Annex SFB

Studienfachbeschreibung (subject description, SFB) for the subject Mathematical Physics as a Bachelor’s with 1 major with the Degree (180 ECTS credits)

Responsible: Faculty of Physics and Astronomy
Responsible: Institute of Mathematics

Examination regulations version: 2012
Examination regulations version: 2012

Abbreviations used:
- Course types: \( E \) = field trip, \( K \) = colloquium, \( O \) = conversatorium, \( P \) = placement/lab course, \( R \) = project, \( S \) = seminar, \( T \) = tutorial, \( Ü \) = exercise, \( V \) = lecture
- Term: \( SS \) = summer semester, \( WS \) = winter semester
- Methods of grading: \( \text{NUM} \) = numerical grade, \( B/NB \) = (not) successfully completed
- Regulations: \( \text{(L)ASPO} \) = general academic and examination regulations (for teaching-degree programmes), \( \text{FSB} \) = subject-specific provisions, \( \text{SFB} \) = list of modules
- Other: \( A \) = thesis, \( LV \) = course(s), \( PL \) = assessment(s), \( TN \) = participants, \( VL \) = prerequisite(s)

Conventions for the modules in this SFB:
- Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Information on assessment procedures:
- Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.
- Should a module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.
- Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.
In accordance with the general regulations governing the degree subject described in this module catalogue:

**ASPO2009**

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

**25-Oct-2012 (2012-170)**

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

Every module will be described using the following form:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th><strong>Module title</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td><strong>Method of assessment</strong></td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td>Only after successful completion of if applicable</td>
</tr>
<tr>
<td><strong>Other prerequisites</strong></td>
<td>if applicable</td>
</tr>
<tr>
<td><strong>Participants and allocation of places</strong></td>
<td>if applicable</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td>if applicable</td>
</tr>
<tr>
<td><strong>Referred to in LPO I</strong></td>
<td>if applicable (examination regulations for teaching-degree programmes)</td>
</tr>
</tbody>
</table>

Bachelor's with 1 major Mathematical Physics (2012)
### Mathematics (69 ECTS credits)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-M-ANA-1-122: V + Ü</td>
<td>2 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

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

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

### Method of assessment

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

#### Assessment in module component 10-M-ANA-1-122: Analysis 1
- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

#### Assessment in module component 10-M-ANA-2-122: Analysis 2
- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

#### Assessment in module component 10-M-ANA-P-122: Examination in Analysis
- 4 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-ANA-1 and 10-M-ANA-2
- Language of assessment: German, English if agreed upon with the examiner

### Other prerequisites

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

Referred to in LPO I § 73 (1) 1. Mathematik Analysis
<table>
<thead>
<tr>
<th>Courses</th>
<th>Method of assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>This module comprises 3 module components. Information on courses will be listed separately for each module component.</td>
<td>Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</td>
</tr>
<tr>
<td>• 10-M-LNA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>Assessment in module component 10-M-LNA-1-122: Linear Algebra 1 Linear Algebra 1</td>
</tr>
<tr>
<td>• 10-M-LNA-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>• 8 ECTS, Method of grading: (not) successfully completed</td>
</tr>
<tr>
<td>• 10-M-LNA-P-122: M (no information on SWS (weekly contact hours) and course language available)</td>
<td>• written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.</td>
</tr>
<tr>
<td>• 10-M-LNA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>• Language of assessment: German, English if agreed upon with the examiner</td>
</tr>
<tr>
<td>• 10-M-LNA-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>• Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
</tr>
<tr>
<td>• 10-M-LNA-P-122: M (no information on SWS (weekly contact hours) and course language available)</td>
<td>Assessment in module component 10-M-LNA-2-122: Linear Algebra 2 Linear Algebra 2</td>
</tr>
<tr>
<td>• 10-M-LNA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>• 8 ECTS, Method of grading: (not) successfully completed</td>
</tr>
<tr>
<td>• 10-M-LNA-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>• written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.</td>
</tr>
<tr>
<td>• 10-M-LNA-P-122: M (no information on SWS (weekly contact hours) and course language available)</td>
<td>• Language of assessment: German, English if agreed upon with the examiner</td>
</tr>
<tr>
<td>• 10-M-LNA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td>• Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
</tr>
<tr>
<td>Assessment in module component 10-M-LNA-P-122: Examination in Linear Algebra</td>
<td>Assessment in module component 10-M-LNA-P-122: Examination in Linear Algebra</td>
</tr>
<tr>
<td>• 4 ECTS, Method of grading: numerical grade</td>
<td>• 4 ECTS, Method of grading: numerical grade</td>
</tr>
<tr>
<td>• oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-LNA-1 and 10-M-LNA-2</td>
<td>• oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-LNA-1 and 10-M-LNA-2</td>
</tr>
<tr>
<td>• Language of assessment: German, English if agreed upon with the examiner</td>
<td>• Language of assessment: German, English if agreed upon with the examiner</td>
</tr>
<tr>
<td>• Only after successful completion of module components: Successful completion of the written examination in any one of the other two module components is a prerequisite for participation in module component 10-M-LNA-P.</td>
<td>• Only after successful completion of module components: Successful completion of the written examination in any one of the other two module components is a prerequisite for participation in module component 10-M-LNA-P.</td>
</tr>
</tbody>
</table>

other prerequisites | By way of exception, additional prerequisites are listed in the section on assessments.
Mathematics in Mathematical Physics

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
<th>undergraduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

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

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

Method of assessment

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

Assessment in module component 10-M-MMP-2-122: Mathematical Methods in Physics 2
- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-MMP-1-122: Mathematics in Mathematical Physics 1
- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-MMP-P-122: Examination in Mathematics in Mathematical Physics
- 4 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-MMP-1 and 10-M-MMP-2
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of the written examination in any of the other two module components is a prerequisite for participation in module component 10-M-MMP-P.

Additional Information

- 10-M-MMP-2-122: Additional information on module duration: 1 to 2 semesters.
- 10-M-MMP-1-122: --
- 10-M-MMP-P-122: --
### Advanced Analysis

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

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

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

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

### Physics (61 ECTS credits)

For students interested in participating in the FOKUS programme, module 11-TQM-F will replace module 11-TQM. Module component 11-TQM-F-2, which will prepare students for studying in the Master's programme FOKUS Physik (FOKUS Physics), will be offered in the form of a block course between the lecture periods of the winter and summer semesters (for students who took up studies in winter semester, block course will be offered between third and fourth subject semester).

### Classical Physics (Mechanics, Thermodynamics, Waves, Oscillations, Electricity, Magnetism and Optics)

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>2 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

**Courses**
- Klassische Physik 1 (Mechanik, Wellen, Wärme) (Classical Physics 1 (Mechanics, Waves, Heat)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester)
- Klassische Physik 2 (Elektromagnetismus, Optik) (Classical Physics 2 (Electromagnetism, Optics)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)

**Method of assessment**
- This module has the following assessment components
  1. Topics covered in lectures and exercises in part 1 (Klassische Physik 1 (Classical Physics 1)): written examination (approx. 120 minutes).
  2. Topics covered in lectures and exercises in part 2 (Klassische Physik 2 (Classical Physics 2)): written examination (approx. 120 minutes).
  3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).

- Assessment component 3 will be offered in German; English if agreed upon with examiner(s).
- Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.
- To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Klassische Physik 1 (Classical Physics 1) and Klassische Physik 2 (Classical Physics 2). The topics discussed in these two courses will be covered in assessment component 3.
- Students must register for assessment components 1 through 3 online (details to be announced).
- To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.

**Other prerequisites**
- Bridge course Mathematische Rechenmethoden der Physik (Mathematical Methods of Physics) for first-semester students.
<table>
<thead>
<tr>
<th>Lab Course A</th>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>1 semester</td>
<td>(not) successfully completed</td>
<td>undergraduate</td>
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<tr>
<td>Courses</td>
<td></td>
<td></td>
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<tr>
<td>Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis): V (1 weekly contact hour) + Ü (1 weekly contact hour), once a year (winter semester)</td>
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<tr>
<td>Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity, BAM): P (2 weekly contact hours)</td>
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<tr>
<td>Method of assessment</td>
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<tr>
<td>This module has the following assessment components</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Topics covered in lectures and exercises: written examination (approx. 120 minutes)</td>
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<tr>
<td>2. Lab course: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).</td>
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</tr>
<tr>
<td>Successful completion of approx. 50% of practice work is a prerequisite for admission to assessment component 1. To pass assessment component 2, students must pass both elements a) and b). Students will be offered one opportunity to retake element a) and/or element b). Students must register for assessment components 1 and 2 online (details to be announced). Students must attend Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis) before attending Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity). To pass this module, students must pass both assessment component 1 and assessment component 2.</td>
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</tbody>
</table>

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

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

### Students must register for assessment components 1 and 2 online (details to be announced).

### Students must attend Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis) before attending Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity).

### To pass this module, students must pass both assessment component 1 and assessment component 2.

### Referred to in LPO I

| § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie |
| § 53 (1) 1. c) Physik physikalische Grundpraktika |
| § 77 (1) 1. a) Physik "Grundlagen der Experimentalphysik" |
| § 77 (1) 1. d) Physik "physikalische Praktika" |

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<table>
<thead>
<tr>
<th>Laboratory Course Mathematical Physics B</th>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>1 semester</td>
<td>(not) successfully completed</td>
<td>undergraduate</td>
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<tr>
<td>Courses</td>
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<td></td>
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<td></td>
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<tr>
<td>P (no information on SWS (weekly contact hours) and course language available)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of assessment</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>a) Preparing, performing and evaluating (lab report) the experiments will be considered successfully completed if a Testat (exam) is passed. And b) talk (with discussion; approx. 30 minutes) to test the candidate's understanding of the physics-related contents of the module component. Talks that were not successfully completed can be repeated once. Both components of the assessment have to be successfully completed.</td>
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### Additional Information
Additional information on module duration: 1 to 2 semesters.

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<table>
<thead>
<tr>
<th>Advanced Laboratory Course Mathematical Physics C</th>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>1 semester</td>
<td>(not) successfully completed</td>
<td>undergraduate</td>
</tr>
<tr>
<td>Courses</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>P (no information on SWS (weekly contact hours) and course language available)</td>
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</tr>
<tr>
<td>Method of assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Preparing, performing and evaluating (lab report) the experiments will be considered successfully completed if a Testat (exam) is passed. And b) talk (with discussion; approx. 30 minutes) to test the candidate's understanding of the physics-related contents of the module component. Talks that were not successfully completed can be repeated once. Both components of the assessment have to be successfully completed.</td>
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</table>

### Additional Information
Additional information on module duration: 1 to 2 semesters.
<table>
<thead>
<tr>
<th>11-STE-092-m01</th>
<th><strong>Statistical Mechanics, Thermodynamics and Electrodynamics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>2 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong></td>
<td>numerical grade</td>
</tr>
<tr>
<td><strong>Modul level</strong></td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

**Courses**
- **Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics):** V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester)
- **Theoretische Elektrodynamik (Theoretical Electrodynamics):** V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)

**Method of assessment**
This module has the following assessment components
1. Topics covered in lectures and exercises in part 1 (Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics)): written examination (approx. 120 minutes).
2. Topics covered in lectures and exercises in part 2 (Theoretische Elektrodynamik (Theoretical Electrodynamics)): written examination (approx. 120 minutes).
3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).

Assessment component 3 will be offered in German; English if agreed upon with examiner(s).
Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.
Students are highly recommended to attend both courses Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics) and Theoretische Elektrodynamik (Theoretical Electrodynamics). The topics discussed in these two courses will be covered in assessment component 3.
Students must register for assessment components 1 through 3 online (details to be announced).

To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.

**other prerequisites**
- 10-M1-PHY and 10-M2-PHY or 10-M1-NST and 10-M2-NST
<table>
<thead>
<tr>
<th>11-TQM-092-m01</th>
<th><strong>Theoretical Mechanics and Quantum Mechanics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>2 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong></td>
<td>numerical grade</td>
</tr>
<tr>
<td><strong>Modul level</strong></td>
<td>undergraduate</td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td>Theoretische Mechanik (Theoretical Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester)</td>
</tr>
<tr>
<td></td>
<td>Quantenmechanik (Quantum Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)</td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td>This module has the following assessment components</td>
</tr>
<tr>
<td></td>
<td>1. Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): written examination (approx. 120 minutes).</td>
</tr>
<tr>
<td></td>
<td>2. Topics covered in lectures and exercises in part 2 (Quantenmechanik (Quantum Mechanics)): written examination (approx. 120 minutes).</td>
</tr>
<tr>
<td></td>
<td>3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).</td>
</tr>
<tr>
<td></td>
<td>Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.</td>
</tr>
<tr>
<td></td>
<td>To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Mechanik (Theoretical Mechanics) and Quantenmechanik (Quantum Mechanics). The topics discussed in these two courses will be covered in assessment component 3.</td>
</tr>
<tr>
<td></td>
<td>Students must register for assessment components 1 through 3 online (details to be announced).</td>
</tr>
<tr>
<td></td>
<td>To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.</td>
</tr>
<tr>
<td><strong>other prerequisites</strong></td>
<td>10-M1-PHY, 10-M2-PHY and 11-MPI-3 or 10-M1-NST, 10-M2-NST and MPI-3</td>
</tr>
<tr>
<td>ECTS</td>
<td>16</td>
</tr>
<tr>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td></td>
</tr>
<tr>
<td>Theoretische Mechanik (Theoretical Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester)</td>
<td></td>
</tr>
<tr>
<td>Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students): V (4 weekly contact hours) + Ü (2 weekly contact hours) + T (1 weekly contact hour), once a year (block taught during semester break between summer and winter semester)</td>
<td></td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td></td>
</tr>
<tr>
<td>This module has the following assessment components</td>
<td></td>
</tr>
<tr>
<td>1. Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): written examination (approx. 120 minutes).</td>
<td></td>
</tr>
<tr>
<td>2. Topics covered in lectures and exercises in part 2 (Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students)): written examination (approx. 120 minutes).</td>
<td></td>
</tr>
<tr>
<td>3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).</td>
<td></td>
</tr>
<tr>
<td>Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Mechanik (Theoretical Mechanics) and Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.</td>
<td></td>
</tr>
<tr>
<td><strong>Modules successfully completed</strong></td>
<td></td>
</tr>
<tr>
<td>10-M-PHY1 and 10-M-PHY2 or 10-M-NST1 and 10-M-NST2 and 11-TQM-1, 11-KP</td>
<td></td>
</tr>
<tr>
<td><strong>Additional Information</strong></td>
<td></td>
</tr>
<tr>
<td>Students who intend to study the FOKUS Master's degree programme must take Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students) instead of Quantenmechanik (Quantum Mechanics).</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Compulsory Electives (20 ECTS credits)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Computational Mathematics</strong></td>
<td></td>
</tr>
<tr>
<td>ECTS</td>
<td>4</td>
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<tr>
<td>Courses</td>
<td>V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
</tr>
<tr>
<td>Method of assessment</td>
<td>project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course)</td>
</tr>
<tr>
<td>other prerequisites</td>
<td>Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
</tr>
<tr>
<td>ECTS</td>
<td>10</td>
</tr>
<tr>
<td>------</td>
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</tr>
</tbody>
</table>

### Courses
- This module has 8 components; information on courses listed separately for each component.
  - 10-M-NUM-1-122, 10-M-STO-1-122, 10-M-ALG-1-122, 10-M-DGE-1-122, 10-M-GAN-1-122, 10-M-DIM-1-122, and 10-M-FAN-1-122: V + Ü (no information on language and number of weekly contact hours available)
  - 10-M-ERP-P-122: M (no information on language and number of weekly contact hours available)

### Method of assessment
- This module has the following 8 assessment components. To pass this module, students must pass one out of the 7 assessment components that are first in the list below and the assessment component that is last in the list below.

  - 8 ECTS credits, pass / fail
  - written examination (approx. 90 to 180 minutes). If announced by the lecturer, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 30 minutes). The module component will also be considered successfully completed if it is selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination is passed.
  - Language of assessment: German; English if agreed upon with examiner(s)
  - Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

**Assessment in module component 10-M-ERP-P-122:** Prüfung in Ergänzung Mathematik für Mathematische Physik (Assessment in Selected Topics from Mathematics for Mathematical Physics)
  - 2 ECTS credits, numerical grading
  - oral examination of one candidate each (approx. 30 minutes). Assessment will have reference to the topics covered in the module component selected by students.
  - Language of assessment: German; English if agreed upon with examiner(s)
  - Only after successful completion of module components: Module component 10-M-ERP-P can only be taken by students who passed the written examination in one of the other seven module components.

**other prerequisites**
- By way of exception, additional prerequisites are listed in the section on assessments.

**Additional Information**
- Additional information on module duration: 1 to 2 semesters.
| Courses | This module has 8 components; information on courses listed separately for each component.  
- 10-M-NUM-1-122, 10-M-STO-1-122, 10-M-ALG-1-122, 10-M-DGE-1-122, 10-M-GAN-1-122, 10-M-DIM-1-122, and 10-M-FAN-1-122: V + Ü (no information on language and number of weekly contact hours available)  
- 10-M-ERP-P-122: M (no information on language and number of weekly contact hours available) |
| Method of assessment | This module has the following 8 assessment components. To pass this module, students must select two out of the 7 assessment components that are first in the list below and pass one of them, furthermore they must pass the assessment component that is last in the list below.  
**Assessment in module component 10-M-NUM-1-122:** Numerische Mathematik 1 (Numerical Mathematics 1),  
**in module component 10-M-STO-1-122:** Stochastik 1 (Stochastics 1),  
**in module component 10-M-ALG-1-122:** Einführung in die Algebra (Introduction to Algebra),  
**in module component 10-M-DGE-1-122:** Einführung in die Differentialgeometrie (Introduction to Differential Geometry),  
**in module component 10-M-GAN-1-122:** Geometrische Analysis (Geometric Analysis),  
**in module component 10-M-DIM-1-122:** Einführung in die Diskrete Mathematik (Introduction to Discrete Mathematics), and  
**in module component 10-M-FAN-1-122:** Einführung in die Funktionalanalyse (Introduction to Functional Analysis):  
- 8 ECTS credits, pass / fail  
- written examination (approx. 90 to 180 minutes). If announced by the lecturer, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 30 minutes). The module component will also be considered successfully completed if it is selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination is passed.  
- Language of assessment: German; English if agreed upon with examiner(s)  
- Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.  
**Assessment in module component 10-M-EWP-P-122:** Prüfung in Erweiterung Mathematik für Mathematische Physik (Assessment in Further Topics from Mathematics for Mathematical Physics)  
- 4 ECTS credits, numerical grading  
- oral examination of one candidate each (approx. 30 minutes). Assessment will have reference to the topics covered in the two module components selected by students.  
- Language of assessment: German; English if agreed upon with examiner(s)  
- Only after successful completion of module components: Module component 10-M-EWP-P can only be taken by students who passed the written examination in one of the other seven module components. |
### Modelling and Computational Science

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

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

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

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

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

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### Seminar Mathematics

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1 semester</td>
<td>(not) successfully completed</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

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

**Method of assessment**: talk (approx. 60 to 180 minutes)

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

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

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### Physics

**Astrophysics**

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

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

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

**Other prerequisites**: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

**Participants and allocation of places**: Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.
<table>
<thead>
<tr>
<th>11-AKM-092-m01</th>
<th><strong>Cosmology</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>1 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong></td>
<td>numerical grade</td>
</tr>
<tr>
<td><strong>Modul level</strong></td>
<td>graduate</td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td>R + V (no information on SWS (weekly contact hours) and course language available)</td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td>a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)</td>
</tr>
<tr>
<td><strong>Assessment offered:</strong></td>
<td>When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.</td>
</tr>
<tr>
<td><strong>Language of assessment:</strong></td>
<td>German, English</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11-APL-092-m01</th>
<th><strong>Plasma-Astrophysics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>1 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong></td>
<td>numerical grade</td>
</tr>
<tr>
<td><strong>Modul level</strong></td>
<td>graduate</td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td>R + V (no information on SWS (weekly contact hours) and course language available)</td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td>a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)</td>
</tr>
<tr>
<td><strong>Assessment offered:</strong></td>
<td>When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.</td>
</tr>
<tr>
<td><strong>Language of assessment:</strong></td>
<td>German, English</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11-AST-092-m01</th>
<th><strong>Theoretical Astrophysics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>1 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong></td>
<td>numerical grade</td>
</tr>
<tr>
<td><strong>Modul level</strong></td>
<td>graduate</td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td>R + V (no information on SWS (weekly contact hours) and course language available)</td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td>written examination (approx. 120 minutes)</td>
</tr>
</tbody>
</table>
Introduction to Plasmaphysics

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>graduate</td>
</tr>
<tr>
<td></td>
<td>V + R (no information on SWS (weekly contact hours) and course language available)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Details:**

- **Courses:** V + R (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment:**
  - a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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

**Language of assessment:** German, English

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

Solid State Physics 1

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
<tr>
<td></td>
<td>V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Details:**

- **Courses:** V + Ü (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment:**
  - written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise specified)

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

**Other Prerequisites:**
Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
<table>
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<tr>
<th>11-GRT-092-m01</th>
<th><strong>Group Theory</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>1 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong></td>
<td>numerical grade</td>
</tr>
<tr>
<td><strong>Modul level</strong></td>
<td>graduate</td>
</tr>
<tr>
<td><strong>Courses</strong></td>
<td>R + V (no information on SWS (weekly contact hours) and course language available)</td>
</tr>
<tr>
<td><strong>Method of assessment</strong></td>
<td>a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)</td>
</tr>
<tr>
<td><strong>Assessment offered</strong></td>
<td>Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.</td>
</tr>
<tr>
<td><strong>Language of assessment</strong></td>
<td>German, English</td>
</tr>
<tr>
<td><strong>other prerequisites</strong></td>
<td>Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
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<tr>
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<th><strong>Nuclear and Elementary Particle Physics</strong></th>
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<tr>
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<td><strong>Modul level</strong></td>
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<td>V + Ü (no information on SWS (weekly contact hours) and course language available)</td>
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<tr>
<td><strong>Method of assessment</strong></td>
<td>written examination (approx. 120 minutes)</td>
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<tr>
<td><strong>other prerequisites</strong></td>
<td>Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
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### Condensed Matter (Quanta, Atoms, Molecules, Solid State Physics)

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#### Courses

- **Kondensierte Materie 1 (Quanten, Atome, Moleküle)** (Condensed Matter 1 (Quanta, Atoms, Molecules)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester)
- **Kondensierte Materie 2 (Festkörperphysik 1)** (Condensed Matter 2 (Solid State Physics)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)

#### Method of assessment

This module has the following assessment components:

1. Topics covered in lectures and exercises in part 1 (Kondensierte Materie 1 (Condensed Matter 1)): written examination (approx. 120 minutes).
2. Topics covered in lectures and exercises in part 2 (Kondensierte Materie 2 (Condensed Matter 2)): written examination (approx. 120 minutes).
3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).

Assessment component 3 will be offered in German; English if agreed upon with examiner(s).

Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.

To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Kondensierte Materie 1 (Condensed Matter 1) and Kondensierte Materie 2 (Condensed Matter 2). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced).

To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.

### Computational Astrophysics

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<th>Module level</th>
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</tbody>
</table>

#### Courses

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

#### Method of assessment

- a) written examination (approx. 120 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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

Language of assessment: German, English

#### Other prerequisites

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

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<th>Modul level</th>
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<td>numerical grade</td>
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**Courses**

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

**Method of assessment**

- a) written examination (approx. 90 minutes) or
- b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or
- c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or
d) presentation/seminar presentation (approx. 30 minutes)

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

Language of assessment: German, English

**Other prerequisites**

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

### Quanta, Atoms, Molecules

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<td>numerical grade</td>
<td>undergraduate</td>
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**Courses**

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

**Method of assessment**

- written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise specified)

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

**Other prerequisites**

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<td>1 semester</td>
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<td><strong>Method of grading</strong></td>
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<td><strong>Courses</strong></td>
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<td><strong>Language of assessment:</strong></td>
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### Quantum Mechanics II

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

**Method of assessment**
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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

**Language of assessment:** German, English

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

### Many Body Quantum Theory

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

**Method of assessment**
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

**Assessment offered:**
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**Language of assessment:** German, English

**other prerequisites**
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### Renormalization Group Methods in Field Theory

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- **Courses**: V + R (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment**: a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)
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- **Language of assessment**: German, English
- **other prerequisites**: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

### Relativistic Effects in Mesoscopic Systems

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- **Courses**: R + V (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment**: a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)
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### Renormalization Theory

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

Method of assessment:
- a) written examination (approx. 90 minutes) or
- b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or
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Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.

Language of assessment: German, English

Other prerequisites:
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### Relativistic Quantumfield Theory

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

Method of assessment:
- a) written examination (approx. 90 minutes) or
- b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or
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Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.

Language of assessment: German, English

Other prerequisites:
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### Theory of Relativity

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#### Courses

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

#### Method of assessment

- a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

#### Assessment offered:

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Language of assessment: German, English

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### Statistics, Data Analysis and Computer Physics

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#### Courses

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

#### Method of assessment

- a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

#### Assessment offered:

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

Language of assessment: German, English

#### Other prerequisites

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### Supersymmetry I and II

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<tr>
<td>6</td>
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</table>

**Courses**

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

**Method of assessment**

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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

Language of assessment: German, English

**other prerequisites**

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### Theoretical Elementary Particle Physics

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**Courses**

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

**Method of assessment**

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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Language of assessment: German, English

**other prerequisites**

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</tr>
<tr>
<td><strong>Assessment offered:</strong> When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.</td>
<td></td>
</tr>
<tr>
<td><strong>Language of assessment:</strong> German, English</td>
<td></td>
</tr>
<tr>
<td><strong>other prerequisites</strong> Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11-TPS-092-m01</th>
<th><strong>Particle Physics (Standard Model)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong> 8</td>
<td><strong>Duration</strong> 1 semester</td>
</tr>
<tr>
<td><strong>Method of grading</strong> numerical grade</td>
<td><strong>Modul level</strong> graduate</td>
</tr>
<tr>
<td><strong>Courses</strong> R + V (no information on SWS (weekly contact hours) and course language available)</td>
<td></td>
</tr>
<tr>
<td><strong>Method of assessment</strong> a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)</td>
<td></td>
</tr>
<tr>
<td><strong>Assessment offered:</strong> When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.</td>
<td></td>
</tr>
<tr>
<td><strong>Language of assessment:</strong> German, English</td>
<td></td>
</tr>
<tr>
<td><strong>other prerequisites</strong> Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>11-TSL-092-m01</td>
<td>Theory of Superconduction</td>
</tr>
<tr>
<td>11-BXMP5-122-m01</td>
<td>Current Topics of Mathematical Physics</td>
</tr>
<tr>
<td>11-BXMP6-122-m01</td>
<td>Current Topics of Mathematical Physics</td>
</tr>
<tr>
<td>11-BXMP8-122-m01</td>
<td>Current Topics of Mathematical Physics</td>
</tr>
</tbody>
</table>

Other Prerequisites:
Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
### Thesis (10 ECTS credits)

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
<th>Subject-specific Key Skills (15-17 ECTS credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
<td>10-M-MDA and 11-SMP must be taken.</td>
</tr>
</tbody>
</table>

#### Courses

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

#### Method of assessment

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

####other prerequisites

- Registration for assessment: as specified.

---

### Subject-specific Key Skills (15-17 ECTS credits)

#### 10-M-MDA-122-m01

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
<th>Introduction into mathematical thinking and working</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1 semester</td>
<td>(not) successfully completed</td>
<td>undergraduate</td>
<td>This module comprises 2 module components. Information on courses will be listed separately for each module component.</td>
</tr>
</tbody>
</table>

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

#### Method of assessment

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

#### Assessment in module component 10-M-MDA-1-122: Basic Notions and Methods of Mathematical Reasoning

- 2 ECTS, Method of grading: (not) successfully completed
- project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

#### Assessment in module component 10-M-MDA-2-122: Reasoning and Writing in Mathematics

- 2 ECTS, Method of grading: (not) successfully completed
- project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

####other prerequisites

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

#### Referred to in LPO I

- § 73 (1) 5. Mathematik Angewandte Mathematik
### Programming course for students of Mathematics and other subjects

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1 semester</td>
<td>(not) successfully completed</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

- **Courses**: P (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment**: project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course)
  Language of assessment: German, English if agreed upon with the examiner
- **other prerequisites**: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

### Seminar Mathematical Physics

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

- **Courses**: S (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment**: talk with discussion (approx. 60 minutes)
  Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.
  Language of assessment: German, English if agreed upon with the examiner
- **other prerequisites**: Admission prerequisite to assessment: regular attendance and successful preparation of seminar presentation.

### Computational Physics

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Duration</th>
<th>Method of grading</th>
<th>Modul level</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1 semester</td>
<td>numerical grade</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

- **Courses**: V + Ü (no information on SWS (weekly contact hours) and course language available)
- **Method of assessment**: written examination (approx. 120 minutes)
  Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.
- **other prerequisites**: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
- **Participants and allocation of places**: Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.
<table>
<thead>
<tr>
<th>Courses</th>
<th>Method of assessment</th>
<th>Referred to in LPO I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematical Rechenmethoden 1 (Mathematical Methods 1): V (2 weekly contact hours) + Ü (1 weekly contact hour), once a year (winter semester)</td>
<td>This module has the following assessment components 1. Topics covered in lectures and exercises in part 1 (Mathematische Rechenmethoden 1 (Mathematical Methods 1)): exercises or talk (approx. 15 minutes, usually chosen) or written examination (approx. 60 minutes) 2. Topics covered in lectures and exercises in part 2 (Mathematische Rechenmethoden 2 (Mathematical Methods 2)): exercises or talk (approx. 15 minutes, usually chosen) or written examination (approx. 60 minutes) Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. Students must register for assessment components 1 and 2 online (details to be announced). To pass this module, students must pass both assessment component 1 and assessment component 2.</td>
<td>§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie § 77 (1) 1. a) Physik &quot;Grundlagen der Experimentalphysik&quot;</td>
</tr>
</tbody>
</table>