universität Bremen widmen, insb. Nachhaltigkeit, Gender und Diversity, Wissenschaftstheorie und -ethik und Forschendes Lernen.

#### Learning outcomes / competencies / targeted competencies:

Die Fachergänzenden Studien sind ein Bereich, in dem Studierende eigene Schwerpunkte setzen und Veranstaltungen wählen, die ihr individuelles Profil schärfen. Darüber hinaus können Veranstaltungen besucht werden, um Kenntnisse und Kompetenzen passend zu individuellen und heterogenen Lernvoraussetzungen zu erwerben.

#### Calculation of student workload:

#### Are there optional courses in the modules?

yes

Die studiengangsspezifischen Vorgaben in den Prüfungsordnungen können die Wahlmöglichkeiten einschränken.

Die Angabe zu ECTS-Punkten / Arbeitsaufwand ist die Maximalangabe, der tatsächliche Arbeitsaufwand und die vergebenen ECTS-Punkte hängen von der persönlichen Veranstaltungsauswahl ab.

#### Language(s) of instruction:

German / English

#### Responsible for the module:

N. <Kein Modulverantwortlicher gewählt>

#### Frequency:

each semester

#### Duration:

1 semester[s]

#### The module is valid since / The module is valid until:

WiSe 24/25 / -

#### Credit points / Workload:

45 / 1350 hours

**This module is ungraded!**

## Module examinations

**Module examination:** Prüfung zum Lehrangebot im Bereich Studium Generale

**Type of examination:** partial exam

#### Form of examination:

Announcement at the beginning of the semester

#### The examination is ungraded?

yes

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Deutsch / English (Die Sprache ist abhängig von der angebotenen Veranstaltung und kann ggf. individuell abgestimmt werden.)

**Description:**

Details zur Prüfung werden durch die Veranstalter festgelegt und bekannt gegeben. Prüfungen in den Fachergänzenden Studien sind i.d.R. unbenotet, im Einzelfall legen aber die Anbieter fest, ob die Prüfung benotet oder unbenotet ist.

**Module courses**

**Course:** Veranstaltungen im Bereich Studium Generale (Fachergänzende Studien)

**Frequency:**

**Language(s) of instruction:**

Deutsch / English (Die Sprache ist abhängig von der angebotenen Veranstaltung.)

**Contact hours:**

-

**University teacher:**

**Additional comments:**

Detaillierte Informationen zu den Lehrveranstaltungen sind in Stud.IP hinterlegt.

**Teaching method(s):**

**Associated module examination:**

Prüfung zum Lehrangebot im Bereich Studium Generale

**Module FS-SK: Schlüsselkompetenzen**

## Key competencies

**Assignment to areas of study:**

- Free Choice

**Content-related prior knowledge or skills:**

none

**Learning content:**

Im Bereich Schlüsselkompetenzen werden Veranstaltungen angeboten, die Studertechniken, Lehr- und Lernkompetenzen, personale Kompetenzen und soziale Kompetenzen vermitteln.

**Learning outcomes / competencies / targeted competencies:**

Die Fachergänzenden Studien sind ein Bereich, in dem Studierende eigene Schwerpunkte setzen und Veranstaltungen wählen, die ihr individuelles Profil schärfen. Darüber hinaus können Veranstaltungen besucht werden, um Kenntnisse und Kompetenzen passend zu individuellen und heterogenen Lernvoraussetzungen zu erwerben.

**Calculation of student workload:****Are there optional courses in the modules?**

yes

Die studiengangsspezifischen Vorgaben in den Prüfungsordnungen können die Wahlmöglichkeiten einschränken.

Die Angabe zu ECTS-Punkten / Arbeitsaufwand ist die Maximalangabe, der tatsächliche Arbeitsaufwand und die vergebenen ECTS-Punkte hängen von der persönlichen Veranstaltungsauswahl ab.

**Language(s) of instruction:**

German / English

**Responsible for the module:**

N. &lt;Kein Modulverantwortlicher gewählt&gt;

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 24/25 / -

**Credit points / Workload:**

45 / 1350 hours

**This module is ungraded!****Module examinations****Module examination:** Prüfung zum Lehrangebot im Bereich Schlüsselkompetenzen**Type of examination:** partial exam**Form of examination:**

Announcement at the beginning of the semester

**The examination is ungraded?**

yes

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

**Language(s) of instruction:**

Deutsch / English (Die Sprache ist abhängig von der angebotenen Veranstaltung und kann ggf. individuell abgestimmt werden.)

**Description:**

Details zur Prüfung werden durch die Veranstalter festgelegt und bekannt gegeben. Prüfungen in den Fachergänzenden Studien sind i.d.R. unbenotet, im Einzelfall legen aber die Anbieter fest, ob die Prüfung benotet oder unbenotet ist.

**Module courses**

**Course:** Veranstaltungen im Bereich Schlüsselkompetenzen (Fachergänzende Studien)

**Frequency:**

each semester

**Language(s) of instruction:**

Deutsch / English (Die Sprache ist abhängig von der angebotenen Veranstaltung.)

**Contact hours:**

-

**University teacher:**

N. <Kein Modulverantwortlicher gewählt>

**Additional comments:**

Detaillierte Informationen zu den Lehrveranstaltungen sind in Stud.IP hinterlegt.

**Teaching method(s):**

**Associated module examination:**

Prüfung zum Lehrangebot im Bereich Schlüsselkompetenzen

## Module FS-SP: Sprachen

### Languages

#### Assignment to areas of study:

- Free Choice

#### Content-related prior knowledge or skills:

none

#### Learning content:

Der Bereich Studium Sprachen ermöglicht das Erlernen oder Vertiefen von Sprachen, z.B. zur Profilbildung, persönlichen Entwicklung, als Vorbereitung auf einen Auslandsaufenthalt oder mit Blick auf spätere Berufe.

#### Learning outcomes / competencies / targeted competencies:

Die Fachergänzenden Studien sind ein Bereich, in dem Studierende eigene Schwerpunkte setzen und Veranstaltungen wählen, die ihr individuelles Profil schärfen. Darüber hinaus können Veranstaltungen besucht werden, um Kenntnisse und Kompetenzen passend zu individuellen und heterogenen Lernvoraussetzungen zu erwerben.

#### Calculation of student workload:

#### Are there optional courses in the modules?

yes

Die studiengangsspezifischen Vorgaben in den Prüfungsordnungen können die Wahlmöglichkeiten einschränken.

Die Angabe zu ECTS-Punkten / Arbeitsaufwand ist die Maximalangabe, der tatsächliche Arbeitsaufwand und die vergebenen ECTS-Punkte hängen von der persönlichen Veranstaltungsauswahl ab.

#### Language(s) of instruction:

#### Responsible for the module:

N. <Kein Modulverantwortlicher gewählt>

#### Frequency:

each semester

#### Duration:

1 semester[s]

#### The module is valid since / The module is valid until:

WiSe 24/25 / -

#### Credit points / Workload:

45 / 1350 hours

**This module is ungraded!**

## Module examinations

**Module examination:** Prüfung zum Lehrangebot im Bereich Sprachen

**Type of examination:** module exam

#### Form of examination:

Announcement at the beginning of the semester

#### The examination is ungraded?

yes

**Number of graded components / ungraded components / prerequisites of the examination:**

- / 1 / -

#### Language(s) of instruction:

alle Sprachen



**Description:**

Details zur Prüfung werden durch die Veranstalter festgelegt und bekannt gegeben. Prüfungen in den Fachergänzenden Studien sind i.d.R. unbenotet, im Einzelfall legen aber die Anbieter fest, ob die Prüfung benotet oder unbenotet ist.

**Module courses**

**Course:** Veranstaltungen im Bereich Sprachen (Fachergänzende Studien)

**Frequency:**

**Language(s) of instruction:**

alle Sprachen

**Contact hours:**

-

**University teacher:**

**Additional comments:**

Detaillierte Informationen zu den Lehrveranstaltungen sind in Stud.IP hinterlegt.

**Teaching method(s):**

**Associated module examination:**

Prüfung zum Lehrangebot im Bereich Sprachen

**Associated module courses**

**Academic English (Part 2 UNICert II) (B2.2) ()**

**Academic English: Listening and Speaking (Part 3b UNICert II) (B2.3) ()**

**Academic English: Reading and Writing (Part 3a UNICert II) (B2.3) ()**

**Advanced Academic English (Part 1 UNICert III) (C1.1) ()**

**Advanced Academic English (Part 1 UNICert III) (C1.1) ()**

**Advanced Academic English C 1.2: Focus on Skills for Research and Work (UNICert III) ()**

**Advanced Academic English for Business Studies & Economics: Focus on Speaking (UNICert III) (C1.2) ()**

**Advanced Academic English for Natural Sciences and Engineering: Focus on Writing (UNICert III) (C1.2) ()**

**Advanced Academic English: Focus on Speaking (Part 2b UNICert III) (C1.2) ()**

**Advanced Academic English: Focus on Writing (Part 2a UNICert III) (C1.2) ()**

**Arabisch (A1.1) ()**

**Arabisch (A1.2) ()**

**C4 - Unité thématique: Langue et civilisation II (Tutorial)**

**Chinesisch (A1.1) ()**

**Chinesisch (A1.2) ()**

**Chinesisch (A2.1) ()**

**Deutsch (A1.2) ()**

**Deutsch (A1.2) ()**

**Deutsch (A1.2) - fällt aus ()**

**Deutsch (A2.1) ()**

Deutsch (A2.1) ()

Deutsch (A2.2) ()

Deutsch (A2.2) ()

Deutsch (B1.1) ()

Deutsch (B1.1) ()

Deutsch (B1.2) ()

Deutsch (B1.2) - fällt aus! ()

Deutsch (B2.1) ()

Deutsch (B2.1) - fällt aus! ()

Deutsch (B2.2) ()

Deutsch (C1.1) ()

Deutsch als Zweitsprache - Sprechen für Studium und Beruf (B2-C1) ()

Deutsch als Zweitsprache: Schreiben für Studium und Beruf (C1) ()

Einführung in die Sprache und Kultur Russlands (A1.1 Teil 1) ()

English (Part 1 UNlcert I) (B1.1) ()

English (Part 2 UNlcert I) (B1.2) ()

German - Complete Beginners (A1.1) ()

German - Complete Beginners (A1.1) ()

German - Complete Beginners (A1.1) ()

German - Complete Beginners (A1.1) ()

German - Complete Beginners (A1.1) ()

German - Complete Beginners (A1.1) ()

German - Complete Beginners (A1.1) - Blended Learning ()

Integrated Academic Skills for Research and Industry C 1.2 (UNlcert III) -Natur- und Ingenieurwissenschaften ()

Intensivkurs Deutsche Gebärdensprache 1 ()

Intensivkurs Deutsche Gebärdensprache 2 ()

Intensivkurs Einführung in die polnische Sprache (Bildungszeit) (A1.1 Teil 1) ()

Intensivkurs Einführung in die polnische Sprache (Bildungszeit) (A1.1 Teil 2) ()

Intensivkurs Italienisch (Bildungszeit) (A1.1) ()

Intensivkurs Italienisch (Bildungszeit) (A1.2) ()

Intensivkurs Russisch (Bildungszeit) (A1.1 Teil 1) ()

Intensivkurs Russisch (Bildungszeit) (A1.1 Teil 2) ()

Italienisch (A1.1) ()

Italienisch (A1.2) ()

Italienisch (A2.1) ()

**Italienisch (A2.2) ()**  
**Italienisch (B1.1) ()**  
**Italienisch (B1.2) ()**  
**Italienisch / Italian (Grundmodul 1 Teil I - Modul 3) (A1) ()**  
**Italienisch niveauübergreifend (B2.1 - B2.2) ()**  
**Japanisch (A1.1 Teil 2 von 2) ()**  
**Japanisch (A1.2 Teil 1 von 2) ()**  
**Japanisch (A2.1 Teil 1 von 2) ()**  
**Japanisch - Gruppe 1 (A1.1 Teil 1 von 2) ()**  
**Japanisch - Gruppe 2 (A1.1 Teil 1 von 2) ()**  
**Kompaktkurs Polnisch (A1.1 Teil 1) ()**  
**Kompaktkurs Russisch (A2.1) ()**  
**Kurdisch für Studium und Job: Sprechen und Schreiben über die Herkunftssprache hinaus (B2-C1) ()**  
**ONLINE: Deutsche Gebärdensprache 1 ()**  
**ONLINE: Latein 1 ()**  
**ONLINE: Lektüre russischer Originaltexte (alle Niveaus) ()**  
**ONLINE: Modernes Hebräisch (A1.1) ()**  
**ONLINE: Russisch für Studium und Job - Schreiben (über die Herkunftssprache hinaus) (B1) ()**  
**ONLINE: Türkisch als Fremdsprache (A1.1) ()**  
**ONLINE: Türkisch als Fremdsprache (A1.2) ()**  
**ONLINE: YUFE Intermediate German on your own WiSe24/25 (A2) ()**  
**Polnisch (A1.2) ()**  
**Polnisch (A2.2) ()**  
**Polnisch für Studium und Job - über die Herkunftssprache hinaus (B1) ()**  
**Polnisch für Studium und Job - über die Herkunftssprache hinaus (B2) ()**  
**Portugiesisch (A2.1) ()**  
**Portugiesisch (A2.2) ()**  
**Portugiesisch (B2.1) ()**  
**Portugiesisch (Grundmodul 1 Teil I - Modul 3) (A1) ()**  
**Portugiesisch für Lernende mit Spanisch-Vorkenntnissen (A1) ()**  
**Russisch (A1.1) ()**  
**Russisch (A1.2) ()**  
**Schwedisch (A1.1) ()**  
**Schwedisch (A1.2) ()**  
**Slawische Sprachen im Doppelpack: Polnisch/Kroatisch (A1.1 Teil 1) ()**

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**Technical English: Listening and Speaking (UNlcert II) (B2.3) ()**

**Technical English: Reading and Writing (UNlcert II) (B2.3) ()**

**Türkisch Russisch für Studium und Job - Schreiben über die Herkunftssprache hinaus (ab A2) ()**

**Türkisch für Studium und Job - Sprechen/Präsentieren über die Herkunftssprache hinaus (B2-C1) ()**

**Übersetzungswerkstatt Russisch (alle Niveaus) ()**

**Module 03-MAT-MA-MTM: Module Master Thesis**

## Module Master Thesis

**Assignment to areas of study:**

- Master Thesis

**Content-related prior knowledge or skills:**

The topic of the master thesis will be discussed with the individual supervisor(s) and will generally build on a previous course in the specialized area.

**Learning content:**

The in-depth exploration of a mathematical topic, which is related to an area of current research, under individual supervision in a limited amount of time. It will ideally be supported by the contribution of individual research results.

**Learning outcomes / competencies / targeted competencies:**

The ability to understand and independently work on scientific premises, in particular:

- Researching the topic through the analysis of provided and found literature,
- Reflecting on the current state of research,
- Generating own research results as far as possible,
- Adhering to the rules of good scientific practice,
- Writing a substantial mathematical text,
- Presenting a concise exploration of the work in a talk.

**Calculation of student workload:**

810 h Exam preparation

90 h Preparation / follow-up work

**Are there optional courses in the modules?**

no

**Language(s) of instruction:**

English

**Responsible for the module:**

Dr. Ingolf Schäfer

**Frequency:**

each semester

**Duration:**

1 semester[s]

**The module is valid since / The module is valid until:**

WiSe 23/24 / -

**Credit points / Workload:**

30 / 900 hours

**Module examinations**

**Module examination:** Master Thesis

**Type of examination:** combination exam

**Form of examination:**

Master Thesis

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (The Master's thesis is written in English. The examination board may allow other languages upon request.)

**Module examination:** Colloquium

**Type of examination:** combination exam

**Form of examination:**

Colloquium

**The examination is ungraded?**

no

**Number of graded components / ungraded components / prerequisites of the examination:**

1 / - / -

**Language(s) of instruction:**

Englisch / German (The Master's thesis is written in English. The examination board may allow other languages upon request.)

## Module courses

**Course:** Master Thesis incl. Colloquium

**Frequency:**

each semester

**Language(s) of instruction:**

Englisch

**Contact hours:**

-

**University teacher:**

Lecturers from Mathematics

**Teaching method(s):**

**Associated module examination:**

Colloquium

Master Thesis