

Module Catalogue

for the Subject

Mathematical Physics

as a Bachelor's with 1 major with the degree "Bachelor of Science" (180 ECTS credits)

Examination regulations version: 2009 Responsible: Institute of Mathematics Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82|b55|-|-|H|2009

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The subject is divided into

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Content and Objectives of the Programme

The Bachelor programme in Mathematical Physics is offered by the Department of Mathematics, jointly with the Faculty of Physics and Astronomy, with a total of currently (SS 2010) 9 resp. 13 chairs.

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

Through the course these skills which the students acquire provide the basic knowledge required for analyzing and solving subsequently the various problems they encounter, and in particular for obtaining a consecutive Bachelor-Masters degree. Therefore, the main emphasis is put on the comprehension of fundamental mathematical and physical notions and principles, the knowledge of a variety of methods, the development of analytical reasoning and abstraction, and the capacity of a qualitative understanding of complex structural interconnections, rather than a detailed quantitative knowledge of many facts in mathematics and physics.

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

The exam should ascertain whether the candidate overlooks the context of the basics in mathematical physics and possesses the ability to apply the corresponding scientific methods. The exam should lead to an internationally comparable degree in mathematical physics and provides the means for entry into the working world. In the framework of a consecutive Bachelor-Masters degree it may also be used as preparation for further Masters study.

Abbreviations used

Course types: \mathbf{E} = field trip, \mathbf{K} = colloquium, \mathbf{O} = conversatorium, \mathbf{P} = placement/lab course, \mathbf{R} = project, \mathbf{S} = seminar, \mathbf{T} = tutorial, $\ddot{\mathbf{U}}$ = exercise, \mathbf{V} = lecture

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASP02009

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

20-Jan-2011 (2011-12)

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



Compulsory Courses

(118 ECTS credits)



Mathematics (59 ECTS credits)

Bachelor's with 1 major Mathematical Physics (2009)

| Module title | | | Abbreviation | | | |
|--|-------------------|--|------------------------------|--|---|--|
| Propaedeutics of Mathematics | | | | 10-M-PPM-082-m01 | | |
| Module coordinator | | | | Module offered by | | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | atics | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | |
| 2 | (not) s | successfully completed | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | | Admission prerequisite to assessment: regular attendance of courses (as specified at the beginning of the course). | | |
| Conten | ts | | | | | |
| | | proof methods and quest g. by reference to its histo | | | es of abstract concepts of ma- c and deduction. | |
| Intende | ed lear | ning outcomes | | | | |
| | asy mat | | | | nematics. He/She is able to per- y and reasonably in written and | |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | | |
| V + Ü (r | no infoi | mation on SWS (weekly o | contact hours) and co | urse language avail | able) | |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether | |
| Assess | ment o | ments (type and expend ffered: once a year, winte ssessment: German, Eng | er semester | | r at the beginning of the course) | |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | | |
| | | | | | | |
| Module appears in | | | | | | |
| | | ree (1 major) Mathematic | s (2008) | | | |
| | - | ree (1 major) Economathe | | | | |
| | - | ree (1 major) Economathe | | | | |
| | - | ree (1 major) Mathematic | • • |) | | |
| | - | ree (1 major) Computatio gree (1 major, 1 minor) Ma | | • | | |
| | | | | | | |
| First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | | | |

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|---|---|---|---|---|--|--|
| Module title | | | | | Abbreviation | |
| Analysi | s | | | | 10-M-ANA-082-m01 | |
| Module | coord | inator | | Module offered by | | |
| Dean of Studies Mathematik (Mathematics) | | | atics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | |
| 17 | nume | rical grade | | | | |
| Duratio | | Module level | Other prerequisites | | | |
| 2 seme | | undergraduate | | f exception, additional prerequisites are listed in the section on | | |
| Conten | ts | | | | | |
| ries, po | wer se | ries, Taylor series, funda | mental calculus in on | e and several variab | ivergence of sequences and se- ples (including inverse and impli- ntegral and improper integrals). | |
| Intende | ed lear | ning outcomes | | | | |
| mathen | natical | arguments and present t | hem adequately in w | ritten and oral form. | He/She is able to perform easy . He/She is acquainted with the geometric interpretation. | |
| Courses | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | | |
| component. 10-M-ANA-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available) 10-M-ANA-2-082: V + Ü (no information on SWS (weekly contact hours) and course language available) 10-M-ANA-P-082: M (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether | | | | | | |
| | | le for bonus) | | | | |
| | less st | ated otherwise, successf | | | e components as specified be- successful completion of all indi- | |
| 8 a) (a) (a) 0 Assession 7 a) (a) <!--</td--><td>ECTS,) writte approx anguag ther pr ment in ECTS,) writte approx anguag ther pr ent 10- ment in ECTS, ral exa anguag nly aft ule cor</td><td>20 minutes) or c) oral ex ge of assessment: Germa rerequisites: Modules 10- n module component 10- Method of grading: (not) n examination (approx. 9 . 20 minutes) or c) oral ex ge of assessment: Germa rerequisites: Modules 10- M-ANA-1 is recommende n module component 10- Method of grading: nume mination of one candidat ge of assessment: Germa er successful completion</td><td>successfully complete o minutes; usually ch kamination in groups n, English if agreed u M-VKM and 10-M-PPI M-ANA-2-082: Analys successfully complete o minutes; usually ch kamination in groups n, English if agreed u -M-VKM and 10-M-PP d for module compor M-ANA-P-082: Exami erical grade te each (approx. 30 m n, English if agreed u o f module compone D-M-ANL-1, 10-M-ANA-</td><td>ted (groups of 2, approx pon with the examin M are recommended sis 2 Analysis 2 ted (groups of 2, approx pon with the examin M are recommended nent 10-M-ANA-2. nation in Analysis ninutes) pon with the examinents: Successful con</td><th>ner l. nination of one candidate each x. 30 minutes) ner d; in addition, module compo-</th> | ECTS,) writte approx anguag ther pr ment in ECTS,) writte approx anguag ther pr ent 10- ment in ECTS, ral exa anguag nly aft ule cor | 20 minutes) or c) oral ex ge of assessment: Germa rerequisites: Modules 10- n module component 10- Method of grading: (not) n examination (approx. 9 . 20 minutes) or c) oral ex ge of assessment: Germa rerequisites: Modules 10- M-ANA-1 is recommende n module component 10- Method of grading: nume mination of one candidat ge of assessment: Germa er successful completion | successfully complete o minutes; usually ch kamination in groups n, English if agreed u M-VKM and 10-M-PPI M-ANA-2-082: Analys successfully complete o minutes; usually ch kamination in groups n, English if agreed u -M-VKM and 10-M-PP d for module compor M-ANA-P-082: Exami erical grade te each (approx. 30 m n, English if agreed u o f module compone D-M-ANL-1, 10-M-ANA- | ted (groups of 2, approx pon with the examin M are recommended sis 2 Analysis 2 ted (groups of 2, approx pon with the examin M are recommended nent 10-M-ANA-2. nation in Analysis ninutes) pon with the examinents: Successful con | ner l. nination of one candidate each x. 30 minutes) ner d; in addition, module compo- | |

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Allocation of places

Additional information

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Workload

--

Teaching cycle

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

§ 73 (1) 1. Mathematik Analysis

Module appears in

Bachelor' degree (1 major) Computer Science (2010)

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

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

| Modul | e title | | | | Abbreviation |
|--|---|---------------|---|-------------------|--------------|
| Linear Algebra | | | | 10-M-LNA-082-m01 | |
| Modul | e coord | inator | | Module offered by | |
| Dean of Studies Mathematik (Mathematics) | | atics) | Institute of Mathem | natics | |
| ECTS | S Method of grading Only after succ. compl. of module(s | | npl. of module(s) | | |
| 14 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 2 seme | ester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. | | |
| <u> </u> | | | | | |

Contents

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

Intended learning outcomes

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

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

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

- 10-M-LNA-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-2-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-P-082: M (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 10-M-LNA-1-082: Linear Algebra 1 Linear Algebra 1

- 7 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- 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-LNA-2-082: Linear Algebra 2 Linear Algebra 2

- 5 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner

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| (2009) | ta record Bachelor (180 ECTS) Mathematische Physik - 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.

Assessment in module component 10-M-LNA-P-082: Examination in Linear Algebra

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of module component 10-M-LNA-1 or module component 10-M-LNA-2 is a prerequisite for participation in module component 10-M-LNA-P.

Allocation of places

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Additional information

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Workload

--

Teaching cycle

--

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

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

Module appears in

Bachelor' degree (1 major) Computer Science (2010)

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

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

First state examination for the teaching degree Gymnasium Mathematics (2009)

| | tle | | | Abbreviation | |
|---|--|--|--|--|--|
| Ordinary Differential Equations and Complex Analysis 10-M-DFT-082-mo1 | | | | | |
| Module coordinator Modu | | | Module offered by | | |
| Dean of S | tudies Mathematik (M | athematics) | Institute of Mathem | natics | |
| ECTS M | lethod of grading | Only after succ. co | ompl. of module(s) | | |
| 13 n | umerical grade | | | | |
| Duration | Module level | Other prerequisit | es | | |
| 2 semeste | er undergraduate | By way of exception assessments. | of exception, additional prerequisites are listed in the section on | | |
| Contents | | | | | |
| ons, basic functions plex analy Intended | c notions in the qualita , meromorphic functio ysis, applications in co learning outcomes | ative theory of ordinary dif ns and conformal maps, b omputer science, physics, | ferential equations, ba basic proof methods in engineering science a | f nonlinear differential equati- asic properties of holomorphic differential equations and com- nd other fields of mathematics. heory of ordinary differential | |
| equations | and holomorphic fun | | nterconnect these con | cepts and realises the advanta- | |
| Courses (t | ype, number of weekly conta | ct hours, language — if other than (| German) | | |
| • 10-l • 10-l | M-DFT-1-082: V + Ü (no M-DFT-2-082: V + Ü (no | information on SWS (wee information on SWS (wee | | l course language available) | |
| Assessme low. Unles | f assessment (type, scopeditable for bonus) ent in this module com | prises the assessments ir | r contact hours) and co n, examination offered — if no n the individual modul | | |
| Assessme low. Unles vidual ass Assessme ons | f assessment (type, scop editable for bonus) ent in this module com ss stated otherwise, su sessments. ent in module compon | e, language — if other than Germa prises the assessments ir uccessful completion of th | r contact hours) and co n, examination offered — if no n the individual modul ne module will require nary Differential Equat | ourse language available) ot every semester, information on whether e components as specified be- | |

- 7 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

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|--|---|---------------|
| (2009) | ta record Bachelor (180 ECTS) Mathematische Physik - 2009 | |

- 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-DFT-P-082: Examination in Ordinary Differential Equations and Complex Analysis

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

Allocation of places

Additional information

--

Workload

--

Teaching cycle

--

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

§ 73 (1) 1. Mathematik Analysis

Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

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

First state examination for the teaching degree Gymnasium Mathematics (2009)

| Bachelor's with 1 major Mathematical Physics | |
|--|--|
| (2009) | |

| Module title | | | Abbreviation | | |
|---|--|---------------|---|-------------------|--|
| Geometric Analysis and Partial Differential Equations | | | 10-M-GAP-092-m01 | | |
| Module coordinator | | | | Module offered by | |
| Dean of Studies Mathematik (Mathematic | | atics) | Institute of Mathematics | | |
| ECTS | 5 Method of grading Only after succ. compl. of | | npl. of module(s) | | |
| 13 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 2 seme | ster | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments. | | |

Contents

Basics in analysis on manifolds, e. g. submanifolds and calculus of differential forms, Stoke's theorem and its applications in vector calculus and topology, examples of first order partial differential equations, existence and uniqueness theorems, basic equations in mathematical physics, boundary value theorems, maximum principle and Dirichlet problem.

Intended learning outcomes

The student knows and masters the basic notions and essential methods of vector analysis on manifolds and partial differential equations. He/She is able to perform mathematical arguments in this field independently, and can present them adequately in written and oral form. He/She is able to apply the central proof methods and concepts of geometric analysis and partial differential equations and knows about their analytic background.

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

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

- 10-M-GAP-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-GAP-2-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-GAP-P-092: M (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 10-M-GAP-1-092: Geometric Analysis Geometric Analysis

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

Assessment in module component 10-M-GAP-2-092: Partial Differential Equations Partial Differential Equations

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

Assessment in module component 10-M-GAP-P-092: Examination in Geometric Analysis and Partial Differential Equations

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

| Bachelor's with 1 major Mathematical Physics | JMU Würzburg • generated 26-Aug-2024 • exam. reg. da- | page 16 / 156 |
|--|---|---------------|
| (2009) | ta record Bachelor (180 ECTS) Mathematische Physik - 2009 | |

Allocation of places

Additional information

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Workload

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Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009)



Physics (59 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).

| Module title | | | Abbreviation | | | |
|--|---|--|--|--|--|---|
| Classical Physics (Mechanics, Thermodynamics, Waves, Oscillations, Electric | | | | | 11-KP-092-m01 | |
| ty, Mag | netism | and Optics) | | | | |
| Module | coord | inator | | Module offered by | | |
| Managi | ng Dire | ector of the Institute of A | pplied Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. com | npl. of module(s) | | |
| 16 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 2 seme | ster | undergraduate | - | ematische Rechenme sics) for first-semeste | ethoden der Physik (er students. | Mathemati- |
| Conten | ts | | | | | |
| gnetic v tion. Int Non-lin rent. Me | vibratio teractic earity a echanis | of mechanics, thermody ons and waves, radiation ons and central forces. G and chaos. Mechanics o sms of conduction. Mag ent. Electromagnetic way | and wave optics. Tim ieneral relativity. Mecl f non-rigid bodies. Ga netostatics. Electroma | e, room and motion hanics of rigid bodie sses. Thermodynami agnetic induction. Ma | . Physical values. For s. Friction. Vibration ics. Electrostatics. Electrostatics. | ce and mo- and waves. ectric cur- |
| Intende | ed learn | ning outcomes | · · · · · · | | | |
| ves, sci are able | ence o e to ap | understand the basic pri f electricity, magnetism, ply mathematical metho the solution of mathema | electromagnetic vibra ds to the formulation | ations and waves, ra | diation and wave op | tics. They |
| Course | 5 (type, n | umber of weekly contact hours, | language — if other than Ger | rman) | | |
| tact hou Klassis | urs) + Ü che Phy | ysik 1 (Mechanik, Weller İ (2 weekly contact hour ysik 2 (Elektromagnetisr) + Ü (2 weekly contact h | s), once a year (winter nus, Optik) (Classical | r semester) Physics 2 (Electroma | | |
| | | s essment (type, scope, langu le for bonus) | age — if other than German, e | examination offered — if no | t every semester, informatio | on on whether |
| 1. Topic on (a 2. Topic tion (3. Topic | s cove pprox. cs cove ápprox s cove | as the following assess red in lectures and exerce 120 minutes). red in lectures and exerce (, 120 minutes). red in lectures and exerce ually chosen) or written | cises in part 1 (Klassis cises in part 2 (Klassis cises in parts 1 and 2: | sche Physik 2 (Classi oral examination of | cal Physics 2)): writte | en examina- |
| 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 com- ponents 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 Klassi- sche 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. | | | | | | |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Bachelor's ((2009) | with 1 maj | or Mathematical Physics | | generated 26-Aug-2024 • exa r (180 ECTS) Mathematische F | - | page 19 / 156 |

| dditional information |
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| |
| orkload |
| |
| eaching cycle |
| |
| eferred to in LPO I (examination regulations for teaching-degree programmes) |
| |
| odule appears in |
| achelor' degree (1 major) Mathematics (2012) |
| achelor' degree (1 major) Mathematics (2013) |
| achelor' degree (1 major) Physics (2010) |
| achelor' degree (1 major) Physics (2012) |
| achelor' degree (1 major) Nanostructure Technology (2010) |
| achelor' degree (1 major) Nanostructure Technology (2012) |
| achelor' degree (1 major) Mathematical Physics (2009) |
| achelor' degree (1 major) Mathematical Physics (2012) |
| achelor' degree (1 major) Computational Mathematics (2012) |
| achelor' degree (1 major) Computational Mathematics (2013) |
| achelor's degree (1 major, 1 minor) Physics (Minor, 2010) |
| o final examination Special study offering (2010) |

| Module title | | | Abbreviation | | | |
|--|--|---|---|---|--|--|
| Statisti | ical Me | chanics, Thermodynam | ics and Electrodynam | lics | 11-STE-092-m01 | |
| Module | e coord | inator | | Module offered by | <u> </u> | |
| Managi and Asi | | ector of the Institute of T sics | heoretical Physics | Faculty of Physics a | and Astronomy | |
| ECTS | | od of grading | Only after succ. co | mpl. of module(s) | | |
| 16 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 2 seme | ster | undergraduate | 10-M1-PHY and 10-I | M2-PHY or 10-M1-NST | and 10-M2-NST | |
| Conten | ts | | | | | |
| ticles, d | critical | tatistical Physics: Ideal phenomena, Maxwell e tromagnetic fields. Spe | quations, electrostati | | | |
| Intende | ed lear | ning outcomes | | | | |
| trodyna | amics, t | nave advanced knowlec hermodynamics and st are able to independen | atistical mechanics. T | hey are familiar with | the corresponding of | calculation |
| | | umber of weekly contact hours | | • | • | |
| hours) Theore | + Ü (2 \ tische l | echanik und Thermody veekly contact hours), c Elektrodynamik (Theore vyear (summer semeste | once a year (winter sei tical Electrodynamics) | mester) | | |
| | | eessment (type, scope, langu le for bonus) | uage — if other than German, | examination offered — if no | ot every semester, informa | tion on whether |
| 1. Topic chan 2. Topic mics 3. Topic | cs cove ics and cs cove)): writh cs cove | as the following assess red in lectures and exer I Thermodynamics)): wr red in lectures and exer een examination (approx red in lectures and exer ually chosen) or written | rcises in part 1 (Statist itten examination (ap rcises in part 2 (Theor x. 120 minutes). rcises in parts 1 and 2 | prox. 120 minutes). etische Elektrodynan : oral examination of | nik (Theoretical Elec | trodyna- |
| Succes ponent Studen cal Meo discuss Studen To pass compos The gra | sful co s 1 and ts are h chanics sed in t ts mus s this m nent 3. de ach | omponent 3 will be offe mpletion of approx. 50% 2. highly recommended to 5 and Thermodynamics) hese two courses will b t register for assessmer hodule, students must f ieved in assessment co will each count 50% tow | 6 of practice work eac attend both courses 9 and Theoretische Ele e covered in assessm at components 1 throu irst pass assessment mponent 1 or 2 (whicl | th is a prerequisite for Statistische Mechani ktrodynamik (Theore ent component 3. Igh 3 online (details t component 1 or 2 an hever is better) and t | r admission to asse k und Thermodynan tical Electrodynamic to be announced). d must then pass as he grade achieved in | nik (Statisti- cs). The topic: ssessment |
| Allocat | | - | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| - | | | | | | |
| achelor's | with 1 ma | or Mathematical Physics | IMU Würzburg | • generated 26-Aug-2024 • ex | am. reg. da- | page 21 / 156 |
| 2009) | | | | or (180 ECTS) Mathematische | | |

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Nanostructure Technology (2010)

Bachelor' degree (1 major) Mathematical Physics (2009)

Bachelor' degree (1 major) Mathematical Physics (2012)

Bachelor' degree (1 major) Computational Mathematics (2012)

Bachelor' degree (1 major) Computational Mathematics (2013)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

| Module title | | | Abbreviation | | | |
|--|--|---|--|--|--|--|
| Theoret | tical M | echanics and Quantum N | Nechanics | | 11-TQM-092-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Managi and Ast | - | ector of the Institute of Th sics | eoretical Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | |
| 16 | | rical grade | | • | | |
| Duratio | | Module level | Other prerequisites | | | |
| | | undergraduate | | | o M1 NST 10 M2 NST and MPLa | |
| | | | | | | |
| Problen Limits c cillator. ny-parti | iian me ns of co of class . Angul icle sys | entral forces, minor vibra ical physics. Schrödinge ar momentum and spin. I stems. | tions, rigid body, mo r equation, mathema | tion in electromagne tical principles of qu | conservation laws. Applications: tic fields. Relativistic dynamics. lantum mechanics, harmonic os- on. Motion in electric fields. Ma- | |
| Intende | ed leari | ning outcomes | | | | |
| miliar w of quan | vith the itum th retical | e principles of theoretical eory. They are able to ap | mechanics and their ply the acquired calc | r different formulatio ulation methods and | Theoretical Physics. They are fa- ns and understand the principles I techniques to simple problems I knowledge of basic mathemati- | |
| Course | S (type, n | umber of weekly contact hours, l | anguage — if other than Ge | rman) | | |
| year (w | inter se nmech | emester) anik (Quantum Mechanie | | | (2 weekly contact hours), once a kly contact hours), once a year | |
| | | s essment (type, scope, langua le for bonus) | ge — if other than German, | examination offered — if no | t every semester, information on whether | |
| Topic amin Topic tion (3. Topic | This module has the following assessment components 1. Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Quantenmechanik (Quantum Mechanics)): 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). | | | | | |
| Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 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 (Quantum Mechanics). The topics discussed in these two courses will be covered in as- sessment 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. | | | | | | |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| · | | | | | | |

| Additional information |
|--|
| |
| Workload |
| |
| Teaching cycle |
| |
| Referred to in LPO I (examination regulations for teaching-degree programmes) |
| |
| Module appears in |
| Bachelor' degree (1 major) Mathematics (2012) |
| Bachelor' degree (1 major) Mathematics (2013) |
| Bachelor' degree (1 major) Physics (2010) |
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Bachelor' degree (1 major) Computational Mathematics (2012) |
| Rechalar degree (a major) Computational Mathematics (2010) |
| Bachelor' degree (1 major) Computational Mathematics (2013) |

| Module | e title | | | | Abbreviation | |
|---|---|--|---|---|--|--|
| Theore | Theoretical Mechanics and Quantum Mechanics for FOKUS | | | 5 Students | 11-TQM-F-092-m01 | |
| Module coordinator | | | Module offered by | | | |
| - | ing Dire trophys | ctor of the Institute of ics | Theoretical Physics | Faculty of Physics a | and Astronomy | |
| ECTS | Metho | d of grading | Only after succ. co | mpl. of module(s) | | |
| 16 | | ical grade | 10-M-PHY1 and 10-1 11-KP | M-PHY2 or 10-M-NST | 1 and 10-M-NST2 and | d 11-TQM-1, |
| Duratio | on | Module level | Other prerequisites | S | | |
| 2 seme | ester | undergraduate | | | | |
| Conten | its | | | | | |
| Probler Limits of cillator | ms of ce of class | chanics. Lagrangian ar entral forces, minor vib ical physics. Schröding ar momentum and spin tems | rations, rigid body, mo er equation, mathema | otion in electromagne atical principles of qu | etic fields. Relativist uantum mechanics, | ic dynamics. harmonic os- |
| Intende | ed learr | ing outcomes | | | | |
| miliar v of quar | with the ntum th pretical | nave gained first experi principles of theoretic eory. They are able to a Physics and to interpre | al mechanics and thei pply the acquired calo | ir different formulation methods and | ons and understand d techniques to sim | the principles ple problems |
| Course | S (type, n | umber of weekly contact hours | , language — if other than Ge | erman) | | |
| Quante + Ü (2 v ween s Methoo | enmech weekly ummer d of ass | emester) anik für FOKUS-Studier contact hours) + T (1 we and winter semester) essment (type, scope, lang le for bonus) | ekly contact hour), or | nce a year (block tauş | ght during semester | break bet- |
| 1. Topio amir 2. Topio chan 3. Topio | cs cove nation (cs cove nics for cs cove | as the following assess red in lectures and exe approx. 120 minutes). red in lectures and exe FOKUS Students)): writh red in lectures and exe ually chosen) or writter | rcises in part 1 (Theore rcises in part 2 (Quant ten examination (appr rcises in parts 1 and 2 | tenmechanik für FOK rox. 120 minutes). : oral examination of | US-Studierende (Qu | antum Me- |
| ponent To qua Studen Quante these t Studen To pass compo The gra compo | is 1 and lify for a sts are h enmech wo cou its mus s this m nent 3. ade ach nent 3. | admission to assessme highly recommended to anik für FOKUS-Studier rses will be covered in a t register for assessmen odule, students must f ieved in assessment co will each count 50% tow | nt component 3, stud attend both courses ende (Quantum Mech assessment compone nt components 1 throu irst pass assessment mponent 1 or 2 (which | ents must pass asse Theoretische Mechar anics for FOKUS Stud nt 3. Igh 3 online (details component 1 or 2 an hever is better) and t | ssment component i nik (Theoretical Mecl dents). The topics di to be announced). d must then pass as he grade achieved in | 1 and/or 2. hanics) and scussed in sessment |
| Allocat | ion of p | laces | | | | |
| | | | | | | |
| | | or Mathematical Physics | | • generated 26-Aug-2024 • e> | | page 25 / 156 |

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Additional information

Students who intend to study the FOKUS Master's degree programme must take Quantenmechanik für FO-KUS-Studierende (Quantum Mechanics for FOKUS Students) instead of Quantenmechanik (Quantum Mechanics).

Workload

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012)

| Module title | | | Abbreviation | | | |
|--|--|---|---|--|---|-----------------------------|
| Practic | al Cour | se Part B Mathematical | Physics | | 11-P-PB-MP-092-mc |)1 |
| Module | e coord | inator | | Module offered by | | |
| Manag | ing Dire | ector of the Institute of A | pplied Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | | |
| 6 | (not) s | successfully completed | 11-P-PA | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | | | | |
| Conten | ts | | | | | |
| Physical laws of mechanics, thermodynamics, optics, science of electricity, vibration and waves, Atomic and Nuclear Physics, wave optics. Basic measuring methods using computers and storage oscilloscopes. | | | | | | |
| Intend | ed learr | ning outcomes | | | | |
| are abl | e to ind | nave knowledge and ski lependently plan and co nent protocol. | | - | | |
| Course | S (type, n | umber of weekly contact hours | , language — if other than Ger | rman) | | |
| Elektriz Wellen Atom- | zitätslei optik (F und Ker | ysik (Classical Physics, nre und Schaltungen (El Physical Optics, WOP): F nphysik (Atomic and Nu Messtechnik (Compute | ectricity and Circuits, 2 (2 weekly contact hou uclear Physics, AKP): P | ELS): P (2 weekly cor urs) (2 weekly contact he | ours) | ours) |
| - | | essment (type, scope, langu | | | • | |
| | | le for bonus) | | | , , | |
| 1. Lab ly co phys 2. Lab ly co | course i mplete sics-rela course i mplete | as the following assess in part 1: a) Preparing, p d if a Testat (exam) is pa ited contents of the cou in part 2: a) Preparing, p d if a Testat (exam) is pa ited contents of the cou | erforming and evaluat assed. b) Talk (with di rse (approx. 30 minut performing and evalua assed. b) Talk (with di | scussion) to test the es). ting the experiments scussion) to test the | students' understan will be considered s | iding of the successful- |
| Studen nent, tl To pass Studen AKP an | its will l ney mus s this m its mus d CMT. | t register for assessmer be offered one opportur st pass both elements a odule, students must s t take exactly one cours Students must attend k odule, students must p | ity to retake element a) and b). uccessfully complete t e each in the areas KL (LP or ELS courses pric | a) and/or element b) two out of the five co P and ELS as well as or to attending WOP, | . To pass an assessr urses. one course in the ar AKP or CMT courses. | nent compo- reas WOP, |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | onal info | ormation | | | | |
| | | | | | | |
| Workload | | | | | | |
| | | | | | | |
| Teaching cycle | | | | | | |
| | | | | | | |
| Referre | ed to in | LPOI (examination regulatio | ns for teaching-degree progra | mmes) | | |
| | | hysik Mechanik, Wärme | | | len Relativitätstheor | ie |
| | | or Mathematical Physics | | generated 26-Aug-2024 • exa | | page 27 / 156 |
| (2009) | , | | | r (180 ECTS) Mathematische F | | |

§ 53 (1) 1. b) Physik Aufbau der Materie

- § 53 (1) 1. c) Physik physikalische Grundpraktika
- § 77 (1) 1. b) Physik "Fortgeschrittene Experimentalphysik"
- § 77 (1) 1. d) Physik "physikalische Praktika"

Module appears in

Bachelor' degree (1 major) Mathematical Physics (2009)

| Module title | | | | Abbreviation | | | |
|---|--------------------------------|---|--|--|---|--|--|
| Practic | al Cour | se A | | | 11-P-PA-092-m01 | | |
| Module | e coord | inator | | Module offered by | | | |
| Managi | ing Dire | ector of the Institute of Ap | oplied Physics | Faculty of Physics a | nd Astronomy | | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | | |
| 5 | (not) s | successfully completed | | | | | |
| Duratio | n | Module level | Other prerequisites | | | | |
| 1 seme | ster | undergraduate | | | | | |
| Conten | Contents | | | | | | |
| Physical laws of mechanics, thermodynamics, science of electricity, types of error, error approximation and pro- pagation, graphs, linear regression, average values and standard deviation, distribution functions, significance tests, writing of lab reports and publications. | | | | | | | |
| Intende | ed leari | ning outcomes | | | | | |
| le to in measu | depenc ring pro | lently plan and conduct e | experiments, to cooperation of the second seco | erate with others, an g results on the basi | menting techniques. They are ab- d to document the results in a s of error propagation and of the | | |
| Course | S (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | | | |
| Ü (1 we Beispie | ekly co ele aus | ntact hour), once a year (| (winter semester) | | ysis): V (1 weekly contact hour) + hermodynamics and Electricity, | | |
| Method | d of ass | s essment (type, scope, langua | ge — if other than German, e | examination offered — if no | t every semester, information on whether | | |
| module is | creditab | le for bonus) | | | | | |
| 1. Topic 2. Lab c ted if | cs cove course: f a Test | | ises: written examina and evaluating the e alk (with discussion) | experiments will be c | inutes) onsidered successfully comple- understanding of the physics-re- | | |
| 1. | | | | | ission to assessment component . Students will be offered one op- | | |
| portuni Studen | ty to re ts mus | take element a) and/or e t register for assessment | lement b). components 1 and 2 | online (details to be | | | |
| re atter Electric | nding B ity). | eispiele aus Mechanik, V | Värmelehre und Elekt | rik (Examples from I | Mechanics, Thermodynamics and | | |
| | | odule, students must pa | ss both assessment | component 1 and as | sessment component 2. | | |
| Allocation of places | | | | | | | |
| | | | | | | | |
| Additional information | | | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachi | ıg cycl | 9 | | | | | |
| | | | | | | | |
| | | | | | | | |

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

§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie

§ 53 (1) 1. c) Physik physikalische Grundpraktika

§ 77 (1) 1. d) Physik "physikalische Praktika"

Module appears in

Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major, 1 minor) Physics (Minor, 2010) No final examination Special study offering (2010)

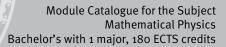


Compulsory Electives

(32 ECTS credits)

Students must achieve a minimum of 8 ECTS credits in each of the module areas Mathematik (Mathematics) and Physik (Physics). To achieve the remaining 16 ECTS credits, students are to complete additional modules in these two areas (any modules in the respective areas may be selected).





Mathematics

(ECTS credits)

| Module | Module title | | | | Abbreviation |
|---|---|--|------------------------------|-----------------------------|--|
| Semina | r in An | alysis | | | 10-M-BSA-072-m01 |
| Module | coord | inator | | Module offered by | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | ic in analysis. | | | |
| Intende | ed learn | ning outcomes | | | |
| of a giv ly in a s | en topi scientif | c using selected literatur c discussion. | e, and prepares a tal | k on the subject. He | sters elaboration and structuring /She is able to participate active- |
| | | umber of weekly contact hours, l | | | |
| S (no in | format | ion on SWS (weekly cont | act hours) and cours | e language available | |
| | | essment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | ot every semester, information on whether |
| Assess | ment o | o minutes) ffered: in the semester in ssessment: German, Eng | | | |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ng cycl | 9 | | | |
| | | | | | |
| | | LPOI (examination regulations | for teaching-degree progra | mmes) | |
| § 73 (1) | 1. Mat | hematik Analysis | | | |
| Module appears in | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) | | | | | |
| | Bachelor' degree (1 major) Mathematics (2007) | | | | |
| | Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) | | | | |
| | Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) | | | | |
| | Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | |
| | | gree (1 major, 1 minor) Ma | | | |
| | | mination for the teaching | | |) |

| 10-M-BSL-072-m01 | | | | |
|---|--|--|--|--|
| Module offered by | | | | |
| Institute of Mathematics | | | | |
| succ. compl. of module(s) | | | | |
| | | | | |
| equisites | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| nt scientific work. He/She masters elaboration and structuring ares a talk on the subject. He/She is able to participate active | | | | |
| ther than German) | | | | |
| and course language available) | | | | |
| an German, examination offered — if not every semester, information on whether | | | | |
| course is offered ed upon with the examiner | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| egree programmes) | | | | |
| id Elemente der Zahlentheorie | | | | |
| Module appears in | | | | |
| Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | |
| | | | | |

| Module | Module title Abbreviation | | | | |
|---|--|---|------------------------------|-----------------------------|--|
| Semina | r in Al | gebra | | | 10-M-BSE-072-m01 |
| Module | coord | inator | | Module offered by | <u> </u> |
| Dean of | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | oic in algebra. | | | |
| Intende | ed leari | ning outcomes | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) |
| Method | l of ass | Sessment (type, scope, langua | ge — if other than German, e | examination offered — if no | ot every semester, information on whether |
| | | le for bonus) | | | |
| Assess | ment o | 50 minutes) ffered: in the semester in ssessment: German, Eng | | | |
| Allocat | - | | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ıg cycl | e | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | |
| § 73 (1) | § 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie | | | | |
| Module | appea | nrs in | | | |
| | Bachelor' degree (1 major) Mathematics (2008) | | | | |
| Bachelor' degree (1 major) Mathematics (2007) | | | | | |
| | Bachelor' degree (1 major) Economathematics (2009) | | | | |
| | Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) | | | | |
| | - | | | | |
| | | ree (1 major) Computatio gree (1 major, 1 minor) Ma | | | |
| | | | | | |
| 1151 310 | First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | |

| Module title | | | | | Abbreviation |
|---|--|--------------------------------------|---------------------|--------------------------|------------------|
| Seminar in Geometry | | | | | 10-M-BSG-072-m01 |
| Module coordinator | | | | Module offered by | |
| Dean of Studies Mathematik (Mathematics) | | | | Institute of Mathematics | |
| ECTS Method of grading | | Only after succ. compl. of module(s) | | | |
| 5 numerical grade | | | | | |
| Duration | | Module level | Other prerequisites | | |
| 1 semester 🛛 ı | | undergraduate | | | |
| Contents | | | | | |
| A selected topic in geometry or differential geometry. | | | | | |
| Intended learning outcomes | | | | | |
| The student gains first experience with independent scientific work. He/She masters elaboration and structuring of a given topic using selected literature, and prepares a talk on the subject. He/She is able to participate active- ly in a scientific discussion. | | | | | |
| Courses (type, number of weekly contact hours, language — if other than German) | | | | | |
| S (no information on SWS (weekly contact hours) and course language available) | | | | | |
| Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) talk (approx. 60 minutes) | | | | | |
| Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner | | | | | |
| Allocation of places | | | | | |
| | | | | | |
| Additional information | | | | | |
| | | | | | |
| Workload | | | | | |
| | | | | | |
| Teaching cycle | | | | | |
| | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) | | | | | |
| § 73 (1) 4. Mathematik Geometrie | | | | | |
| Module appears in | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) | | | | | |
| Bachelor' degree (1 major) Mathematics (2007) | | | | | |
| Bachelor' degree (1 major) Economathematics (2009) | | | | | |
| Bachelor' degree (1 major) Economathematics (2008) | | | | | |
| Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | |
| Bachelor's degree (1 major, 1 minor) Mathematics (2009) | | | | | |
| | | mination for the teaching | | | |

| Module | title | | | | Abbreviation |
|-----------|-------------------|---|------------------------------|-----------------------------|--|
| Semina | r in Nu | mber Theory | | | 10-M-BSZ-072-m01 |
| Module | coord | inator | | Module offered by | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | atics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | ic in number theory. | | | |
| Intende | ed leari | ning outcomes | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- |
| Course | 5 (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no in | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) |
| module is | creditab | le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| Assess | ment o | oo minutes) ffered: in the semester in ssessment: German, Eng | | | |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ıg cycl | 8 | | | |
| | | | | | |
| | | LPO I (examination regulations | | | |
| § 73 (1) | 2. Mat | hematik Lineare Algebra, | , Algebra und Elemen | te der Zahlentheorie | |
| Module | | | | | |
| | - | ree (1 major) Mathematic | | | |
| | - | ree (1 major) Mathematic ree (1 major) Economathe | | | |
| | - | ree (1 major) Economathe | - | | |
| | - | ree (1 major) Mathematic | | | |
| | - | ree (1 major) Computation | | 9) | |
| | | gree (1 major, 1 minor) Ma | | | |
| First sta | ate exa | mination for the teaching | degree Gymnasium | Mathematics (2009) | |

| Semina | | | | Abbreviation |
|-----------|--|------------------------------|-----------------------------|--|
| | r in Ordinary Differential Equat | ions | | 10-M-BSW-072-m01 |
| Module | coordinator | | Module offered by | |
| Dean of | Studies Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Method of grading | Only after succ. com | pl. of module(s) | |
| 5 | numerical grade | | - | |
| Duratio | n Module level | Other prerequisites | | |
| 1 semes | ter undergraduate | | | |
| Content | S | | | |
| A select | ed topic in the theory of ordina | ry differential equation | ons. | |
| | d learning outcomes | · · · | | |
| of a give | | | | sters elaboration and structuring /She is able to participate active- |
| Courses | (type, number of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no in | formation on SWS (weekly cont | act hours) and cours | e language available | 2) |
| module is | of assessment (type, scope, langua creditable for bonus) prox. 60 minutes) | ge — if other than German, e | examination offered — if no | ot every semester, information on whether |
| Assessn | nent offered: in the semester ir ge of assessment: German, Eng | | | |
| Allocati | on of places | | | |
| | | | | |
| Addition | nal information | | | |
| | | | | |
| Workloa | ad | | | |
| | | | | |
| Teachin | g cycle | | | |
| | | | | |
| Referred | d to in LPO I (examination regulation | s for teaching-degree progra | mmes) | |
| § 73 (1) | 1. Mathematik Analysis | | | |
| | appears in | | | |
| | r' degree (1 major) Mathematic | | | |
| | or' degree (1 major) Mathematic | | | |
| | or' degree (1 major) Economathe or' degree (1 major) Economathe | - | | |
| | or' degree (1 major) Economatic or' degree (1 major) Mathematic | | | |
| | r' degree (1 major) Mathematic | | ററ | |
| | or's degree (1 major, 1 minor) M | | | |
| | te examination for the teaching | | |) |

| Module | title | | | | Abbreviation |
|----------|-------------------|---|------------------------------|-----------------------------|--|
| Semina | r in Co | mplex Analysis | | | 10-M-BSC-072-m01 |
| Module | coord | inator | | Module offered by | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | atics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | ic in complex analysis. | | | |
| Intende | ed leari | ning outcomes | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- |
| Course | 5 (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no in | Iformat | ion on SWS (weekly cont | act hours) and cours | e language available |) |
| | | s essment (type, scope, langua ₎ le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| Assess | ment o | 50 minutes) ffered: in the semester in ssessment: German, Eng | | | |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ng cycl | e | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | |
| § 73 (1) | 1. Mat | hematik Analysis | | | |
| Module | appea | irs in | | | |
| Bachel | or' deg | ree (1 major) Mathematic | s (2008) | | |
| | - | ree (1 major) Mathematic | | | |
| | - | ree (1 major) Economathe | - | | |
| | | ree (1 major) Economathe | | | |
| | - | ree (1 major) Mathematic | | | |
| | - | ree (1 major) Computation gree (1 major, 1 minor) Ma | | • | |
| | | mination for the teaching | | | |

| Module | Module title Abbreviation | | | | |
|-------------------------------|--|--|---|-----------------------------|--|
| Semina | r in Nu | merical Mathematics | | | 10-M-BSN-072-m01 |
| Module | coord | inator | | Module offered by | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | atics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | ic in numerical mathema | tics. | | |
| Intende | ed learn | ning outcomes | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no in | format | ion on SWS (weekly cont | act hours) and cours | e language available |) |
| module is | creditab | essment (type, scope, langua le for bonus) 50 minutes) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| Assess | ment o | ffered: in the semester in sessment: German, Eng | | | |
| Allocat | | | | | |
| | | | | | |
| Additio | nal info | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ng cycl | 9 | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | |
| § 73 (1) | 5. Mat | hematik Angewandte Ma | thematik | | |
| Module | appea | rs in | | | |
| Bachelo Bachelo Bachelo | Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) | | | | |
| Bachelo Bachelo | or' degi or's deg | ree (1 major) Mathematic ree (1 major) Computation gree (1 major, 1 minor) Ma mination for the teaching | nal Mathematics (200 athematics (Minor, 20 | 008) | |

| Module | e title | | | | Abbreviation |
|----------|-------------------|---|------------------------------|-----------------------------|--|
| Semina | ar in St | ochastics | | | 10-M-BSS-072-m01 |
| Module | e coord | inator | | Module offered by | <u>.</u> |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | · | | |
| A selec | ted top | ic in stochastics. | | | |
| Intende | ed lear | ning outcomes | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether |
| Assess | ment o | 50 minutes) ffered: in the semester ir ssessment: German, Eng | | | |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| | | | | | |
| Referre | d to in | LPOI (examination regulation | s for teaching-degree progra | mmes) | |
| § 73 (1) | 3. Mat | hematik Stochastik | - | | |
| Module | e appea | urs in | | | |
| Bachel | or' deg | ree (1 major) Mathematic | s (2008) | | |
| | - | ree (1 major) Mathematic | | | |
| | - | ree (1 major) Economathe | - | | |
| | - | ree (1 major) Economathe | | | |
| | - | ree (1 major) Mathematic | • | | |
| | | ree (1 major) Computatio gree (1 major, 1 minor) M | | | |
| | | mination for the teaching | | | |
| | | | See Synnasian | | , |

| Module | title | | | | Abbreviation |
|---|---|--|---|-----------------------------|--|
| Semina | r in Fu | nctional Analysis | | | 10-M-BSF-072-m01 |
| Module | coord | inator | | Module offered by | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | atics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | oic in functional analysis. | | | |
| Intende | ed learı | ning outcomes | | | |
| of a giv | en topi | • | • | - | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, n | number of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no in | Iformat | ion on SWS (weekly cont | act hours) and cours | e language available | e) |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| talk (ap | prox. 6 | óo minutes) | | | |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ng cycl | e | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | |
| | | | | | |
| Module | e appea | ars in | | | |
| Bachelo Bachelo Bachelo Bachelo Bachelo | or' deg or' deg or' deg or' deg or' deg | ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Economathe ree (1 major) Economathe ree (1 major) Mathematic ree (1 major) Computatio gree (1 major, 1 minor) Ma | s (2007) ematics (2009) ematics (2008) al Physics (2009) nal Mathematics (200 | • | |

| Module | Module title Abbreviation | | | | | |
|---|---|---|------------------------------|-----------------------------|--|--|
| Semina | ar in Op | eration Research | | | 10-M-BSO-072-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | |
| 5 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | | | | |
| Conten | ts | | | | | |
| A selec | ted top | ic in operations research | l. | | | |
| Intende | ed lear | ning outcomes | | | | |
| of a giv | en top | | | | sters elaboration and structuring /She is able to participate active- | |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) | |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether | |
| talk (ap | prox. 6 | óo minutes) | | | | |
| Allocat | ion of _l | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | | |
| | | | | | | |
| Module | e appea | urs in | | | | |
| Bachelo Bachelo Bachelo Bachelo Bachelo | Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) | | | | | |

| Module | Module title Abbreviation | | | | | |
|--|---|--|------------------------------|-----------------------------|--|--|
| Semina | ar in Di | screte Mathematics | | | 10-M-BSD-072-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. com | npl. of module(s) | | |
| 5 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | | | | |
| Conten | ts | | | | | |
| A selec | ted top | oic in discrete mathemation | cs. | | | |
| Intende | ed lear | ning outcomes | | | | |
| of a giv | en top | | | | sters elaboration and structuring /She is able to participate active- | |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | rman) | | |
| S (no ir | format | tion on SWS (weekly cont | act hours) and cours | e language available | 2) | |
| | | sessment (type, scope, langua ıle for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether | |
| talk (ap | prox. e | 60 minutes) | | | | |
| Allocat | ion of _l | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | | |
| | | | | | | |
| Module | e appea | ars in | | | | |
| Bachel Bachel Bachel Bachel Bachel | Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) | | | | | |

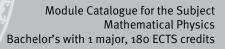
| Module | e title | | | | Abbreviation | |
|--------------------|----------------------|--|--|--|--|--|
| Introdu | uction t | o Discrete Mathematics | 5 | | 10-M-EDM-072-mo | 1 |
| Module | e coord | inator | | Module offered by | | |
| Dean o | of Studio | es Mathematik (Mathen | natics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | | |
| 5 | | rical grade | | • | | |
| Duratio | | Module level | Other prerequisites | | | |
| 1 seme | ester | undergraduate | sessment. The lectur at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | t. Students who mee n the current or in th date, students will h | nts about the respe ion for the course w hission to assessme or admission to asse will put their registra et all prerequisites w e subsequent seme | ctive details ill be con- nt. If stu- ssment over ation for as- rill be admit- ster. For as- |
| Conten | its | | | | | |
| Techni | ques fro | om combinatorics, intro g codes. | duction to graph theo | ry (including applica | tions), cryptographi | c methods, |
| Intend | ed lear | ning outcomes | | | | |
| levant realise | proof te s the so | acquainted with the fu echniques, is able to ap cope of applications of | ply methods from num discrete structures. | ber theory and alge | | |
| | _ | umber of weekly contact hours | | | | |
| Metho | d of ass | mation on SWS (weekly sessment (type, scope, lang le for bonus) | · | | - | ion on whether |
| by an c 2, appr | oral exa rox. 30 | nation (approx. 90 minu mination of one candid minutes) ssessment: German, Er | ate each (approx. 20 n | ninutes) or an oral ex | | |
| Allocat | | | <u> </u> | | | |
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| Additio | onal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulation | ons for teaching-degree progra | immes) | | |
| | | hematik Lineare Algebr | | | 5 | |
| Module | e appea | irs in | | | | |
| Bachel Bachel | or' deg or' deg | ree (1 major) Computer ree (1 major) Computer ree (1 major) Mathemat ree (1 major) Mathemat | Science (2010) ics (2008) | | | |
| | | or Mathematical Physics | | generated 26-Aug-2024 • ex | | |

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

| Module | e title | | | | Abbreviation | | |
|---|--|---|---|--|---|--|--|
| Introdu | uction t | o Functional Analysis | | | 10-M-FAN-072-mo | 1 | |
| Module | e coord | inator | | Module offered by | Ι | | |
| Dean o | of Studio | es Mathematik (Mathem | natics) | Institute of Mathem | natics | | |
| ECTS | | od of grading | Only after succ. com | | | | |
| 5 | 1 | rical grade | | | | | |
| Duratio | | Module level | Other prorequisites | | | | |
| 1 semester undergraduate Certain prerequisites must be m sessment. The lecturer will informat the beginning of the course. R sidered a declaration of will to sidents have obtained the qualified the course of the semester, the lisessment into effect. Students w ted to assessment in the current sessment at a later date, student | | | | rer will inform stude he course. Registrat n of will to seek adm I the qualification fo mester, the lecturer Students who mee n the current or in th | nts about the respe- tion for the course we hission to assessme or admission to assess will put their register all prerequisites we e subsequent seme | ective details vill be con- ent. If stu- essment over ration for as- vill be admit- ester. For as- | |
| Conten | nts | | - | | | | |
| | | s and Hilbert spaces, bo | ounded operators, prir | ciples of functional | analysis. | | |
| | - | ning outcomes | | • | , | | |
| Course V + Ü (r Methoo module is written by an o 2, appr | es (type, r no infor d of ass s creditab examin oral exa rox. 30 | bility of the theory to oth number of weekly contact hours, mation on SWS (weekly sessment (type, scope, langu le for bonus) nation (approx. 90 minu mination of one candida minutes) ssessment: German, En | language — if other than Ger contact hours) and co age — if other than German, o tes); if announced by ate each (approx. 20 n | man) purse language avail examination offered — if no the lecturer, the writ hinutes) or an oral ex | ot every semester, information ca | n be replaced | |
| | | | glisti li agreeu upoli w | | | | |
| Allocal | tion of p | Jlaces | - | | | | |
| Additio | | ormation | | | | | |
| Teachi | ng cycl | e | | | | | |
| | | | | | | | |
| | | LPO I (examination regulation hematik Analysis | ns for teaching-degree progra | mmes) | | | |
| | e appea | • | | | | | |
| Bachel Bachel Bachel Bachel | lor' deg lor' deg lor' deg lor' deg | ree (1 major) Mathemati ree (1 major) Mathemati ree (1 major) Technology ree (1 major) Technology ree (1 major) Economath | cs (2007) / of Functional Materia / of Functional Materia | - | | | |
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Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009) Bachelor' degree (1 major) Technology of Functional Materials (2009)

| Module | title | | | | Abbreviation | |
|--|---|--|---|--|--|---|
| Operati | ions Re | esearch | | | 10-M-ORS-072-m01 | |
| Module | coord | inator | | Module offered by | | |
| Dean of | fStudie | es Mathematik (Mathe | matics) | Institute of Mathem | atics | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | |
| 5 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | i | | |
| 1 semes | ster | undergraduate | sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | s must be met to qua irer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew. | nts about the respection for the course wints in the course wints on to assessment radmission to assest will put their registrates were subsequent semesticated as the semestic term of term | ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- |
| Conten | ts | | | | | |
| Linear p | orograr | nming, duality theory, | transport problems, int | egral linear program | ming, graph theoret | ic problems. |
| Intende | ed leari | ning outcomes | | | | |
| for solv | ing ma | | undamental methods ir especially in economic merically. | | | |
| Courses | S (type, n | umber of weekly contact hour | rs, language — if other than Ger | rman) | | |
| V + Ü (n | no infor | mation on SWS (week | ly contact hours) and co | ourse language avail | able) | |
| | | essment (type, scope, lang le for bonus) | guage — if other than German, | examination offered — if no | t every semester, informat | on on whether |
| by an o 2, appro | ral exa ox. 30 | mination of one candio minutes) | utes); if announced by date each (approx. 20 n nglish if agreed upon w | ninutes) or an oral ex | | |
| Allocati | | | · | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachir | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulat | ions for teaching-degree progra | ammes) | | |
| § 73 (1) | 5. Mat | hematik Angewandte I | Mathematik | | | |
| Module | e appea | ars in | | | | |
| Bachelo Bachelo Bachelo Bachelo | or' deg or' deg or' deg or' deg or' deg | ree (1 major) Computer ree (1 major) Computer ree (1 major) Mathema ree (1 major) Mathema ree (1 major) Economa or Mathematical Physics | Science (2010) tics (2008) tics (2007) thematics (2009) | generated 26-Aug-2024 • ex. | am reg da- | page 49 / 156 |
| (2009) | | | - | r (180 ECTS) Mathematische I | - | F-0-47/10 |



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

| Non-Linear Dynamics Module offered by Dean of Studies Mathematik (Mathematics) Institute of Mathematics CTS Method of grading Only after succ. compl. of module(s) s numerical grade - Duration Module level Other 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 over the course of the semester. The lecturer will put their registration for admission to assessment into effect. Students who meet all prerequisites will be admission to assessment over the course of the semester. If studies who meet all prerequisites will be admission to assessment into effect. Students who neet all precequisites will be admission to assessment into effect. Students who meet all precequisites will be admission to assessment into effect. Students who meet all precequisites will be admission to assessment into effect. Students who but an the qualification for admission to assessment into effect. Students who but all have to obtain the qualification for admission to assessment into effect. Students who admission to assessment over the course of the semester, the acture will have to obtain the qualification for admission to assessment. The lecture will have to obtain the qualification for admission to assessment. The secure advises who advises admission to assessment in the furch admission to assessment. The secure advises who advises admission to assessment and advise tade. Students who advises admission to assessment advise tade. Students who advises admission to assessment in the furch secure advises who advise admisited with the fundamental concepts and test. | Module | e title | | | | Abbreviation | |
|--|----------------------------|-------------------------------|--|---|---|---|-------------|
| Dean of Studies Mathematik (Mathematics) Institute of Mathematics ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Certain prerequisites must be met to qualify for admission to assessment. The lecturer will not the course will be considered a declaration of will to seek admission to assessment over the course of the course. Registration for the course set of the course. Registration for the course will be admitted to qualify for admission to assessment over the course of the semester, the lecturer will put their registration for assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment in the current or in the subsequent semester. For assessment in student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof me thods. He/She is able to apply these methods to simple situations, e.g. in physics or biology. Courses (type, number of weekly contact hours, language – if other than German) V + () to information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German) V + () to information on SWS (weekly contact hours, anduage – if other than German) | Non-Liı | near Dy | namics | | | 10-M-NLD-072-m01 | |
| Dean of Studies Mathematik (Mathematics) Institute of Mathematics ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade 1 semester Module level Other prerequisites 1 semester undergraduate Certain prerequisites must be met to qualify for admission to assessment over the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment over the course of the semester, the lecturer will put their registration for admission to assessment over the course of the semester, the lecturer will put their registration for admission to assessment over the course of the semester, the lecturer will put their registration for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment and the course of the semester. For assessment in the furce date is subcating Poincare-Bendixson, chaotic dynamics; applications in physics and biology (e. g. Hamiltonian systems, Volterra-Lotka). Intended learning outcomes The student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof methods. He/5 he is able to apply these methods to simple situations, e.g. in physics or biology. Courses type, number of weeky contact hours, language – if other than German, examination of methods he/5 he/5 he/s able to apply these methods to simple situations. The student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof methods. He/5 he/s able to apply these methods to simple situations, e.g. in physics or biology. | Module | e coord | inator | | Module offered by | | |
| ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade | Dean o | f Studie | es Mathematik (Mathem | atics) | | natics | |
| 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment over the course of the semester, the lecturer will put their registration for assessment in the fere. Students who meet all prerequisites will be admitted to assessment in the fere. Students who meet all prerequisites will be admitted to assessment in the fere. Students who meet all prerequisites will be admitted to assessment and are date, students will have to obtain the qualification for admission to assessment and are date, students will have to obtain the qualification for admission to assessment and are date, students will have to obtain the qualification for admission to assessment. The student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof me thods. He/She is able to apply these methods to simple situations, e.g. in physics or biology. Courses (pre, number of weekly contact hours, language – if other than Geman) V + Û (no information on SWS (weekly contact hours) and course language available) Methods He/She is able to apply these methods to simple situations, e.g. in physics or biology. Courses (pre, number of weekly contact hours) and course language available) Methods is for bands Germanination of SWS (weekly contact hours) and course language available) Methods is for bands Germanination of one candidate each (approx. 20 m | _ | 1 | · · · · · | E . | | | |
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| Basic notions in stability theory, Lyapunov theory; stable manifolds, periodic solutions including Poincare-Ben- dixson, chaotic dynamics; applications in physics and biology (e. g. Hamiltonian systems, Volterra-Lotka). Intended learning outcomes The student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof me thods. He/She is able to apply these methods to simple situations, e.g. in physics or biology. Courses (type, number of weekly contact hours, language – if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination on one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Allocation of places | 1 semester undergraduate | | sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later | rer will inform stude the course. Registrat n of will to seek adm the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h | nts about the respective ion for the course will be hission to assessment. If r admission to assessme will put their registration et all prerequisites will be e subsequent semester. | e details e con- f stu- ent over n for as- e admit- For as- | |
| Basic notions in stability theory, Lyapunov theory; stable manifolds, periodic solutions including Poincare-Ben- dixson, chaotic dynamics; applications in physics and biology (e. g. Hamiltonian systems, Volterra-Lotka). Intended learning outcomes The student is acquainted with the fundamental concepts and results in non-linear dynamics and their proof me thods. He/She is able to apply these methods to simple situations, e.g. in physics or biology. Courses (type, number of weekly contact hours, language – if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination on one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Allocation of places | Conten | its | | | | | |
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| V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 73 (1) 1. Mathematik Analysis Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2009) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2009) | The stu | ıdent is | acquainted with the fur | | | | proof me- |
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| Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Allocation of places | 1) Ü + V | no infor | mation on SWS (weekly | contact hours) and co | ourse language avail | able) | |
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| by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching degree programmes) § 73 (1) 1. Mathematik Analysis Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematics (2009) | | | | | | | |
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| Additional information | | | | | | | |
| Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 73 (1) 1. Mathematik Analysis Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) | Αιισται | | Jaces | | | | |
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| Teaching cycle Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 73 (1) 1. Mathematik Analysis Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2009) | \\\ <i>\\\</i> l=1 | ad | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) § 73 (1) 1. Mathematik Analysis Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematics (2009) | WORKIO | Dad | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) § 73 (1) 1. Mathematik Analysis Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematics (2009) | Teachi | | 0 | | | | |
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| Module appears in Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematics (2009) | | | | | | | |
| Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) | | | • | | | | |
| | Bachel Bachel Bachel | or' deg or' deg or' deg | ree (1 major) Mathemati ree (1 major) Economath ree (1 major) Economath | cs (2007) ematics (2009) ematics (2008) | | | |
| (2009) ta record Bachelor (180 ECTS) Mathematische Physik - 2009 | Bachelor's | | | JMU Würzburg • | | | ge 51 / 156 |

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

| Module | e title | | | | Abbreviation | |
|--|----------|---------------|--|---------------------|-------------------------------------|--|
| Introdu | iction t | o Geometry | | 10-M-GEO-082-m01 | | |
| Module | e coord | inator | | Module offered by | | |
| Dean of Studies Mathematik (Mathematics) | | | atics) | Institute of Mathem | natics | |
| ECTS | Methe | od of grading | Only after succ. compl. of module(s) | | | |
| 8 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | i | | |
| 1 semester un | | undergraduate | By way of exception, additional prerequisites are listed in the section assessments. | | isites are listed in the section on | |
| Conten | ts | ~ | • • | | | |

Introduction to topics in geometry: axiomatic introduction of projective spaces, coordinates, fundamental theorems, relations to linear algebra and algebra, curves and hypersurfaces in Euclidean spaces, curvature.

Intended learning outcomes

The student is acquainted with the fundamental concepts and methods of geometry.

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

This module has 2 components; information on courses listed separately for each component.

- 10-M-GEO-1-082: V + Ü (no information on language and number of weekly contact hours available)
- 10-M-GEO-2-082: V + Ü (no information on language and number of weekly contact hours available)

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

This module has the following 2 assessment components. To pass the module as a whole students must pass one of the two assessment components.

Assessment component to module component 10-M-GEO-1-082: Einführung in die Projektive Geometrie

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

Assessment component to module component 10-M-GEO-2-082: Einführung in die Differentialgeometrie

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

| Bachelor's with 1 major Mathematical Physics | JMU Würzburg • generated 26-Aug-2024 • exam. reg. da- | page 53 / 156 |
|--|---|---------------|
| (2009) | ta record Bachelor (180 ECTS) Mathematische Physik - 2009 | |

Allocation of places

Additional information

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Workload

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Teaching cycle

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

§ 73 (1) 4. Mathematik Geometrie

Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

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

First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module | e title | | | | Abbreviation |
|--|---------|---|----------------------|-------------------|------------------|
| Numbe | r Theo | ry and Algebra | | | 10-M-ZAL-082-m01 |
| Module | e coord | inator | | Module offered by | |
| Dean of Studies Mathematik (Mathematics) | | atics) | Institute of Mathem | natics | |
| ECTS | Methe | od of grading | Only after succ. con | npl. of module(s) | |
| 13 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 5 | | By way of exception, additional prerequisites are listed in the section on assessments. | | | |
| Conten | tc | | | | |

Introduction to number theory, algebra and their interrelations: basic algebraic structures (groups, rings, fields); discussion of properties of integers and rational numbers (as well as algebraic extensions) with regard to their algebraic structure (residue class rings and finite fields).

Intended learning outcomes

The student is acquainted with the fundamental concepts and methods of number theory and algebra. He/she is able to interrelate these concepts and realises the advantages of thinking across the borders of different branches in mathematics.

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

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

- 10-M-ZAL-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-ZAL-2-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-ZAL-P-082: M (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 10-M-ZAL-1-082: Introduction to Number Theory Introduction to Number Theory

- 4 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- 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-ZAL-2-082: Introduction to Algebra Introduction to Algebra

- 7 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- 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

| Bachelor's with 1 major Mathematical Physics | JMU Würzburg • generated 26-Aug-2024 • exam. reg. da- | page 55 / 156 |
|--|---|---------------|
| (2009) | ta record Bachelor (180 ECTS) Mathematische Physik - 2009 | |

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-ZAL-P-082: Examination in Number Theory and Algebra

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of module component 10-M-ZAL-1 or module component 10-M-ZAL-2 is a prerequisite for participation in module component 10-M-ZAL-P.

Allocation of places

Additional information

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Workload

Teaching cycle

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

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

Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

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

First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module | e title | | | | Abbreviation | |
|--------------------------|--------------------|---|------------------------------|----------------------------|---|----------------|
| Numerical Mathematics 1 | | | | | 10-M-NM1-082-mo | 1 |
| Module | e coord | inator | | Module offered by | | |
| Dean o | f Studie | es Mathematik (Mathem | atics) | Institute of Mathem | atics | |
| ECTS | | od of grading | Only after succ. con | | | |
| | 1 | | | | | |
| 8 Duratio | | rical grade Module level | Other preveruisites | | | |
| | | | Other prerequisites | | | |
| 1 semester undergraduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- | |
| Conten | ts | | | | | |
| Solutio | n of sys | stems of linear equation tion with polynomials, s | | | | s of equati- |
| Intend | ed learı | ning outcomes | | | | |
| | | acquainted with the fur oblems and knows abou | | | erical mathematics, | applies them |
| Course | S (type, n | umber of weekly contact hours, | language — if other than Ger | man) | | |
| V + Ü (I | no infor | mation on SWS (weekly | contact hours) and co | ourse language avail | able) | |
| - | | sessment (type, scope, langu | | | | ion on whether |
| | | le for bonus) | | | , | |
| by an c 2, appr | oral exa ox. 30 | nation (approx. 90 minu mination of one candida minutes) ssessment: German, En | ate each (approx. 20 n | ninutes) or an oral ex | | |
| Allocat | | | | | | |
| | | | - | | | |
| Additic | nal inf | ormation | | | | |
| Auunn | | | | | | |
| Worklo | | | | | | |
| WORKIO | du | | - | | | |
| | | | _ | | | |
| Teachi | ig cycl | 9 | | | | |
| | | | | | | |
| | | LPOI (examination regulation | | mmes) | | |
| | | hematik Angewandte M | athematik | | | |
| | e appea | | | | | |
| | - | ree (1 major) Computer S | | | | |
| | - | ree (1 major) Mathemati ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Physics (20 | • | | | |
| | - | or Mathematical Physics | | generated 26-Aug-2024 • ex | am, reg. da- | page 57 / 156 |

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Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

| Module | e title | | | | Abbreviation | |
|-------------------------------|-------------------------------|--|--|---|---------------------------------------|---------------|
| Stochastics 1 | | | | 10-M-ST1-082-m01 | | |
| Module coordinator | | | Module offered by | | | |
| | | es Mathematik (Mathe | matics) | Institute of Mathem | natics | |
| ECTS | 1 | od of grading | Only after succ. con | pl. of module(s) | | |
| 8 | | rical grade | | | | |
| Duratio | | Module level | Other prerequisites | | | |
| 1 semester undergraduate | | sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment into | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | | |
| Conten | ts | | | | | |
| continu chastic varianc | ious di indepe e, limit | stributions: normal dis endence, elementary co theorems: law of large | ected discrete distributi tribution, random varia onditional probability, o e numbers, central limit | ble, distribution fun characteristics of dis | ction, product meas | ures and sto- |
| Intende | ed lear | ning outcomes | | | | |
| | | | amental concepts and r the typical fields of ap | | ics, applies these m | ethods to |
| | | | s, language — if other than Ger | | | |
| | | · · · · · · | ly contact hours) and co | | · · · · · · · · · · · · · · · · · · · | |
| | | s essment (type, scope, lang le for bonus) | guage — if other than German, o | examination offered — if no | ot every semester, informat | on on whether |
| by an o 2, appr | oral exa ox. 30 | mination of one candio minutes) | utes); if announced by date each (approx. 20 n nglish if agreed upon w | ninutes) or an oral ex | | |
| Allocat | <u> </u> | | <u></u> | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulati | ons for teaching-degree progra | mmes) | | |
| § 73 (1) | 3. Mat | hematik Stochastik | | | | |
| Module | | | | | | |
| Bachel | or' deg | ree (1 major) Computer ree (1 major) Mathema ree (1 major) Economat | tics (2008) | | | |
| Bachelor's (2009) | with 1 maj | or Mathematical Physics | JMU Würzburg • ta record Bachelo | generated 26-Aug-2024 • ex | am. reg. da- | page 59 / 156 |

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

| Module | e title | | | | Abbreviation | |
|----------------------------|----------------------------------|---|-------------------------------|-----------------------------|-----------------------------|----------------|
| Numerical Mathematics 2 | | | | | 10-M-NM2-082-mo | 1 |
| Module | e coord | inator | | Module offered by | 1 | |
| Dean o | of Studio | es Mathematik (Mathem | natics) | Institute of Mathem | natics | |
| ECTS | | od of grading | Only after succ. com | | | |
| 5 | 1 | rical grade | | , , , , | | |
| Duratio | | Module level | Other prerequisites | | | |
| 1 semester undergraduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | | |
| Conten | nts | | | | | |
| Solutio nary di | on meth ifferenti | ods and applications fo al equations, boundary | | s, linear programmin | ng, initial value prob | lems for ordi- |
| | | ning outcomes | | | | |
| about t | their ad | able to draw a distincti vantages and limitation ng sciences and econon | s concerning the poss | | | |
| Course | es (type, r | number of weekly contact hours, | language — if other than Ger | man) | | |
| V + Ü (I | no infoi | mation on SWS (weekly | contact hours) and co | ourse language avail | able) | |
| | | sessment (type, scope, langu le for bonus) | age — if other than German, e | examination offered — if no | ot every semester, informat | ion on whether |
| by an o 2, appr | oral exa rox. 30 | nation (approx. 90 minu mination of one candida minutes) ssessment: German, En | ate each (approx. 20 n | ninutes) or an oral ex | | • |
| | tion of p | | | | | |
| | | | | | | |
| Additic | onal inf | ormation | | | | |
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| Worklo | bad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulation | ns for teaching-degree progra | mmes) | | |
| | | hematik Angewandte M | | | | |
| | e appea | | | | | |
| Bachel Bachel Bachel | lor' deg lor' deg lor' deg | ree (1 major) Mathemati ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 | 010) 009) | | | |
| | with 1 ma | jor Mathematical Physics | IMIL Würzburg | generated 26-Aug-2024 • ex | | page 61 / 156 |

UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

| Modul | e title | | | | Abbreviation | |
|--|---|---|--|-----------------------------|-----------------------------|----------------|
| Stochastics 2 | | | | | 10-M-ST2-082-m01 | |
| Modul | e coord | inator | | Module offered by | | |
| Dean c | of Studie | es Mathematik (Mathe | matics) | Institute of Mathem | atics | |
| ECTS | 1 | od of grading | Only after succ. com | | | |
| | | | | | | |
| 5 | · · · · · | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 semester undergraduate | | sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | | |
| Conter | nts | | | | | |
| | | ata analysis, statistics | of data in normal and o | ther distributions | lements of multivari | ate statistics |
| | | ning outcomes | | | | |
| | | • | | | | |
| | | | amental concepts and r typical fields of applica | | , applies these metr | loas to prac- |
| | | | s, language — if other than Ger | | | |
| | | | y contact hours) and co | | abla) | |
| | | | | | | |
| | | essment (type, scope, lang le for bonus) | guage — if other than German, e | examination offered — if no | t every semester, informati | ion on whether |
| | | | utes); if announced by | the lecturer the writ | ten examination car | he replaced |
| | | | late each (approx. 20 n | | | |
| | | minutes) | | · | | |
| Langua | age of a | ssessment: German, E | nglish if agreed upon w | ith the examiner | | |
| Allocat | tion of p | olaces | | | | |
| | | | | | | |
| Additio | onal info | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | 2 | | | | |
| Teacill | ng cycl | | | | | |
| | | | | | | |
| | | | ons for teaching-degree progra | mmes) | | |
| § 73 (1 |) 3. Mat | hematik Stochastik | | | | |
| | | rc in | | | | |
| | e appea | | | | | |
| Bachel | or' deg | ree (1 major) Mathema | | | | |
| Bachel Bachel | or' degi or' degi | ree (1 major) Mathema ree (1 major) Economa | thematics (2009) | | | |
| Bachel Bachel Bachel | or' degi or' degi or' degi | ree (1 major) Mathema ree (1 major) Economa ree (1 major) Economa | thematics (2009) thematics (2008) | | | |
| Bachel Bachel Bachel Bachel | or' degi or' degi or' degi or' degi | ree (1 major) Mathema ree (1 major) Economa ree (1 major) Economa ree (1 major) Mathema | thematics (2009) thematics (2008) tical Physics (2009) | 20) | | |
| Bachel Bachel Bachel Bachel Bachel | or' degi or' degi or' degi or' degi or' degi | ree (1 major) Mathema ree (1 major) Economa ree (1 major) Economa ree (1 major) Mathema ree (1 major) Computat | thematics (2009) thematics (2008) tical Physics (2009) tional Mathematics (200 | - | | |
| Bachel Bachel Bachel Bachel Bachel Bachel | or' degi or' degi or' degi or' degi or' degi or's degi | ree (1 major) Mathema ree (1 major) Economa ree (1 major) Economa ree (1 major) Mathema ree (1 major) Computat | thematics (2009) thematics (2008) tical Physics (2009) tional Mathematics (200 Mathematics (Minor, 20 | - | am. reg. da- | page 63 / 156 |



First state examination for the teaching degree Gymnasium Mathematics (2009)

| Modul | e title | | | | Abbreviation | |
|----------------------------|----------------------------------|---|---|-----------------------------|--------------------------------|---------------|
| Advanced Analysis | | | | | 10-M-VAN-082-m01 | |
| Module coordinator | | | | Module offered by | | |
| Dean o | of Studi | es Mathematik (Mathe | matics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | | |
| 8 | | rical grade | | | | |
| Duratio | | Module level | Other prerequisites | | | |
| 1 semester undergraduate | | sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | |
| Conter | nts | | | | | |
| Lebesg | gue inte | gral in several variable ry Fourier theory in L^2 | s, including theorems o , Gauss's theorem. | on convergence and | Fubini's theorem, L^ | p-spaces |
| Intend | ed lear | ning outcomes | | | | |
| | | | nced topics in analysis uction of a complex ma | | e of the Lesbegue inte | egral, he or |
| Course | es (type, r | number of weekly contact hour | s, language — if other than Ger | man) | | |
| Ü + V (| no infoi | mation on SWS (weekl | y contact hours) and co | ourse language avail | able) | |
| | | Sessment (type, scope, lang le for bonus) | guage — if other than German, o | examination offered — if no | ot every semester, information | on on whether |
| by an o 2, appi | oral exa rox. 30 | mination of one candic minutes) | utes); if announced by date each (approx. 20 n nglish if agreed upon w | ninutes) or an oral ex | | |
| Allocat | tion of p | olaces | | | | |
| | | | | | | |
| Additio | onal inf | ormation | | | | |
| | | | | | | |
| Worklo | bad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulati | ons for teaching-degree progra | mmes) | | |
| | | hematik Analysis | 0 - 30.22 P. 00.00 | | | |
| | e appea | | | | | |
| Bachel Bachel Bachel | lor' deg lor' deg lor' deg | ree (1 major) Mathema ree (1 major) Economat ree (1 major) Economat ree (1 major) Mathema | thematics (2009) thematics (2008) | | | |
| | lar' dag | ree (1 major) Computat | in al Mathematica (an | ` | | |
| Bachel | ior deg | iee (1 majoi) computat | ional Mathematics (20) | 09) | | |

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

| Module title Abbreviation | | | | | | | |
|---------------------------|---|--|------------------------------|-----------------------------|---|--|--|
| Model | Modelling and Computational Science10-M-MWR-092-m01 | | | | | | |
| Modul | e coord | inator | | Module offered by | | | |
| Dean c | of Studio | es Mathematik (Mathema | atics) | Institute of Mathem | natics | | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | | |
| 8 | nume | rical grade | | | | | |
| Durati | on | Module level | Other prerequisites | | | | |
| 1 seme | ester | undergraduate | | | | | |
| Conter | nts | | | | | | |
| scaling ons, fu | g the mo | odelling, asymptotic serie ntal methods for numeric | es, classical methods | for solving ordinary | rinciples of modelling, aspects of and partial differential equati- ns and the resulting systems of li- | | |
| Intend | ed lear | ning outcomes | | | | | |
| | | asters the fundamental r ng sciences on a comput | | ds and techniques to | simulate processes from natural | | |
| Course | S (type, r | umber of weekly contact hours, l | anguage — if other than Ger | rman) | | | |
| V + Ü (| no infoi | mation on SWS (weekly o | contact hours) and co | ourse language avail | able) | | |
| | | essment (type, scope, langua le for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether | | |
| | | mination (approx. 90 min tes) or c) oral examinatio | | | tion of one candidate each (ap- utes) | | |
| - | tion of p | | 0 1 0 1 | · 11 5 | | | |
| | | | | | | | |
| Additio | onal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachi | ng cycl | е | | | | | |
| | | | | | | | |
| Referre | ed to in | LPO I (examination regulation | s for teaching-degree progra | immes) | | | |
| | | | | | | | |
| Modul | e appea | ars in | | | | | |
| | - | ree (1 major) Nanostructu | |) | | | |
| | | ree (1 major) Mathematic | | , | | | |
| Bache | or' deg | ree (1 major) Computatio | nal Mathematics (20 | 09) | | | |

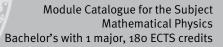


Physics (ECTS credits)

Students who took module 11-QAM or module 11-FKP will not be able to take module 11-KM. With regard to future participation in the Master's degree programme FOKUS Physik (Physics), students interested in participating in the FOKUS programme are recommended to take modules 11-KM and 11-KET.

| Module title Abbreviation | | | | | | | |
|---|--|--|--|---|--|--|--|
| Astroph | hysics | | | | 11-A4-072-m01 | | |
| Module coordinator | | | | Module offered by | 1 | | |
| | ing Dire | ector of the Institute of | Theoretical Physics | Faculty of Physics a | and Astronomy | | |
| ECTS | | od of grading | Only after succ. con | npl. of module(s) | | | |
| 6 | | rical grade | | | | | |
| Duratio | <u> </u> | Module level | Other prerequisites | | | | |
| 1 seme | ster | undergraduate | 50% of exercises. C sion to assessment ve details at the beg be considered a dec students have obtain over the course of the assessment into eff mitted to assessme | on prerequisite to assessment: successful completion of approx. exercises. Certain prerequisites must be met to qualify for admis- ssessment. The lecturer will inform students about the respecti- s at the beginning of the course. Registration for the course will dered a declaration of will to seek admission to assessment. If have obtained the qualification for admission to assessment course of the semester, the lecturer will put their registration for the transfer of the course admission to assessment course of the semester, the lecturer will put their registration for the time of the current or in the subsequent semester. For the tat a later date, students will have to obtain the qualification | | | |
| Conten | | | | sessment anew. | | | |
| large-so nucleos Intende The stu physica | cale str synthes ed learn idents a al obse iey know | n, structure of the Milky ucture of the universe, sis, cosmic microwave l ning outcomes are familiar with the mo rvations and evaluatior w the structure of the u | Friedmann World Mod background radiation, odern world view of Ast ns. They are able to use | els, thermodynamics structure formation, rophysics. They know these methods to p | s of the early univers inflation w methods and tool olan and analyse ow | se, primordial s for astro- n observati- | |
| • | | umber of weekly contact hours | . language — if other than Ge | rman) | | | |
| | | mation on SWS (weekly | | | able) | | |
| Method | d of ass | essment (type, scope, lang le for bonus) | · | | | tion on whether | |
| | | nation (approx. 120 mir | nutes) | | | | |
| Allocat | | | | | | | |
| | | f pool of general key sk | ills (ASQ): 15 places. P | laces will be allocate | ed by lot. | | |
| Additio | nal info | ormation | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachir | ng cycl | 9 | | | | | |
| | | | | | | | |
| Referre | d to in | LPO I (examination regulation | ons for teaching-degree progra | immes) | | | |
| | | | | | | | |
| Module | | | | | | | |
| Bachelo | or' deg | ree (1 major) Physics (2 | 007) | | | | |
| Bachelor's ((2009) | with 1 maj | or Mathematical Physics | - | generated 26-Aug-2024 • ex r (180 ECTS) Mathematische | - | page 69 / 156 | |





Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

| Module | e title | | | | Abbreviation |
|---|---|--|---|---|--|
| Introdu | iction t | o Plasmaphysics | | | 11-EPP-092-m01 |
| Module | e coord | inator | | Module offered by | <u> </u> |
| Manag and As | | ector of the Institute of T sics | heoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS | | od of grading | Only after succ. con | pl. of module(s) | |
| 6 | 1 | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 seme | ster | graduate Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective de at the beginning of the course. Registration for the course will be co sidered a declaration of will to seek admission to assessment. If stu dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration fo sessment into effect. Students who meet all prerequisites will be ac ted to assessment in the current or in the subsequent semester. Fo sessment at a later date, students will have to obtain the qualificat admission to assessment anew. | | | nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- |
| Conten | ts | | | | |
| Transpo thin the | ort equ e solar | ations for energetic part | icles, Properties of ma on via shock waves ar | agnetic turbulence, F nd via interaction wit | elds, Magnetohydrodynamics, Propagation of solar particles wi- th plasma turbulence, Particle ac liation. |
| Intend | ed lear | ning outcomes | | | |
| | | | | | of transport phenomena in plas- nowledge to Astrophysics. |
| Course | S (type, r | number of weekly contact hours, | language — if other than Ger | rman) | |
| V + R (r | no infor | mation on SWS (weekly | contact hours) and co | ourse language avail | able) |
| | | Sessment (type, scope, langu le for bonus) | age — if other than German, | examination offered — if no | ot every semester, information on whether |
| groups project (approz Assess and wil examin | (appro report x. 30 m ment o Il be an nation r | x. 30 minutes per candi (approx. 8 to 10 pages, inutes) ffered: When and how o | date, for modules with time to complete: 1 to ften assessment will h der observance of Sec | n less than 4 ECTS cr 4 weeks) or d) prese pe offered depends o | date each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and |
| Allocat | ion of p | olaces | <u> </u> | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| Teachi | ng cycl | e | | | |
| Doforro | d to in | | no fortoookin - Ja | | |
| | | LPOI (examination regulatio | is for teaching-degree progra | innines) | |
| Bachelor's | with 1 ma | jor Mathematical Physics | JMU Würzburg • | generated 26-Aug-2024 • ex | am. reg. da- page 71 / 156 |
| (2009) | | | | r (180 ECTS) Mathematische | |

Module appears in

| Bachelor' degree (1 major) Physics (2010) |
|---|
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |
| Master's degree (1 major) Computational Mathematics (2012) |

| Modul | e title | | | | Abbreviation |
|--|--|---|--|--|--|
| Quantum Mechanics II | | | | | 11-QM2-092-m01 |
| Module coordinator | | | | Module offered by | <u>l</u> |
| | ing Dire | ector of the Institute of sics | Theoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS Method of grading Only after succ. compl. of module(s) | | | | | |
| 8 | 1 | rical grade | | | |
| Duration Module level Other prerequisites | | | | | |
| 1 semester | | undergraduate | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective deta at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment of the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be adr ted to assessment in the current or in the subsequent semester. For sessment at a later date, students will have to obtain the qualification | | |
| Conter | nts | I | admission to asses | | |
| 2. Band 3. Angu 4. Scat 5. Rela of aton 6. Qua 7. Cand Intende | d struct ular mo ttering t tivistic nic spe ntum e onical f ed lear udents | quantum mechanics: ctra ntanglement ormalism ning outcomes acquire in-depth know | rystal perators, Lie Algebras ering, partial wave expa Klein-Gordon equation, ledge of advanced qua | Dirac equation, Lore | etz group, fine structure splitting |
| of the modern thods a | mathen n theor and to i | natical and theoretical etical Quantum Physic nterpret the results ph | concepts of the listed t s mathematically, to so sysically. The course is p | opics. They are able lve problems analyti pivotal to subsequen | to describe or model problems o cally, to use approximation me- it theory courses in Astrophysics, nandatory for all Master's stu- |
| Course | es (type, r | number of weekly contact hou | rs, language — if other than Ge | rman) | |
| $R \perp V h$ | no infoi | mation on SWS (week | ly contact hours) and co | ourse language avail | able) |
| л т v (I | | | | | |
| Metho | | sessment (type, scope, lan ble for bonus) | guage — if other than German, | examination offered — if no | ot every semester, information on whether |
| Metho module is a) writt groups project (appro. Assess and wi examir | s creditat ten exa 5 (appro t report x. 30 m sment o Il be an nation r | nle for bonus) mination (approx. 90 r ox. 30 minutes per can (approx. 8 to 10 pages inutes) ffered: When and how | ninutes) or b) oral exam didate, for modules wit s, time to complete: 1 to often assessment will under observance of Se | nination of one candi h less than 4 ECTS cr 9 4 weeks) or d) prese be offered depends o | ot every semester, information on whether idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and |

| Allocation of places |
|--|
| |
| |
| Additional information |
| |
| Workload |
| |
| Teaching cycle |
| |
| Referred to in LPO I (examination regulations for teaching-degree programmes) |
| |
| Module appears in |
| Bachelor' degree (1 major) Physics (2010) |
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Nanostructure Technology (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |
| Master's degree (1 major) Computational Mathematics (2012) |

Bachelor's with 1 major Mathematical Physics

(2009)

| Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 8 numerical grade Duration Module level Other prerequisites 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 admission to assessment. The locturer will inform students about the respective details at the beginning of the course. Registration for admission to assessment over the course of the semester, the lecturer will put their registration for assessment inte circle of the semester. The admission to assessment or admission to assessment inte circle of the samester in the current or in the subsequent semester. For assessment in the current or in the subsequent semester. For assessment into diffect. Students will have to obtain the qualification for admission to assessment anew. Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. 1 Single-particle Green's function 2 Neview of second quantization 3 Diagrammatic method using many particle Green's functions at temperature T=o 4 Diagrammatic method using many particle Green's functions at temperature T=o 4 Diagrammatic method using many particle Green's function a temperature T=o 9 Londau theory of Fermi liquids 6 Superconductivity | Module | e title | | | | Abbreviation |
|--|--|---|---|---|-----------------------------|---|
| Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 8 numerical grade Duration Module level Other prerequisites 1 semester graduate 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 in the current or in the subsequent semester. For assessment in the feat. Students will have to obtain the qualification for admission to assessment anew. Contents | Many B | Body Qı | uantum Theory | | | 11-QVTP-092-m01 |
| and Astrophysics Method of grading Only after succ. compl. of module(s) 8 numerical grade 1 semester graduate 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 over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew. Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. An outline could be: 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method using many particle Green's functions at temperature T=o 4 Diagrammatic method using many particle Green's functions at temperature T=o 4 Diagrammatic method versing outcomes The students have mastered the principles of quantum field theory in many-particle systems. They are able to apply the acquired methods to current problems of Theoretical Solid-State Physics. Courses (type, number of weekly contact hours, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German) A writte | Module coordinator | | | | Module offered by | 1 |
| 8 numerical grade - Duration Module level Other prerequisites 1 semester graduate 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 time offect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment in the diffect. Students who meet all prerequisites will be admitted to assessment at a later date, students will have to obtain the qualification for admission to assessment anew. Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. An outline could be: 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method using many particle Green's functions at temperature T=o 4 Diagrammatic method using many particle Green's functions at temperature T=o 4 Diagrammatic method using many particle Green's function 2 Kewident Method using many particle Green's functions at temperature T=o 4 Diagrammatic method using many particle for the functions at temperature T=o 9 Loigrammatic method using many particle for the funceman | | | | neoretical Physics | Faculty of Physics a | and Astronomy |
| Duration Module level Other prerequisites 1 semester graduate 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 current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment and aution admission to assessment anew. Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. A notifice Could be: 1 Single-particle Green's functions at temperature T=0 4 Diagrammatic method using many particle Green's functions at temperature T=0 4 Diagrammatic method using many particle Green's functions at temperature T=0 9 Landau theory of Fermi liquids 6 Superconductivity 7 One-dimensional systems and bosonization Intended learning outcomes The students have mastered the principles of quantum | ECTS | ECTS Method of grading Only after succ. compl. of module(s) | | | | |
| 1 semester graduate 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 in the current or in the subsequent semester. For asferen's functions. Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method for finite T 5 Jandau theory of Fermi liquids 6 Superconductivity 7 One-dimensional systems and bosonization Intended learning outcomes The students whor meety in many-particle systems. They are able to apply the acquired methods to current problems of Theoretical Solid-State Physics. Courses (type, number of weekly contact hours) and course language available) Method of assessment (uppc. scope, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (uppc. scope, language – if other than German) R + V (no information (approx. 90 minutes) or b) oral examination of one candidate each or oral ex | 8 | nume | rical grade | | | |
| sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. A no uttine could be: 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method of finite T 4 Diagrammatic method for finite T 5 Landau theory of Fermi liquids 6 Superconductivity 7 One-dimensional systems and bosonization Intended learning outcomes The students have mastered the principles of quantum field theory in many-particle systems. They are able to ap ply the acquired methods to current problems of Theoretical Solid-State Physics. Courses (type, number of weekly contact hours,) and course language available) Method of assessment (type, scope, language – if other than Geman, Reamination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination (approx. 90 minutes) or co) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 9 minutes) <td>Duratio</td> <td>on</td> <td>Module level</td> <td>Other prerequisites</td> <td></td> <td></td> | Duratio | on | Module level | Other prerequisites | | |
| Contents Contents This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. An outline could be: 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method using many particle Green's functions at temperature T=0 4 Diagrammatic method for finite T 5 Landau theory of Fermi liquids 6 Superconductivity 7 One-dimensional systems and bosonization Intended learning outcomes The students have mastered the principles of quantum field theory in many-particle systems. They are able to ap ply the acquired methods to current problems of Theoretical Solid-State Physics. Courses (type, number of weekly contact hours, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) or al examination of one candidate each or or al 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 Allocation of places | 1 semester graduate | | graduate | sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | |
| This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions. An outline could be: 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method using many particle Green's functions at temperature T=0 4 Diagrammatic method for finite T 5 Landau theory of Fermi liquids 6 Superconductivity 7 One-dimensional systems and bosonization Intended learning outcomes The students have mastered the principles of quantum field theory in many-particle systems. They are able to ap ply the acquired methods to current problems of Theoretical Solid-State Physics. Courses (type, number of weekly contact hours, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) or al 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 Allocation of places | Conton | | | | | |
| Courses (type, number of weekly contact hours, language — if other than German) R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) 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 Allocation of places | 2 Revie 3 Diagr 4 Diagr 5 Landa 6 Supe 7 One-c Intende | ew of se rammat rammat au theo rcondu dimens ed learn idents l | econd quantization ic method using many pa ic method for finite T ory of Fermi liquids ctivity ional systems and bosor ning outcomes have mastered the princi | nization ples of quantum field | l theory in many-par | ticle systems. They are able to ap- |
| R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) 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 Allocation of places | | | · · · | - | · · · · | 5. |
| Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) 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 Allocation of places | | | | | | -11-) |
| 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 Allocation of places | | | · | - | | |
| 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 Allocation of places | | | | ige — if other than German, | examination offered — If no | of every semester, information on whether |
| | 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 | | | | | |
| Additional information | | | - | | | |
| Additional information | | | | | | |
| | <u>Additio</u> | onal inf | ormation | | | |
| | | | | | | |

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Mathematische Physik - 2009

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Workload

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

| Module | e title | | | | Abbreviation |
|---|---|--|---|---|---|
| Relativ | istic Ef | fects in Mesoscopic Sy | /stems | | 11-RMS-092-m01 |
| Module coordinator | | | | Module offered by | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | | Theoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS | <u> </u> | od of grading | Only after succ. con | npl. of module(s) | |
| 5 numerical grade | | | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 semester gradua | | graduate | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | |
| Conten | its | · | | | |
| | | fects in mesoscopic sy tors Majorana fermio | | oling Dirac equatio | n Quantum Hall effect Topo- |
| Intende | ed lear | ning outcomes | | | |
| | | | | | elativistic quantum systems, edge to simple systems. |
| Course | S (type, r | number of weekly contact hou | rs, language — if other than Ge | rman) | |
| R + V (r | no infoi | rmation on SWS (week | y contact hours) and co | ourse language avail | able) |
| | | Sessment (type, scope, lang ble for bonus) | guage — if other than German, | examination offered — if no | ot every semester, information on whether |
| groups project (approx Assess and wil examin Langua | (appro report x. 30 m ment o Il be an nation r age of a | ox. 30 minutes per cana (approx. 8 to 10 pages inutes) Iffered: When and how nounced in due form u regulations) 2009. | didate, for modules with , time to complete: 1 to often assessment will l inder observance of Sec | n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and |
| Allocat | ion of _l | places | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| World - | | | | | |
| Worklo | au | | | | |
| Teachi | ng cvcl | e | | | |
| | 0 - 9 - 0 | | | | |
| Referre | ed to in | LPO I (examination regulat | ions for teaching-degree progra | ummes) | |
| Module | e appea | ars in | | | |
| Bachelor's (2009) | with 1 ma | jor Mathematical Physics | | generated 26-Aug-2024 • ex r (180 ECTS) Mathematische | |

| Bachelor' degree (1 major) Physics (2010) |
|---|
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |

| Module title | | | | | Abbreviation | |
|---|--|---|---|--|---|---------------|
| Theoret | tical So | lid State Physics | | | 11-TFK-092-m01 | |
| Module | coord | inator | | Module offered by | | |
| Managing Director of the Institute of Theoretica and Astrophysics | | | Theoretical Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. com | npl. of module(s) | | |
| 8 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 1 semester | | graduate | sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | |
| Conten | ts | | 1 | | | |
| | | heoretical Solid-State F tism. Superconductivity | , | eory. Electron-electro | on interaction. Varia | tional me- |
| Intende | ed learr | ning outcomes | | | | |
| respond theory a | ding mand to | nave basic knowledge of athematical or theoretion understand the connection opic of solid-state theo | cal methods and are al tions to experimental r | ole to apply them to results. The individua | basic problems of so al students have elal | olid-state |
| Courses | 5 (type, n | umber of weekly contact hours | s, language — if other than Ger | man) | | |
| R + V (n | o infor | mation on SWS (weekly | / contact hours) and co | ourse language availa | able) | |
| | | s essment (type, scope, lang le for bonus) | uage — if other than German, e | examination offered — if no | t every semester, informati | on on whether |
| groups project (approx Assessi and will examin | 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 | | | | | |
| Allocati | ion of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Workload | | | | | | |
| | | | | | | |
| Teachin | Teaching cycle | | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulation | ons for teaching-degree progra | mmes) | | |
| | | | | | | |
| Bachelor's v (2009) | witri 1 maj | or Mathematical Physics | _ | generated 26-Aug-2024 • exa r (180 ECTS) Mathematische F | - | page 79 / 156 |

| Bachelor' degree (1 major) Physics (2010) |
|---|
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |
| Master's degree (1 major) Computational Mathematics (2012) |

Bachelor's with 1 major Mathematical Physics

(2009)

| Modul | Module title Abbreviation | | | | |
|--|--|--|---|---|---|
| Theory | of Sup | erconduction | | | 11-TSL-092-m01 |
| Module coordinator | | | | Module offered by | |
| | ing Dire trophys | ector of the Institute of Th ics | eoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | |
| 5 | | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| sessment. The lectur at the beginning of th sidered a declaration dents have obtained the course of the sen sessment into effect. ted to assessment in | | es must be met to qualify for admission to as- urer will inform students about the respective details the course. Registration for the course will be con- on of will to seek admission to assessment. If stu- ed the qualification for admission to assessment over emester, the lecturer will put their registration for as- ct. Students who meet all prerequisites will be admit- in the current or in the subsequent semester. For as- date, students will have to obtain the qualification for | | | |
| Conter | | | admission to assess | sinch ancw. | |
| Phenor vity (Ar elemer Intende The stu | menolo ndreev s nts. ed learn udents l operties | gical theory of supercond scattering, Bobolioubov- ning outcomes nave basic knowledge of | ductivity (Ginzburg-La de Gennes equation, the theoretical mode | andau theory). Meso SQUIDS). Quantum | aperconductivity (BCS theory). scopic aspects of superconducti- computing with superconductive n of superconductivity. They know ulation methods to simple pro- |
| | | umber of weekly contact hours, l | anguage — if other than Ger | rman) | |
| | | mation on SWS (weekly o | | | able) |
| | | essment (type, scope, langua le for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether |
| 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 | | | | | |
| Allocat | Allocation of places | | | | |
| | | | | | |
| Additio | Additional information | | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teaching cycle | | | | | |
| | | | | | |
| | | | | | |

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Mathematische Physik - 2009

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Module appears in

| Bachelor' degree (1 major) Physics (2010) |
|---|
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |
| Master's degree (1 major) Computational Mathematics (2012) |
| |

| Module title | | | Abbreviation | |
|--|---|--|--|--|
| Physics of Complex Systems | | | 11-PKS-092-m01 | |
| Module coordinator | | Module offered by | | |
| Managing Director of the Institute and Astrophysics | of Theoretical Physics | Faculty of Physics a | ind Astronomy | |
| ECTS Method of grading | Only after succ. con | npl. of module(s) | | |
| 6 numerical grade | | | | |
| Duration Module level | Other prerequisites | | | |
| 1 semester graduate | sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | |
| Contents | | | | |
| Theory of critical phenomena in Introduction into the physics of Entropy production and fluctua Phase transitions away from eq Universalityt Spin glassest Theory of neural networks | ut of equilibriumt tionst | | | |
| Intended learning outcomes | | | | |
| The students have specific and ac methods of Statistical Physics, Co such systems. They are able to wo | omputational Physics and | non-linear dynamics | | |
| Courses (type, number of weekly contact h | ours, language — if other than Ger | rman) | | |
| R + V (no information on SWS (we | ekly contact hours) and co | ourse language avail | able) | |
| Method of assessment (type, scope, module is creditable for bonus) | language — if other than German, | examination offered — if no | t every semester, information on whether | |
| 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 | | | | |
| Allocation of places | | | | |
| | | | | |
| Additional information | | | | |
| | | | | |
| Workload | | | | |
| | | | | |

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

| Modul | e title | | | | Abbreviation | |
|---|---|--|---|--|---|--|
| Quantı | um Info | rmation and Quantur | n Computing | | 11-QIC-092-m01 | |
| Module coordinator | | | | Module offered by | | |
| | ing Dire trophys | | of Theoretical Physics | Faculty of Physics a | and Astronomy | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | |
| 5 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | i | | |
| 1 semester graduate | | graduate | sessment. The lectu at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | |
| Conten | te | | | | | |
| tron sp states. Intende The stu They an | in state ed learn idents l re able | es. The third part cove ning outcomes have an advanced un to solve simple probl | ers the description and e | xplanation of decoh theory and basic kn tion theory. | nipulation of coherent two-elec- erence of quantum mechanical | |
| | _ | | kly contact hours) and co | | lable) | |
| Metho | d of ass | | | | ot every semester, information on whether | |
| a) writt groups project (appro Assess and wi examir | en exa (appro report x. 30 m ment o ll be an | mination (approx. 90 x. 30 minutes per cal (approx. 8 to 10 page inutes) ffered: When and ho | ndidate, for modules with es, time to complete: 1 to w often assessment will under observance of Se | h less than 4 ECTS c 4 weeks) or d) pres be offered depends | idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and | |
| Allocat | tion of p | olaces | | | | |
| | | | | | | |
| Additio | onal inf | ormation | | | | |
| Worklo | oad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |

Module appears in

| Bachelor' degree (1 major) Physics (2010) |
|---|
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |

| Module | title | | | | Abbreviation | |
|---|--|---|---|---|--|--|
| Statisti | ics, Dat | a Analysis and Compu | ter Physics | | 11-SDC-092-m01 | |
| Module | Module coordinator | | | Module offered by | | |
| Managing Director of the Institute of Applied Physics | | | Applied Physics | Faculty of Physics and Astronomy | | |
| ECTS | | od of grading | Only after succ. con | | | |
| 4 | | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 1 semester graduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | | |
| Conten | ts | | | | | |
| Statisti | cs, dat | a analysis and comput | er physics. | | | |
| Intende | ed lear | ning outcomes | | | | |
| The stu Physics | | nave specific and adva | nced knowledge in the | field of statistics, da | ata analysis and Con | nputational |
| Course | S (type, r | umber of weekly contact hour | s, language — if other than Gei | rman) | | |
| R + V (n | io infor | mation on SWS (weekl | y contact hours) and co | ourse language avail | able) | |
| module is | creditab | le for bonus) | guage — if other than German, | | | |
| groups project (approx Assess and wil examin Langua | (appro report <. 30 m ment o l be an ation r ge of a | x. 30 minutes per cand (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E | ninutes) or b) oral exam lidate, for modules with , time to complete: 1 to often assessment will h nder observance of Sec nglish | n less than 4 ECTS cr 4 weeks) or d) prese pe offered depends o | edits approx. 20 min entation/seminar pro on the method of as: | nutes) or c) esentation sessment |
| Allocat | ion of p | olaces | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachir | ig cycl | 9 | | | | |
| Doform- | d to : | | | | | |
| Keierre | | LFUI (examination regulati | ons for teaching-degree progra | mmes) | | |
| Module | annor | in in | | | | |
| Bachel | or' deg | ree (1 major) Physics (2 ree (1 major) Physics (2 | | | | |
| Bachelor's (2009) | with 1 ma | or Mathematical Physics | | generated 26-Aug-2024 • ex r (180 ECTS) Mathematische | - | page 87 / 156 |

| WÜRZBURG |
|---|
| |
| Bachelor' degree (1 major) Nanostructure Technology (2010) |
| Bachelor' degree (1 major) Nanostructure Technology (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Nanostructure Technology (2011) |
| Master's degree (1 major) Nanostructure Technology (2010) |
| Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) |
| Master's degree (1 major) FOKUS Physics (2010) |

Master's degree (1 major) FOKUS Physics (2010)

Julius-Maximilians-UNIVERSITÄT

Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

| Module | e title | | | Abbreviation | |
|---|--|--|--|---|---|
| Cosmo | logy | | | | 11-AKM-092-m01 |
| Module | e coord | inator | | Module offered by | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | | Theoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS | | od of grading | Only after succ. con | npl. of module(s) | |
| 6 | nume | rical grade | | - | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 semester graduate | | sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the set sessment into effect ted to assessment i | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | |
| Conten | ts | 1 | - I | | |
| matter, | , primo | rdial nucleosynthesis, | | kground, structure fo | e early universe, inflation, dark ormation, supercluster, galaxies |
| Intend | ed lear | ning outcomes | | | |
| | late the | em to observations. The | | | ethods of cosmology and are ab- th topics and are able to work on |
| | | | rs, language — if other than Ger | | |
| | | | y contact hours) and co | | |
| | | sessment (type, scope, lang ble for bonus) | guage — if other than German, | examination offered — if no | ot every semester, information on whether |
| groups project (approz Assess and wil examin | (appro report x. 30 m ment o Il be an ation r | ox. 30 minutes per cano (approx. 8 to 10 pages inutes) iffered: When and how | lidate, for modules with , time to complete: 1 to often assessment will l inder observance of Sec | n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and |
| Allocat | ion of _l | places | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| | - | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| Referre | ed to in | LPO I (examination regulati | ions for teaching-degree progra | immes) | |
| | | | | , | |

| Plasma | e title | | | | Abbreviation | |
|--|---|---|---|---|---|---|
| | a-Astro | physics | | | 11-APL-092-m01 | |
| Module coordinator | | | | Module offered by | | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | | Faculty of Physics a | and Astronomy | | |
| ECTS Method of grading Only after succ. compl. of module(s) | | | | | | |
| 6 | | rical grade | | • | | |
| Duratio | on | Module level | Other prerequisites | i | | |
| 1 semester graduate Certain pro- sessment. at the beg sidered a dents have the course sessment ted to asset | | | sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | is must be met to qu irer will inform stude the course. Registrat on of will to seek adm d the qualification for mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew. | nts about the resp ion for the course on hission to assessm or admission to ass will put their regist et all prerequisites e subsequent sem | ective details will be con- ent. If stu- essment over tration for as- will be admit- ester. For as- |
| Conten | Its | | | | | |
| The stu motion compa Course | idents and a re and s (type, i | ning outcomes have basic knowledge of cceleration of charged p evaluate theory and ex number of weekly contact hour rmation on SWS (weekly | particles in space, they periments. s, language — if other than Ge | know corresponding | g measuring metho | |
| | | sessment (type, scope, lang | · | | | ation on whether |
| | | ble for bonus) | | | st every semester, morni | ation on whether |
| | en exa | mination (approx oo m | vinutes) or b) oral exam | | | |
| groups project (approz Assess and wil examin | (appro report x. 30 m ment o Il be ar nation r | (approx. 90 minutes per cand (approx. 8 to 10 pages inutes) Iffered: When and how mounced in due form u regulations) 2009. | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (approz Assess and wil examir Langua | (appro report x. 30 m ment o Il be ar nation r age of a | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) Iffered: When and how inounced in due form u regulations) 2009. | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (approz Assess and wil examir Langua Allocat | (appro report x. 30 m ment c Il be ar nation r age of a tion of | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) Iffered: When and how inounced in due form u regulations) 2009. | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (appro: Assess and wil examir Langua Allocat Additic | (approd report x. 30 m ment o ll be ar nation r age of a ion of | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) offered: When and how nounced in due form u regulations) 2009. Issessment: German, En places | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (approz Assess and wil examir Langua Allocat | (approd report x. 30 m ment o ll be ar nation r age of a ion of | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) offered: When and how nounced in due form u regulations) 2009. Issessment: German, En places | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (appro: Assess and wil examir Langua Allocat Additic Worklo | (approd report x. 30 m ment o Il be an nation r age of a ion of | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) offered: When and how inounced in due form u regulations) 2009. Issessment: German, En places | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (appro: Assess and wil examir Langua Allocat Additio Worklo | (approd report x. 30 m ment o Il be an nation r age of a ion of | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) offered: When and how inounced in due form u regulations) 2009. Issessment: German, En places | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |
| groups project (appro: Assess and wil examir Langua Allocat Additic | (approd report x. 30 m ment o Il be an nation r age of a ion of | ox. 30 minutes per cand (approx. 8 to 10 pages inutes) offered: When and how inounced in due form u regulations) 2009. Issessment: German, En places | lidate, for modules with, time to complete: 1 to often assessment will nder observance of Se | h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o | redits approx. 20 m entation/seminar p on the method of a | ninutes) or c) presentation ssessment |

Module appears in

| Module title | | | | | Abbreviation | |
|--|--|---|--|----------------------------------|-----------------------------|----------------|
| Group Theory | | | | | 11-GRT-092-m01 | |
| Module | coord | inator | | Module offered by | | |
| Managing Director of the Institute of The and Astrophysics | | | Theoretical Physics | Faculty of Physics and Astronomy | | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | |
| 6 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 1 semester graduate | | sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | | |
| Conten | ts | | | | | |
| Group t | heory. | Finite groups. Lie grou | ps. Lie algebra. Depicti | on. Tensors. Classifi | cation theorem. App | lications. |
| Intende | d learr | ning outcomes | | | | |
| group tl | heory a | | up theory, especially of sing the acquired methologies. | | | |
| Courses | 5 (type, n | umber of weekly contact hour | s, language — if other than Gei | rman) | | |
| R + V (n | o infor | mation on SWS (weekl | y contact hours) and co | ourse language availa | able) | |
| | | essment (type, scope, lang le for bonus) | uage — if other than German, | examination offered — if no | t every semester, informati | ion on whether |
| groups project (approx Assessi and will | 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. | | | | | |
| Allocati | ion of p | olaces | | | | |
| Additio | nal info | ormation | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teaching cycle | | | | | | |
| | <u> </u> | | | | | |
| Referre | d to in | LPO I (examination regulati | ons for teaching-degree progra | immes) | | |
| | | | | | | |
| Module | appea | rs in | | | | |
| Bachelor's | with 1 mai | or Mathematical Physics | IMII Würzburg • | generated 26-Aug-2024 • exa | am, reg. da- | page 93 / 156 |
| (2009) | | | | r (180 ECTS) Mathematische F | - | P~5~ 7) / 100 |

| Bachelor' degree (1 major) Physics (2010) |
|--|
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) Mathematics (2012) |
| Master's degree (1 major) Mathematics (2010) |
| Master's degree (1 major) Physics (2010) |
| Master's degree (1 major) Physics (2011) |
| Master's degree (1 major) Mathematical Physics (2012) |
| Master's degree (1 major) FOKUS Physics (2010) |
| Master's degree (1 major) FOKUS Physics (2011) |
| Master's degree (1 major) Computational Mathematics (2012) |

| Numor | e title | | | | Abbreviation |
|--|---|--|---|---|--|
| Hamel | rical Mo | ethods in Astrophysi | cs | | 11-NMA-092-m01 |
| Module coordinator | | | | Module offered by | 1 |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | | of Theoretical Physics | Faculty of Physics a | |
| ECTS Method of grading Only after succ. compl. of module(s) | | | | | |
| 6 | | erical grade | | 1 | |
| Durati | on | Module level | Other prerequisites | 6 | |
| 1 semester graduate | | graduate | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | |
| Conter | nts | | | | |
| CL). | | as of high-performant rning outcomes | e computing. Message-p | assing interface (Mi | PI). GPGPU programming (Open- |
| The stu | udents | are able to solve typ | | | and other subdisciplines of Phy- osing adequate strategies to ap- |
| The stu sics wi | udents ith the | are able to solve typ | nulations. They are espec | | and other subdisciplines of Phy- osing adequate strategies to ap- |
| The stu sics wi proach Course | udents ith the n such es (type, | are able to solve typ help of numerical sin problems and of valio number of weekly contact h | nulations. They are espec dating the results. hours, language — if other than Ge | ially capable of choo | osing adequate strategies to ap- |
| The stu sics wi proach Course V + Ü (| udents ith the n such es (type, (no info | are able to solve typ help of numerical sin problems and of valio number of weekly contact h prmation on SWS (we | nulations. They are espec dating the results. Hours, language — if other than Ge ekly contact hours) and co | ially capable of choo man) ourse language avai | osing adequate strategies to ap- |
| The stu sics wi proach Course V + Ü (Metho module i | udents ith the n such es (type, no info od of as | are able to solve typ help of numerical sin problems and of valid number of weekly contact h prmation on SWS (we seessment (type, scope, l ble for bonus) | nulations. They are espec dating the results. hours, language — if other than Ge ekly contact hours) and co language — if other than German, | ially capable of choo rman) ourse language avai examination offered — if n | lable) ot every semester, information on whether |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin | udents ith the n such es (type, fino info d of as is credita ten exa s (appro- t report ox. 30 n sment o ill be an nation | are able to solve typi help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | osing adequate strategies to ap- |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua | udents ith the n such es (type, fno info d of as is credita ten exa s (appro- t report x. 30 n sment o ill be an nation age of a | are able to solve typ help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination ir redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua | udents ith the n such es (type, fno info d of as is credita ten exa s (appro- t report x. 30 n sment o ill be an nation age of a | are able to solve typ help of numerical sin problems and of valio number of weekly contact h ormation on SWS (week issessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination ir redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua | udents ith the n such es (type, ino info d of as is credita ten exa s (appro t report x. 30 n sment o ill be an nation age of a tion of | are able to solve typ help of numerical sin problems and of valio number of weekly contact h ormation on SWS (week issessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination ir redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua Alloca | udents ith the n such es (type, ino info d of as is credita ten exa s (appro t report x. 30 n sment o ill be an nation age of a tion of | are able to solve typ help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German places | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination ir redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua Alloca | udents ith the n such es (type, ino info d of as is credita ten exa s (appro t report x. 30 n sment o ill be an nation age of a tion of | are able to solve typ help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German places | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua Alloca Additio | udents ith the n such es (type, ino info d of as is credita ten exa s (appro- treport x. 30 n sment o ill be an nation age of a tion of onal in | are able to solve typi help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German places | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua Alloca Additio | udents ith the n such es (type, ino info d of as is credita ten exa s (appro t report x. 30 n sment o ill be an nation age of a tion of | are able to solve typi help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German places | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination ir redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |
| The stu sics wi proach Course V + Ü (Metho module i a) writh groups project (appro Assess and wi examin Langua Alloca Additio | udents ith the n such es (type, ino info d of as is credita ten exa s (appro- treport x. 30 n sment o ill be an nation age of a tion of onal in | are able to solve typi help of numerical sin problems and of valid number of weekly contact h ormation on SWS (week seessment (type, scope, l ble for bonus) amination (approx. 90 ox. 30 minutes per ca t (approx. 8 to 10 pag ninutes) offered: When and ho nnounced in due form regulations) 2009. assessment: German places | nulations. They are espected dating the results. | ially capable of choo rman) ourse language avai examination offered — if n nination of one cand h less than 4 ECTS co 4 weeks) or d) pres be offered depends | lable) ot every semester, information on whether idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment |

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

| Modul | e title | | | | Abbreviation | |
|--|--|--|---|---|---|---|
| Quanti | um Fiel | d Theory II | | | 11-QFT2-092-m01 | _ |
| Module coordinator | | | | Module offered by | le offered by | |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | | Faculty of Physics a | ind Astronomy | | |
| ECTS Method of grading Only after succ. compl. of m | | | npl. of module(s) | | | |
| 6 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 semester graduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew. | | | | |
| Conter | nts | | | | | |
| | | theory II. Generating f ntaneous symmetry bre | _ | | Renormalisation g | roup. Gauge |
| | | ning outcomes | | | | |
| red the proble | e princi ms of c | have advanced knowle ples, especially of reno uantum field theory by number of weekly contact hour | rmalisation and gauge using the acquired cal | theories. They are al culation methods. | | |
| | | rmation on SWS (week) | | | able) | |
| Metho | d of as | sessment (type, scope, lang ole for bonus) | | | | ation on whether |
| groups project (appro Assess and wi examir | s (appro t report ox. 30 m sment o ill be ar nation r | mination (approx. 90 m ox. 30 minutes per canc (approx. 8 to 10 pages inutes) offered: When and how mounced in due form u regulations) 2009. Issessment: German, E | lidate, for modules with , time to complete: 1 to often assessment will I nder observance of Sec | n less than 4 ECTS cr 4 weeks) or d) prese pe offered depends o | edits approx. 20 m entation/seminar p on the method of as | inutes) or c) resentation ssessment |
| Allocat | tion of | places | | | | |
| | | | | | | |
| Additio | onal inf | ormation | | | | |
| | | | | | | |
| Worklo | oad | | | | | |
| | | | | | | |
| ſeachi | ing cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulati | ons for teaching-degree progra | immes) | | |
| | | | | | | |
| | | | | | | |

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

| Module title Abbrevia | | | | | Abbreviation | |
|---|---|---|--|--|---|--|
| Renorm | nalizati | on Theory | | | 11-RNT-092-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Managi and Ast | | ector of the Institute of Th sics | eoretical Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | |
| 6 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 semester graduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | | |
| Conten | tc | | | inent anew. | | |
| behavio levance ons. Sto berg-M and con Intende The stu | our for e for ph ochast a differ mparis ed learn | dynamics beyond the eq ase diagrams in cryogen ic non-linear partial differ rential equations. Symme on of different RG method ning outcomes have gained an overview | uilibrium. Classical-c ic temperatures. Insta rential equations. Con stries, e.g. in the stoc ds. of renormalisation gr | ritical and quantum- ability of statistical a nstruction of generat hastic Burgers' equa oup methods for not | erential equations with scaling critical phenomena and their re- and dynamic mean-field soluti- ting functionals. Halperin-Hohen- ation (KPZ equation). Introduction n-linear partial differential equa- are able to apply them to specific | |
| | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | | |
| | | mation on SWS (weekly o | | | able) | |
| Method | d of ass | sessment (type, scope, langua | | | t every semester, information on whether | |
| groups project (approx Assess and wil examin | 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 Allocation of places | | | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| | | | | | | |

Teaching cycle

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

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Module appears in

Bachelor's with 1 major Mathematical Physics

(2009)

| Module title Abbreviation | | | | | |
|--|--------------------------------------|--|-----------------------------|---|--|
| Relativistical | Quantumfield Theory | | | 11-RQFT-092-m01 | |
| Module coordinator | | | Module offered by | red by | |
| Managing Dir and Astrophy | ector of the Institute of Th sics | neoretical Physics | Faculty of Physics a | and Astronomy | |
| ECTS Meth | | | | | |
| 8 nume | rical grade | | | | |
| Duration | Module level | Other prerequisites | | | |
| 1 semester graduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for | | | |
| Contents | | admission to asses | sment anew. | | |
| theory. Feynm normalisatior | nan rules. Quantum elect | | | and interaction. Perturbation ion. Radiative corrections and re- | |
| | | ples and underlying i | mathematics of relat | tivistic quantum field theories. | |
| They know ho processes in | w to use perturbation the | eory and how to apply m electrodynamics in | / Feynman rules. The | ey are able to calculate basics cover, they have a basic under- | |
| Courses (type, | number of weekly contact hours, | language — if other than Ge | rman) | | |
| R + V (no info | rmation on SWS (weekly | contact hours) and co | ourse language avail | able) | |
| | | age — if other than German, | examination offered — if no | ot every semester, information on whether | |
| 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 | | | | | |
| Allocation of | | | | | |
| | | | | | |
| Additional in | ormation | | | | |
| | | | | | |
| Workload | | | | | |
| | | | | | |
| Teaching cyc | le | | | | |
| | | | | | |
| | | | | | |

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Mathematische Physik - 2009

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Module appears in

| Module | e title | | | | Abbreviation |
|---|--|---|---|---|---|
| Theory | of Rela | ativity | | | 11-RTT-092-m01 |
| Module coordinator | | | | Module offered by | 1 |
| Managing Director of the Institute of Theoretical Physics and Astrophysics | | | of Theoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS | | od of grading | Only after succ. con | npl. of module(s) | |
| 6 | 1 | rical grade | | • | |
| Duratio | on in the second | Module level | Other prerequisites | | |
| 1 semester graduate | | sessment. The lectu at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo | | |
| Conten | ts | | | | |
| ments | of diffe | rential geometry; ele | | nple of a relativistic § | mmary of special relativity; ele- gauge theory; field equations of Ilation |
| | | ning outcomes | | | |
| mather able to Course | natical apply s (type, r | understanding of the the acquired knowled number of weekly contact he | | elativity on the basis physics and cosmolo rman) | |
| Metho | d of as | | · | | ot every semester, information on whether |
| groups project (approx Assess and wil examin | (appro report x. 30 m ment o Il be an nation r | ox. 30 minutes per car (approx. 8 to 10 page inutes) Iffered: When and how | ndidate, for modules with es, time to complete: 1 to w often assessment will under observance of Sec | n less than 4 ECTS cr 4 weeks) or d) prese be offered depends | idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and |
| Allocat | ion of | places | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| | - | | | | |
| Worklo | ad | | | | |
| Teachiı | ng cycl | e | | | |
| Referre | ed to in | LPO I (examination regul | ations for teaching-degree progra | immes) | |
| | | ior Mathematical Disso | 1840 1 18725 | concepted of August | am. reg. da- page 103 / 156 |
| sachelor's | with 1 ma | jor Mathematical Physics | JMU Würzburg • | generated 26-Aug-2024 • ex | |

| Module title Abbreviation | | | | |
|---|--|---|---|--|
| Theoretical E | lementary Particle Physic | CS | | 11-TEP-092-m01 |
| Module coord | linator | | Module offered by | |
| Managing Dir and Astrophy | ector of the Institute of Th sics | neoretical Physics | Faculty of Physics a | and Astronomy |
| ECTS Meth | thod of grading Only after succ. compl. of module(s) | | | |
| 8 nume | rical grade | | | |
| Duration | Module level | Other prerequisites | | |
| sessment. The lat the beginning sidered a declar dents have obta the course of the sessment into e ted to assessme | | | rer will inform stude the course. Registrat on of will to seek adn d the qualification for mester, the lecturer t. Students who mee n the current or in th date, students will h | alify for admission to as- ents about the respective details tion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- ne subsequent semester. For as- nave to obtain the qualification fo |
| Contents | I | admission to asses | sment anew. | |
| Gauge theorie | | | | ples of quantum field theory. . Quantum chrome dynamics. Ex- |
| Intended lear | ning outcomes | - | | |
| structure of th lation method | ne standard model based | on symmetry princip imple problems and p | les and experimenta processes of Elemen | e Physics. They understand the al observations. They know calcu- tary Particle Physics. Furthermo- nded theories. |
| | number of weekly contact hours, | | | |
| R + V (no info | rmation on SWS (weekly | contact hours) and co | ourse language avail | able) |
| | | age — if other than German, | examination offered — if no | ot every semester, information on whether |
| module is creditable for bonus) 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 | | | | |
| Allocation of | places | | | |
| | | | | |
| Additional inf | formation | | | |
| | | | | |
| Workload | | | | |
| | | | | |
| Teaching cyc | le | | | |
| | | | | |
| | | | | |

Module appears in

| Module title | | | | | Abbreviation | |
|--|------------|---|---|--|----------------|----------------|
| Experimental Particle Physics | | | | | 11-TPE-092-m01 | |
| Module coordinator | | | | Module offered by | | |
| Managing Director of the Institute of A | | pplied Physics Faculty of Physics and Astronomy | | | | |
| ECTS Method of grading | | Only after succ. con | Only after succ. compl. of module(s) | | | |
| 4 numerical grade | | | | | | |
| Duration | | Module level | Other prerequisites | | | |
| 1 semester | | graduate | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | |
| Contents | | | | | | |
| Physics with modern particle detectors at the LHC and at the Tevatron. Discovery of the Higgs boson. Search for supersymmetry and other physics beyond the standard model. Determination of the top quark mass and W mass as well as other parameters of the standard model. Introduction to modern methods of analysis and assessment of systematic errors. | | | | | | |
| Intended learning outcomes | | | | | | |
| The students are familiar with the principles of modern particle detector physics, especially with currently open questions of Particle Physics, which are examined by using these detectors. They know modern methods of analysis and are able to put results into context and to assess their systematic uncertainties. | | | | | | |
| Courses (type, number of weekly contact hours, language — if other than German) | | | | | | |
| R + V (no information on SWS (weekly contact hours) and course language available) | | | | | | |
| Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) | | | | | | |
| a) 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 | | | | | | |
| Allocation of places | | | | | | |
| | | | | | | |
| Additional information | | | | | | |
| | | | | | | |
| Workload | | | | | | |
| | | | | | | |
| Teaching cycle | | | | | | |
| | | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) | | | | | | |
| | | | | | | |
| Bachelor's ((2009) | with 1 maj | or Mathematical Physics | | generated 26-Aug-2024 • ex r (180 ECTS) Mathematische I | | page 107 / 156 |

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

| Module | e title | | | | Abbreviation | |
|--|---|---|---|---|--|--|
| Particle | e Physi | cs (Standard Model) | | | 11-TPS-092-m01 | |
| Module | e coord | inator | | Module offered by | <u> </u> | |
| | | ectors of the Institute o f Theoretical Physics a | | Faculty of Physics a | nd Astronomy | |
| ECTS | | od of grading | Only after succ. con | pl. of module(s) | | |
| 8 | nume | rical grade | | - | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 semestergraduateCertain prerequisites must be met to qualify for admission to sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessme dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites wited to assessment at a later date, students will have to obtain the qualification to assess the course of the semester at a later date, students will have to obtain the qualification to assessment at a later date, students will have to obtain the qualification to assessment anew. | | ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- | | | | |
| Conten | ts | | | | | |
| | | o the theory of electrov el and determination c | veak interaction and sp | ontaneous symmetr | y breaking. Experim | ents on the |
| | | ning outcomes | I | | | |
| perime | nts tha | t have established and | ndamental laws of the I confirmed the standar of the standard model a | d model. They are al | ole to interpret expe | |
| | | | s, language — if other than Ger | | | |
| | | | y contact hours) and co | | | |
| | | s essment (type, scope, lang le for bonus) | guage — if other than German, o | examination offered — if no | t every semester, informat | ion on whether |
| groups project (appro» Assess and wil examin Langua | (appro report x. 30 m ment o Il be an nation r ige of a | x. 30 minutes per cand (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E | ninutes) or b) oral exam lidate, for modules with , time to complete: 1 to often assessment will h nder observance of Sec nglish | n less than 4 ECTS cr 4 weeks) or d) prese pe offered depends o | edits approx. 20 mir entation/seminar pro on the method of as: | nutes) or c) esentation sessment |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachiı | ig cycl | e | | | | |
| Referre | ed to in | LPO I (examination regulati | ons for teaching-degree progra | mmes) | | |
| | | | | | | |
| | | or Mathematical Physics | 1841114/** 1 | generated 26-Aug-2024 • ex | | |

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Bachelor's with 1 major Mathematical Physics

(2009)

| Module | e title | | | | Abbreviation |
|---|---|---|--|---|---|
| Supers | symmet | ry I and II | | , | 11-SUS-092-m01 |
| Module | e coord | inator | | Module offered by | |
| Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astronomy and Astrophysics | | and Astronomy | | | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | |
| 6 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 semestergraduateCertain prerequisites must be met to qualify for admission to as sessment. The lecturer will inform students about the respectiv at the beginning of the course. Registration for the course will b sidered a declaration of will to seek admission to assessment. dents have obtained the qualification for admission to assess n the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will b ted to assessment in the current or in the subsequent semester sessment at a later date, students will have to obtain the qualifi admission to assessment anew. | | Ints about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- | | | |
| persym | symmet nmetry: | Algebra and multiplets. | Superfield formalism | . Breaking of supers | puszanski-Sohnius theorem. Su- ymmetry. spectrum of supersymmetric par- |
| | | | | | s models. Violation of R-parity. |
| Intende | ed lear | ning outcomes | | | |
| tric mo | dels. Tl | | y's formalism and red | | persymmetry and supersymme- ons to other models as well as its |
| Course | S (type, r | umber of weekly contact hours, l | anguage — if other than Ger | rman) | |
| V + R (r | no infor | mation on SWS (weekly o | contact hours) and co | ourse language avail | able) |
| | | eessment (type, scope, langua le for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether |
| groups project (approx Assess and wil examin | (appro report x. 30 m ment o Il be an nation r | x. 30 minutes per candid (approx. 8 to 10 pages, ti inutes) ffered: When and how of | ate, for modules with ime to complete: 1 to ten assessment will h ler observance of Sec | n less than 4 ECTS cr 4 weeks) or d) prese pe offered depends o | idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and |
| Allocat | - | - | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| | | | | | |
| | | | | | |

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Mathematische Physik - 2009

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

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Master's degree (1 major) FOKUS Physics (2006)

| Module | e title | | | | Abbreviation |
|--|---|--|--|--|--|
| Conder | ised Ma | atter (Quanta, Atoms, Mo | olecules, Solid State | Physics) | 11-KM-092-m01 |
| Module | coord | inator | | Module offered by | |
| Managi | ng Dire | ector of the Institute of Ap | oplied Physics | Faculty of Physics a | nd Astronomy |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 16 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 2 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| Quantu Atoms mical b (FEG). (| in Physin exter onding Crystal | sics. Mathematical formu mal fields. Many-electror g. Molecule rotations and | lation of quantum mo atoms. Optical trans vibrations. Bonding lattice. Structure dete | echanics. Quantum i sitions and spectrose in crystals. Mechani | ls. Experimental principles of mechanics of hydrogen atoms. copy. Laser. Molecules and che- cal properties. Free electron gas ibrations (phonons). Thermal |
| Intende | ed learr | ning outcomes | · | | |
| The stu ding an They ar | dents l d struc e able i | know the basic contexts at the transformer to the t | nermal properties, pri ethods to the formula | nciples of electronic ation of modern phy | tomic Physics and solids (bon- properties (free electron gas)). sical contexts and autonomously |
| Course | S (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | |
| kly con Konder hours) | tact ho isierte + Ü (2 v | urs) + Ü (2 weekly contac Materie 2 (Festkörperphy veekly contact hours), or | et hours), once a year vsik 1) (Condensed Ma nce a year (summer se | (winter semester) atter 2 (Solid State P emester) | ita, Atoms, Molecules)): V (4 wee- hysics)): V (4 weekly contact |
| | | le for bonus) | ge — If other than German, e | examination offered — if no | t every semester, information on whether |
| 1. Topio amin 2. Topio amin 3. Topio | ation (ation (cs cove ation (cs cove | approx. 120 minutes). red in lectures and exerc approx. 120 minutes). | ises in part 1 (Konder ises in part 2 (Konder ises in parts 1 and 2: | nsierte Materie 2 (Co oral examination of | ndensed Matter 1)): written ex- ondensed Matter 2)): written ex- one candidate each (approx. 30 |
| Succes ponent To qual Studen | sful con s 1 and ify for a ts are h | 2. admission to assessmen highly recommended to a | of practice work each t component 3, stude ttend both courses K | n is a prerequisite fo onts must pass asses ondensierte Materie | n examiner(s). r admission to assessment com- ssment component 1 and/or 2. 1 (Condensed Matter 1) and o courses will be covered in as- |
| sessme Studen To pass compor The gra | ent com ts mus s this m nent 3. de ach | pponent 3. t register for assessment nodule, students must fir | components 1 throug st pass assessment c 1ponent 1 or 2 (which | gh 3 online (details t component 1 or 2 and ever is better) and tl | o be announced). d must then pass assessment ne grade achieved in assessment |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| | | | | | |

| Additional information |
|--|
| |
| |
| Workload |
| |
| Teaching cycle |
| |
| Referred to in LPO I (examination regulations for teaching-degree programmes) |
| |
| Module appears in |
| Bachelor' degree (1 major) Mathematics (2012) |
| Bachelor' degree (1 major) Mathematics (2013) |
| Bachelor' degree (1 major) Physics (2010) |
| Bachelor' degree (1 major) Physics (2012) |
| Bachelor' degree (1 major) Nanostructure Technology (2010) |
| Bachelor' degree (1 major) Nanostructure Technology (2012) |
| Bachelor' degree (1 major) Mathematical Physics (2009) |
| Bachelor' degree (1 major) Mathematical Physics (2012) |
| Bachelor' degree (1 major) Computational Mathematics (2012) |
| Bachelor' degree (1 major) Computational Mathematics (2013) |
| Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010) |

| Module | e title | | | | Abbreviation | |
|-----------------------------|---------------------------|---|------------------------------|-----------------------------|---|----------------|
| Nuclea | r and E | lementary Particle Physi | cs | | 11-KET-092-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Manag | ing Dire | ing Director of the Institute of Applied Physics Faculty of Physics and Astronomy | | | | |
| ECTS | Metho | od of grading | Only after succ. con | . compl. of module(s) | | |
| 4 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | es | | |
| 1 semester undergraduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo | | | ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- | |
| Conten | its | | admission to assess | | | |
| Nuclea ticles. model. | r mode Symme Curren | of Nuclear and Elementa ls. Radioactive decay. St tries. Particle accelerator t results. | ructure of nuclei. Nuc | lear energy. Quantu | m theoretical descri | ption of par- |
| Intend | ed lear | ning outcomes | | | | |
| | ave an | understand the basic cor overview of the experime | | | | |
| Course | S (type, r | number of weekly contact hours, I | anguage — if other than Ger | rman) | | |
| V + Ü (I | no infoi | mation on SWS (weekly | contact hours) and co | ourse language avail | able) | |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, informat | ion on whether |
| | examii ise spe | nation (approx. 120 minu cified) | tes, for modules with | less than 4 ECTS cr | edits approx. 90 mir | nutes; unless |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | onal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| Referre | ed to in | LPOI (examination regulation | s for teaching-degree progra | mmes) | | |
| Module | e appea | urs in | | | | |
| Bachel Bachel | or' deg or' deg | ree (1 major) Physics (20 ree (1 major) Mathematic gree (1 major, 1 minor) Ph | al Physics (2009) | | | |
| | | | | | | |
| | | ior Mathematical Physics | | generated 26-Aug-2024 • ex | | 1 1 1 |

| Modul | e title | | | | Abbreviation |
|----------|-------------------|----------------------------------|--------------------------------------|------------------------------|---|
| Theore | etical As | strophysics | | | 11-AST-092-m01 |
| Modul | e coord | inator | | Module offered by | |
| | ing Dir trophy | | of Theoretical Physics | Faculty of Physics | and Astronomy |
| ECTS | Meth | od of grading | Only after succ. compl. of module(s) | | |
| 6 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | 5 | |
| 1 seme | ester | graduate | | | |
| Conter | nts | | | | |
| Theore | tical As | trophysics, models f | or the description of con | nplex observation re | sults, numeric simulations. |
| | | ning outcomes | · · | • | |
| | - | | e of the methods of Theo | oretical Astrophysics | . They are able to design complex |
| | | | ls with the help of simul | | , , , |
| Course | S (type, 1 | number of weekly contact ho | ours, language — if other than Ge | erman) | |
| R + V (1 | no infoi | mation on SWS (wee | kly contact hours) and c | ourse language avai | lable) |
| Metho | d of as | sessment (type, scope, la | inguage — if other than German, | , examination offered — if n | ot every semester, information on whether |
| module i | s creditat | le for bonus) | | | |
| written | exami | nation (approx. 120 n | ninutes) | | |
| Allocat | tion of | places | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| | <u> </u> | | | | |
| Referre | d to in | IPOI (examination regul | ations for teaching-degree progr | rammes) | |
| | | | | | |
| Modul | e appea | ars in | | | |
| | | ree (1 major) Physics | (2010) | | |
| | - | ree (1 major) Physics | | | |
| | - | - | atical Physics (2009) | | |
| | - | • | atical Physics (2012) | | |
| | - | ee (1 major) Physics (| | | |
| | - | ee (1 major) Physics (| | | |
| | - | ee (1 major) Mathema | | | |
| | - | ee (1 major) FOKUS P | | | |
| | - | ee (1 major) FOKUS P | • | | |
| Master | 's degr | ee (1 major) FOKUS P | hysics (2006) | | |

| Module title Abbreviation | | | | | | |
|---------------------------|--------------------|---|--|---|----------------------------|----------------|
| Solid S | tate Ph | lysics 1 | | | 11-FKP-092-m01 | |
| Module | coord | inator | | Module offered by | | |
| Managi | ng Dire | ector of the Institute of | Applied Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | |
| 8 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | i | | |
| 1 semester undergraduate | | sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the set sessment into effect ted to assessment i sessment at a later | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew. | | | |
| Conten | ts | | | | | |
| | | of solids: Bonding and lectron gas). | structure, lattice dyna | mics, thermal proper | ties, principles of el | ectronic pro- |
| Intende | ed learı | ning outcomes | | | | |
| | | | ontexts and principles ctronic properties (free | | nd structure, lattice | dynamics, |
| Course | S (type, n | umber of weekly contact hour | s, language — if other than Ge | rman) | | |
| V + Ü (r | no infor | mation on SWS (week | ly contact hours) and co | ourse language avail | able) | |
| | | s essment (type, scope, lang le for bonus) | guage — if other than German, | examination offered — if no | t every semester, informat | on on whether |
| otherwi Assessi | ise spe ment o | cified) ffered: When and how | nutes, for modules with often assessment will inder observance of Se | be offered depends o | on the method of ass | sessment |
| | | egulations) 2009. | | | | |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachir | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulation | ons for teaching-degree progra | ammes) | | |
| | | | | | | |
| Module | appea | ars in | | | | |
| Bachelo Bachelo | or' deg or' deg | ree (1 major) Mathema ree (1 major) Mathema ree (1 major) Mathema ree (1 major) Mathema | tics (2013) tical Physics (2009) | | | |
| Bachelor's ((2009) | with 1 maj | or Mathematical Physics | | generated 26-Aug-2024 • exa r (180 ECTS) Mathematische I | - | page 117 / 156 |



Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

| Module | e title | | | | Abbreviation | |
|---|-------------------------------|--|---|--------------------------------------|----------------------------|----------------|
| Quanta | a, Atom | s, Molecules | | | 11-QAM-092-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Manag | ing Dire | ector of the Institute of | Applied Physics | Faculty of Physics a | nd Astronomy | |
| ECTS | Metho | od of grading | Only after succ. con | npl. of module(s) | | |
| 8 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 semesterundergraduateCertain prerequisites must be met to qualify for admission sessment. The lecturer will inform students about the resp at the beginning of the course. Registration for the course v sidered a declaration of will to seek admission to assessm dents have obtained the qualification for admission to ass the course of the semester, the lecturer will put their regist sessment into effect. Students who meet all prerequisites ted to assessment in the current or in the subsequent sem sessment at a later date, students will have to obtain the c admission to assessment anew. | | nts about the respection for the course wints in to assessment admission to assessment admission to assest will put their registration and prerequisites were subsequent semestive semestive semestive subsequent semestive semest | ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- | | | |
| Conten | ts | | | | | |
| Physica | al laws | of Atomic, Quantum ar | nd Molecular Physics. | | | |
| Intende | ed lear | ning outcomes | | | | |
| Quantu | ım mec | hanical atom model, o | basic contexts and prin ne/multi-electron atom and elementary excitati | ns, electronic dipole | transitions, atoms ir | n B field, as |
| Course | S (type, r | umber of weekly contact hour | s, language — if other than Ge | rman) | | |
| Ü + Ü (I | no info | rmation on SWS (week | ly contact hours) and co | ourse language avail | able) | |
| | | essment (type, scope, lang le for bonus) | guage — if other than German, | examination offered — if no | t every semester, informat | ion on whether |
| otherw Assess and wil | ise spe ment o Il be an | cified) ffered: When and how | nutes, for modules with often assessment will l nder observance of Sec | be offered depends o | on the method of ass | sessment |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | - | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulation | ons for teaching-degree progra | ammes) | | |
| | | | | | | |
| Module | | | | | | |
| | - | ree (1 major) Mathema ree (1 major) Mathema | | | | |
| Bachel | or' deg | ree (1 major) Mathema ree (1 major) Mathema ree (1 major) Mathema | tical Physics (2009) | | | |
| | | or Mathematical Physics | | generated 26-Aug-2024 • example 2014 | am. reg. da- | page 119 / 156 |
| (2009) | | | - | r (180 ECTS) Mathematische I | - | |



Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)



Thesis (10 ECTS credits)

| Modul | e title | | | | Abbreviation | |
|---------|----------------------|--|------------------------------|------------------------------|---|--|
| Thesis | Mathe | matical Physics (Bachelo | or Thesis) | | 10-M-BAP-092-m01 | |
| Modul | e coord | inator | | Module offered by | | |
| Dean c | of Studi | es Mathematik (Mathem | atics) | Institute of Mathem | atics | |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | | |
| 10 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 seme | ester | undergraduate | Registration for asse | or assessment: as specified. | | |
| Conter | nts | | | | | |
| | | y researching and writing ation with the superviso | | erdisciplinary) topic i | n mathematics or physics selec- | |
| Intend | ed lear | ning outcomes | | | | |
| and ap | ply the | • | , . | , , , , | topic in mathematics or physics e can write down the result of | |
| Course | es (type, r | number of weekly contact hours, | language — if other than Gei | rman) | | |
| (no inf | ormatic | on on SWS (weekly conta | ct hours) and course | language available) | | |
| | | Sessment (type, scope, langua ole for bonus) | age — if other than German, | examination offered — if no | t every semester, information on whether | |
| | thesis | ssessment: German, Eng | glish if agreed upon w | vith the examiner | | |
| Allocat | tion of _l | places | | | | |
| | | | | | | |
| Additio | onal inf | ormation | | | | |
| | | | | | | |
| Worklo | bad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPOI (examination regulation | s for teaching-degree progra | ammes) | | |
| | | | | | | |
| Modul | e appea | ars in | | | | |
| | - | ree (1 major) Mathematio | | | | |
| Bachel | lor' deg | ree (1 major) Mathematio | cal Physics (2012) | | | |



Subject-specific Key Skills

(ECTS credits)



Key Skills 1 (Compulsory)

(5 ECTS credits)

| Module | title | | | | Abbreviation |
|---|--|--|--|-----------------------------|---|
| Prepara | atory C | ourse Mathematics | | | 10-M-VKM-082-m01 |
| Module | coord | inator | | Module offered by | 1 |
| Dean of | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | |
| 1 | (not) s | successfully completed | | | |
| Duratio | n | Module level | Other prerequisites | ites | |
| 1 semesterundergraduateAdmission prerequisite to assessment: regular attendance of or specified at the beginning of the course). | | | | | |
| Conten | ts | | | | |
| Introdu | ction to | o the basic techniques in | mathematics; appro | ach to sets, proposi | tions, propositional logic. |
| Intende | ed lear | ning outcomes | | | · · · · |
| The stu | dent g | | | ues which are prere | quisites for the further courses in |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Gei | man) | |
| V + Ü (r | no infoi | mation on SWS (weekly | contact hours) and co | ourse language avail | able) |
| | | Sessment (type, scope, langua le for bonus) | ge — if other than German, | examination offered — if no | ot every semester, information on whether |
| Assess | ment o | ments (type and expend ffered: once a year, winte ssessment: German, Eng | er semester | | er at the beginning of the course) |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ıg cycl | e | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulation | s for teaching-degree progra | mmes) | |
| | | | | | |
| Module | | | | | |
| Bachelo Bachelo Bachelo Bachelo Bachelo | or' deg or' deg or' deg or' deg or's deg | ree (1 major) Mathematic ree (1 major) Economathe ree (1 major) Economathe ree (1 major) Mathematic ree (1 major) Computatio gree (1 major, 1 minor) M mination for the teaching | ematics (2009) ematics (2008) al Physics (2009) nal Mathematics (20 athematics (Minor, 2 | 008) |) |

| Module | title | | | | Abbreviation |
|--------------------------------|---|-----------------------------------|------------------------------|--|--|
| Semina | r Mathemati | cal Physics | | | 11-SMP-092-m01 |
| Module | coordinator | | | Module offered by | |
| | rson of exam (Mathematic | nination committee al Physics) | e Mathematische | Faculty of Physics a | nd Astronomy |
| ECTS | Method of g | rading | Only after succ. con | mpl. of module(s) | |
| 4 | numerical g | rade | | | |
| Duratio | n Modu | ıle level | Other prerequisites | i i | |
| 1 semes | ster unde | rgraduate | | quisite to assessment: regular attendance and suc- ion of seminar presentation. | |
| Content | ts | | | | |
| A select | ted topic of N | Aathematical Phys | ics. | | |
| Intende | d learning o | utcomes | | | |
| sion of a | | on the basis of lit | | | olves the development and divi- ell as the ability to actively partici- |
| Courses | 5 (type, number o | of weekly contact hours, | language — if other than Ge | rman) | |
| S (no in | formation or | n SWS (weekly con | tact hours) and cours | e language available | <u>a</u>) |
| | of assessme | | age — if other than German, | examination offered — if no | t every semester, information on whether |
| Assessn and will examina | ment offered l be announc ation regulat | ed in due form un ions) 2009. | ften assessment will l | ction 32 Subsection | on the method of assessment 3 ASPO (general academic and |
| Allocati | on of places | | | | |
| | | | | | |
| Additio | nal informati | ion | | | |
| | | | | | |
| Workloa | ad | | | | |
| | | | | | |
| Teachin | ig cycle | | | | |
| | | | | | |
| Referre | d to in LPO I | (examination regulation | s for teaching-degree progra | immes) | |
| | | | | | |
| | | | | | |
| | appears in | | | | |



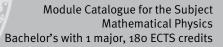
Key Skills 2 (Elective)

(ECTS credits)

Students may only take one out of the two modules 10-M-COM and 10-M-COMg or, respectively, out of the two modules 10-M-PRG and 10-M-PRGk.

| Modul | e title | | | | Abbreviation | | |
|--|---|--|--|--|--|--|--|
| Astrop | hysics | | | | 11-A4-072-m01 | | |
| Modul | e coord | inator | | Module offered by | <u> </u> | | |
| Manag | | ector of the Institute of T | Theoretical Physics | Faculty of Physics a | and Astronomy | | |
| | T | od of grading | Only after succ. con | npl. of module(s) | | | |
| 6 | 1 | rical grade | | | | | |
| Duratio | | Module level | Other prerequisites | | | | |
| 1 seme | ester | undergraduate | Admission prerequi 50% of exercises. Co sion to assessment. ve details at the beg be considered a dec students have obtai over the course of th assessment into eff mitted to assessme assessment at a late for admission to ass | ertain prerequisites The lecturer will inf ginning of the course claration of will to se ned the qualification he semester, the lect ect. Students who m nt in the current or in er date, students wil | must be met to qual orm students about e. Registration for the ek admission to ass n for admission to as turer will put their re teet all prerequisites n the subsequent se | ify for admis- the respecti- course will essment. If seessment gistration for will be ad- mester. For | |
| Conten | | | for admission to ass | sessment anew. | | | |
| large-s nucleo Intende The stu physica | scale str osynthes ed learn udents a al obse hey kno | n, structure of the Milky ucture of the universe, sis, cosmic microwave b ning outcomes are familiar with the mo rvations and evaluation w the structure of the un | Friedmann World Mod background radiation, dern world view of Ast s. They are able to use | els, thermodynamics structure formation, rophysics. They know these methods to p | s of the early univers inflation w methods and tools lan and analyse own | s for astro- n observati- | |
| | | umber of weekly contact hours | language — if other than Ge | man) | | | |
| | | mation on SWS (weekly | | | able) | | |
| Metho | d of ass | essment (type, scope, langule for bonus) | | | | ion on whether | |
| | | nation (approx. 120 min | utes) | | | | |
| | tion of p | | | | | | |
| | | f pool of general key ski | ills (ASQ): 15 places. P | laces will be allocate | ed by lot. | | |
| Additio | onal info | ormation | | | | | |
| Workla | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | ing cycl | e | | | | | |
| | ing cycl | e | _ | | | | |
| Teachi | | E | ns for teaching-degree progra | mmes) | | | |
| Teachi | | | ns for teaching-degree progra | mmes) | | | |
| Teachi Referre | | LPOI (examination regulatio | ns for teaching-degree progra | mmes) | | | |
| Teachi Referre Module | ed to in e appea | LPOI (examination regulatio | | mmes) | | | |





Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

| Module | Module title Abbreviation | | | | | | |
|---|---|---|------------------------------|-----------------------------|--|--|--|
| Semina | r in An | alysis | | | 10-M-BSA-072-m01 | | |
| Module | Module coordinator N | | | | | | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | natics | | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | | |
| 5 | nume | rical grade | | | | | |
| Duratio | n | Module level | Other prerequisites | | | | |
| 1 semes | ster | undergraduate | | | | | |
| Conten | ts | | · | | | | |
| A select | ted top | ic in analysis. | | | | | |
| Intende | ed learn | ning outcomes | | | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- | | |
| Courses | 5 (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | | | |
| S (no in | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) | | |
| | | s essment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | ot every semester, information on whether | | |
| Assessi | ment o | 50 minutes) ffered: in the semester in ssessment: German, Eng | | | | | |
| Allocati | ion of p | olaces | | | | | |
| | | | | | | | |
| Additio | nal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachir | ng cycl | 9 | | | | | |
| | | | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | | | |
| § 73 (1) | 1. Mat | hematik Analysis | | | | | |
| Module | appea | ins in | | | | | |
| | - | ree (1 major) Mathematic | | | | | |
| Bachelor' degree (1 major) Mathematics (2007) | | | | | | | |
| | - | ree (1 major) Economathe | - | | | | |
| | Bachelor' degree (1 major) Economathematics (2008) | | | | | | |
| | Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | | |
| | | gree (1 major, 1 minor) Ma | | | | | |
| | | mination for the teaching | | | | | |

| 10-M-BSL-072-m01 | | | | | |
|---|--|--|--|--|--|
| Module offered by | | | | | |
| Institute of Mathematics | | | | | |
| succ. compl. of module(s) | | | | | |
| | | | | | |
| equisites | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| nt scientific work. He/She masters elaboration and structuring ares a talk on the subject. He/She is able to participate active | | | | | |
| ther than German) | | | | | |
| and course language available) | | | | | |
| an German, examination offered — if not every semester, information on whether | | | | | |
| course is offered ed upon with the examiner | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| egree programmes) | | | | | |
| id Elemente der Zahlentheorie | | | | | |
| Module appears in | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | | |
| | | | | | |

| Module | Module title Abbreviation | | | | | | |
|---|---|---|------------------------------|-----------------------------|--|--|--|
| Semina | ar in Alg | gebra | | | 10-M-BSE-072-m01 | | |
| Module | e coord | inator | | Module offered by | | | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | atics | | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | | |
| 5 | nume | rical grade | | | | | |
| Duratio | on | Module level | Other prerequisites | | | | |
| 1 seme | ster | undergraduate | | | | | |
| Conten | Contents | | | | | | |
| A selec | ted top | oic in algebra. | | | | | |
| Intende | ed lear | ning outcomes | | | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- | | |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | | | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | e) | | |
| module is | creditab | le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether | | |
| Assess | ment o | 50 minutes) ffered: in the semester in ssessment: German, Eng | | | | | |
| Allocat | ion of p | olaces | | | | | |
| | | | | | | | |
| Additio | nal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachi | ng cycl | e | | | | | |
| | | | | | | | |
| Referre | d to in | LPO I (examination regulation | s for teaching-degree progra | mmes) | | | |
| § 73 (1) | 2. Mat | hematik Lineare Algebra | , Algebra und Elemen | te der Zahlentheorie | | | |
| Module | e appea | ars in | | | | | |
| Bachelo Bachelo Bachelo Bachelo Bachelo | Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | | |
| | | gree (1 major, 1 minor) Ma mination for the teaching | | | | | |
| inst Sta | First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | | | |

| Module | Module title Abbreviation | | | | | |
|-----------|---|--|------------------------------|-----------------------------|--|--|
| Semina | Seminar in Geometry | | | | 10-M-BSG-072-m01 | |
| Module | coord | inator | | Module offered by | | |
| Dean of | [:] Studie | es Mathematik (Mathema | atics) | Institute of Mathem | atics | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | |
| 5 | nume | rical grade | | | | |
| Duratio | n | Module level | Other prerequisites | | | |
| 1 semes | ster | undergraduate | | | | |
| Content | Contents | | | | | |
| A select | ted top | ic in geometry or differen | itial geometry. | | | |
| Intende | d learr | ning outcomes | | | | |
| of a give | en topi | | | | sters elaboration and structuring /She is able to participate active- | |
| Courses | 5 (type, n | umber of weekly contact hours, la | anguage — if other than Ger | man) | | |
| S (no in | format | ion on SWS (weekly cont | act hours) and cours | e language available |) | |
| module is | creditab | eessment (type, scope, languag le for bonus) 50 minutes) | ge — if other than German, e | examination offered — if no | t every semester, information on whether | |
| | | ffered: in the semester in ssessment: German, Eng | | | | |
| Allocati | on of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachin | ig cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPOI (examination regulations | s for teaching-degree progra | mmes) | | |
| § 73 (1) | 4. Mat | hematik Geometrie | | | | |
| Module | appea | ins in | | | | |
| Bachelo | or' deg | ree (1 major) Mathematic | s (2008) | | | |
| | - | ree (1 major) Mathematic | | | | |
| | Bachelor' degree (1 major) Economathematics (2009) | | | | | |
| | Bachelor' degree (1 major) Economathematics (2008) | | | | | |
| | Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | |
| | - | gree (1 major, 1 minor) Ma | | • | | |
| | | mination for the teaching | | | | |

| Module | Module title Abbreviation | | | | | | |
|--|---|---|------------------------------|-----------------------------|--|--|--|
| Semina | r in Nu | mber Theory | | 10-M-BSZ-072-m01 | | | |
| Module | coord | inator | | Module offered by | | | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | atics | | |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | | | |
| 5 | nume | rical grade | | | | | |
| Duratio | n | Module level | Other prerequisites | | | | |
| 1 seme | ster | undergraduate | | | | | |
| Conten | ts | | | | | | |
| A selec | ted top | ic in number theory. | | | | | |
| Intende | ed learr | ning outcomes | | | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- | | |
| Course | S (type, n | umber of weekly contact hours, l | anguage — if other than Ger | man) | | | |
| S (no in | format | ion on SWS (weekly cont | act hours) and cours | e language available |) | | |
| module is | creditab | le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether | | |
| Assess | ment o | oo minutes) ffered: in the semester in ssessment: German, Eng | | | | | |
| Allocat | ion of p | olaces | | | | | |
| | | | | | | | |
| Additio | nal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachir | ng cycl | e | | | | | |
| | | | | | | | |
| Referre | d to in | LPOI (examination regulations | s for teaching-degree progra | mmes) | | | |
| § 73 (1) | 2. Mat | hematik Lineare Algebra, | , Algebra und Elemen | te der Zahlentheorie | 9 | | |
| Module | appea | ars in | | | | | |
| | - | ree (1 major) Mathematic | | | | | |
| | - | ree (1 major) Mathematic | | | | | |
| | Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) | | | | | | |
| Bachelor' degree (1 major) Mathematical Physics (2009) | | | | | | | |
| | Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | | |
| | - | gree (1 major, 1 minor) Ma | | • | | | |
| | | mination for the teaching | | | | | |

| Seminar in Complex Analysis 10-M-BSC-072-m01 Module coordinator Module offered by Dean of Studies Mathematik (Mathematics) Institute of Mathematics | | | | | |
|---|--|--|--|--|--|
| | | | | | |
| Dean of Studios Mathematik (Mathematics) | | | | | |
| | | | | | |
| ECTS Method of grading Only after succ. compl. of module(s) | | | | | |
| 5 numerical grade | | | | | |
| Duration Module level Other prerequisites | | | | | |
| 1 semester undergraduate | | | | | |
| Contents | | | | | |
| A selected topic in complex analysis. | | | | | |
| Intended learning outcomes | | | | | |
| The student gains first experience with independent scientific work. He/She masters elaboration and structu of a given topic using selected literature, and prepares a talk on the subject. He/She is able to participate ac ly in a scientific discussion. | | | | | |
| Courses (type, number of weekly contact hours, language $-$ if other than German) | | | | | |
| S (no information on SWS (weekly contact hours) and course language available) | | | | | |
| Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on wheth module is creditable for bonus) | | | | | |
| talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner | | | | | |
| Allocation of places | | | | | |
| | | | | | |
| Additional information | | | | | |
| | | | | | |
| Workload | | | | | |
| | | | | | |
| Teaching cycle | | | | | |
| | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) | | | | | |
| § 73 (1) 1. Mathematik Analysis | | | | | |
| Module appears in | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) | | | | | |
| Bachelor' degree (1 major) Mathematics (2007) | | | | | |
| Bachelor' degree (1 major) Economathematics (2009) | | | | | |
| Bachelor' degree (1 major) Economathematics (2008) | | | | | |
| Bachelor' degree (1 major) Mathematical Physics (2009) | | | | | |
| Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | |
| Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | | |

| Module | e title | | | | Abbreviation | |
|-----------|--|---|------------------------------|-----------------------------|--|--|
| Semina | Seminar in Numerical Mathematics 10-M-BSN-072-m01 | | | | | |
| Module | e coord | inator | | Module offered by | | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | | |
| 5 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | | | | |
| Conten | ts | | | | | |
| A selec | ted top | ic in numerical mathema | itics. | | | |
| Intende | ed lear | ning outcomes | | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- | |
| | | umber of weekly contact hours, l | | | | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | e) | |
| module is | s creditab | S essment (type, scope, langua le for bonus) 50 minutes) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether | |
| Assess | ment o | ffered: in the semester ir ssessment: German, Eng | | | | |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachir | ng cycl | e | | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulation | s for teaching-degree progra | mmes) | | |
| § 73 (1) | 5. Mat | hematik Angewandte Ma | thematik | | | |
| Module | e appea | ars in | | | | |
| | - | ree (1 major) Mathematic | | | | |
| | Bachelor' degree (1 major) Mathematics (2007) | | | | | |
| | Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) | | | | | |
| | - | ree (1 major) Economatic | | | | |
| | - | ree (1 major) Computatio | | 09) | | |
| | | gree (1 major, 1 minor) M | | | | |
| First sta | ate exa | mination for the teaching | g degree Gymnasium | Mathematics (2009) |) | |

| Module | Module title Abbreviation | | | | | | |
|-----------------------|---|---|------------------------------|----------------------|--|--|--|
| Semina | r in Ste | ochastics | | | 10-M-BSS-072-m01 | | |
| Module | coord | inator | | Module offered by | | | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | natics | | |
| ECTS | Metho | od of grading | Only after succ. com | npl. of module(s) | | | |
| 5 | nume | rical grade | | | | | |
| Duratio | n | Module level | Other prerequisites | | | | |
| 1 seme | ster | undergraduate | | | | | |
| Conten | ts | | | | | | |
| A selec | ted top | ic in stochastics. | | | | | |
| Intende | ed leari | ning outcomes | | | | | |
| of a giv | en topi | | | | sters elaboration and structuring /She is able to participate active- | | |
| Course | S (type, n | number of weekly contact hours, l | anguage — if other than Ger | man) | | | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) | | |
| module is talk (ap | creditab | Gessment (type, scope, langua le for bonus) 60 minutes) ffered: in the semester in | | | ot every semester, information on whether | | |
| | | ssessment: German, Eng | | | | | |
| Allocat | ion of p | olaces | | | | | |
| | | | | | | | |
| Additio | nal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachir | ng cycl | e | | | | | |
| | | | | | | | |
| | | LPO I (examination regulation | s for teaching-degree progra | mmes) | | | |
| § 73 (1) | 3. Mat | hematik Stochastik | | | | | |
| Module | | | | | | | |
| | - | ree (1 major) Mathematic | | | | | |
| | Bachelor' degree (1 major) Mathematics (2007) | | | | | | |
| | Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) | | | | | | |
| | Bachelor' degree (1 major) Athematical Physics (2008) | | | | | | |
| | Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | | |
| | | gree (1 major, 1 minor) Ma | | | | | |
| | | mination for the teaching | | |) | | |

| Module title | | | | | Abbreviation |
|---|-------------------|---|------------------------------|-----------------------------|--|
| Semina | r in Fu | nctional Analysis | | | 10-M-BSF-072-m01 |
| Module | coord | inator | | Module offered by | |
| Dean of | fStudie | es Mathematik (Mathema | atics) | Institute of Mathem | atics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | oic in functional analysis. | | | |
| Intende | ed learı | ning outcomes | | | |
| of a giv | en topi | • | • | - | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, n | number of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no in | Iformat | ion on SWS (weekly cont | act hours) and cours | e language available | e) |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| talk (ap | prox. 6 | óo minutes) | | | |
| Allocat | ion of p | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachir | ng cycl | e | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | |
| | | | | | |
| Module | e appea | ars in | | | |
| Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) | | | | | |

| Module title Abbreviation | | | | | Abbreviation |
|---|---------------------|---|------------------------------|-----------------------------|--|
| Semina | ar in Op | eration Research | | | 10-M-BSO-072-m01 |
| Module | e coord | inator | | Module offered by | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Metho | od of grading | Only after succ. com | pl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | n | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | ic in operations research | l. | | |
| Intende | ed lear | ning outcomes | | | |
| of a giv | en top | | | | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | man) | |
| S (no ir | format | ion on SWS (weekly cont | act hours) and cours | e language available | 2) |
| | | sessment (type, scope, langua le for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| talk (ap | prox. 6 | óo minutes) | | | |
| Allocat | ion of _l | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| | | | | | |
| Referre | d to in | LPOI (examination regulations | s for teaching-degree progra | mmes) | |
| | | | | | |
| Module appears in | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) | | | | | |

| Module title | | | | | Abbreviation |
|---|---------------------|--|------------------------------|-----------------------------|--|
| Semina | ar in Di | screte Mathematics | | | 10-M-BSD-072-m01 |
| Module | e coord | inator | | Module offered by | |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Metho | od of grading | Only after succ. com | npl. of module(s) | |
| 5 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | ts | | | | |
| A selec | ted top | oic in discrete mathemation | cs. | | |
| Intende | ed lear | ning outcomes | | | |
| of a giv | en top | | | | sters elaboration and structuring /She is able to participate active- |
| Course | S (type, r | number of weekly contact hours, l | anguage — if other than Ger | rman) | |
| S (no ir | format | tion on SWS (weekly cont | act hours) and cours | e language available | 2) |
| | | sessment (type, scope, langua ıle for bonus) | ge — if other than German, e | examination offered — if no | t every semester, information on whether |
| talk (ap | prox. e | 60 minutes) | | | |
| Allocat | ion of _l | olaces | | | |
| | | | | | |
| Additio | nal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| | | | | | |
| Referre | d to in | LPO I (examination regulations | s for teaching-degree progra | mmes) | |
| | | | | | |
| Module | e appea | ars in | | | |
| Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) | | | | | |

| Module | e title | | | | Abbreviation | | |
|----------------------|--|---|--|--|---|----------------|--|
| Compu | tationa | l Mathematics, advance | ed | | 10-M-COMg-082-m | 01 | |
| Module | e coord | inator | | Module offered by | | | |
| Dean o | f Studi | es Mathematik (Mathem | atics) | Institute of Mathem | natics | | |
| ECTS | | od of grading | Only after succ. com | | | | |
| | | successfully completed | | | | | |
| 4 Duratio | | Module level | Other prevenuicites | | | | |
| | | | Other prerequisites | | 1 11 1 | <u> </u> | |
| 1 seme | ster | undergraduate | Admission prerequi: (attendance monito sence). | | regular attendance c one incident of unexo | | |
| Contents | | | | | | | |
| merica 10-M-A | l compi NL and | o modern mathematical utation (e. g. Matlab) to s 10-M-LNA). Computer-b and integral calculus; v | supplement the basic ased solution of probl | modules in analysis lems in linear algebr | and linear algebra | (10-M-ANA, | |
| Intende | ed lear | ning outcomes | | | | | |
| | | arns the use of advance cation to solve mathema | | cal software package | es, and is able to as | sess their | |
| Course | S (type, r | umber of weekly contact hours, | language — if other than Ger | man) | | | |
| Ü + V (r | no infoi | mation on SWS (weekly | contact hours) and co | ourse language avail | able) | | |
| | | sessment (type, scope, langua | age — if other than German, e | examination offered — if no | ot every semester, informat | ion on whether | |
| | ige of a | ffered: once a year, sum ssessment: German, Eng blaces | | ith the examiner | | | |
| | | | | | | | |
| Additio | onal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| Teachi | ng cycl | 9 | | | | | |
| | | | | | | | |
| | | LPO I (examination regulation | | mmes) | | | |
| | _ | hematik Angewandte Ma | athematik | | | | |
| Module | | | | | | | |
| | - | ree (1 major) Mathemati | | | | | |
| | - | ree (1 major) Nanostruct | |) | | | |
| | Bachelor' degree (1 major) Economathematics (2009) | | | | | | |
| | - | ree (1 major) Economath | | | | | |
| | - | ree (1 major) Mathematic ree (1 major) Computatic | • • | 20) | | | |
| | Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Technology of Functional Materials (2009) | | | | | | |
| | - | gree (1 major, 1 minor) N | | - | | | |
| | | mination for the teachin | | |) | | |
| | | | | | | | |
| Bachelor's (2009) | with 1 ma | or Mathematical Physics | | generated 26-Aug-2024 • ex r (180 ECTS) Mathematische | - | page 141 / 156 | |
| 71 | | | | (| , | | |

| Modul | e title | | Abbreviation | | | | |
|--|--|---|--|-----------------------------|---|--|--|
| Programming course for students of Mathematics and other subjects, simple 10-M-PRGk-082-mo1 | | | | | | | |
| Module coordinator | | | | Module offered by | | | |
| Dean of Studies Mathematik (Mathematics) | | | | Institute of Mathematics | | | |
| ECTS | Meth | od of grading | Only after succ. con | compl. of module(s) | | | |
| 2 | (not) | successfully completed | | | | | |
| Duration Module level | | Module level | Other prerequisites | | | | |
| 1 semester undergraduate | | undergraduate | Admission prerequisite to assessment: regular attendance (attendance monitored, a maximum of one incident of unexcused absence). | | | | |
| Conter | nts | | | | | | |
| Basics matics | | odern programming langi | uage (e. g. C or Fortra | n) taking into accou | nt the particular needs in mathe- | | |
| Intend | ed lear | ning outcomes | | | | | |
| | udent is hemati | | ntly on small program | nming exercises and | standard programming problems | | |
| Course | es (type, i | number of weekly contact hours, | language — if other than Ger | rman) | | | |
| P (no ii | nforma | tion on SWS (weekly cont | tact hours) and cours | e language available | e) | | |
| | | S essment (type, scope, langua ole for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether | | |
| 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 | | | | | | | |
| Allocat | tion of | places | | | | | |
| | | | | | | | |
| Additio | onal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachi | ng cycl | e | | | | | |
| | | | | | | | |
| Referre | ed to in | LPO I (examination regulation | s for teaching-degree progra | immes) | | | |
| § 73 (1) |) 5. Mat | thematik Angewandte Ma | athematik | | | | |
| Module appears in | | | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) | | | | | | | |
| Bachelor' degree (1 major) Nanostructure Technology (2010) | | | | | | | |
| Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) | | | | | | | |
| Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) | | | | | | | |
| Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | | | |
| | Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) | | | | | | |
| | First state examination for the teaching degree Gymnasium Mathematics (2009) | | | | | | |

| Module | e title | · · · · · · · · · · · · · · · · · · · | | Abbreviation | | | |
|---|-------------------|---|----------------------------------|----------------------------|--|--|--|
| Reading Course Numerical Mathematics 10-M-RCN-082-m01 | | | | | | | |
| Module | e coord | linator | | Module offered by | | | |
| Dean o | f Studi | es Mathematik (Mathe | ematics) | Institute of Mathematics | | | |
| ECTS | Meth | Method of grading Only after succ. compl. | | | ol. of module(s) | | |
| 4 | nume | rical grade | | | | | |
| Duration Module level Othe | | | Other prerequisites | ther prerequisites | | | |
| 1 seme | ster | undergraduate | | | | | |
| Conten | ts | | | | | | |
| Advand | ed top | ics in numerical mathe | ematics. | | | | |
| Intende | ed lear | ning outcomes | | | | | |
| | | s able to work indepen use standard literature | | tific topic. He or she | e can tackle a simple mathematical | | |
| Course | S (type, 1 | number of weekly contact hou | ırs, language — if other than Ge | rman) | | | |
| A (no ir | nforma | tion on SWS (weekly c | ontact hours) and cours | se language availab | le) | | |
| | | sessment (type, scope, lan ble for bonus) | guage — if other than German, | examination offered — if r | not every semester, information on whether | | |
| a) talk | (appro | x. 30 minutes) or b) wr | itten elaboration (appro | ox. 5 to 10 pages) | | | |
| Allocat | ion of | places | | | | | |
| | | | | | | | |
| Additio | onal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teaching cycle | | | | | | | |
| | | | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) | | | | | | | |
| | | | | | | | |
| Module appears in | | | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) | | | | | | | |

| Module title Abbreviation | | | | | | | |
|---|------------------------|--|--------------------------------------|-----------------------------|---|--|--|
| Reading Course Stochastics 10-M-RCS-082-m01 | | | | | | | |
| Modul | e coord | inator | | Module offered by | Module offered by | | |
| Dean o | f Studi | es Mathematik (Mathem | atics) | Institute of Mathematics | | | |
| ECTS | ECTS Method of grading | | Only after succ. compl. of module(s) | | | | |
| 4 | nume | rical grade | | | | | |
| Duration | | Module level | Other prerequisites | | | | |
| 1 seme | ster | undergraduate | | | | | |
| Conten | ts | κ. | | | | | |
| Advand | ced top | ics in stochastics. | | | | | |
| Intend | ed lear | ning outcomes | | | | | |
| The student is able to work independently on a given scientific topic. He or she can tackle a simple mathematical text and can use standard literature. | | | | | | | |
| Course | S (type, 1 | number of weekly contact hours, | language — if other than Ge | rman) | | | |
| A (no ii | nforma | tion on SWS (weekly con | tact hours) and cours | e language available | e) | | |
| | | Sessment (type, scope, langua ole for bonus) | age — if other than German, | examination offered — if no | ot every semester, information on whether | | |
| a) talk | (appro | x. 30 minutes) or b) writt | en elaboration (appro | ox. 5 to 10 pages) | | | |
| Allocat | ion of | places | | | | | |
| | | | | | | | |
| Additio | onal inf | ormation | | | | | |
| | | | | | | | |
| Worklo | ad | | | | | | |
| | | | | | | | |
| Teachi | ng cycl | e | | | | | |
| | | | | | | | |
| Referred to in LPO I (examination regulations for teaching-degree programmes) | | | | | | | |
| | | | | | | | |
| Module appears in | | | | | | | |
| Bachelor' degree (1 major) Mathematics (2008) | | | | | | | |
| Bachelor' degree (1 major) Mathematical Physics (2009) | | | | | | | |
| Bachelor' degree (1 major) Computational Mathematics (2009) | | | | | | | |

| Modul | e title | | | | Abbreviation | |
|---------|--|---|-------------------------------|-----------------------------|---|--|
| Readin | Reading Course Discrete Mathematics 10-M-RCD-082-mo1 | | | | | |
| Modul | e coord | linator | | Module offered by | <u> </u> | |
| Dean c | of Studi | ies Mathematik (Mathem | atics) | Institute of Mathen | natics | |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | | |
| 4 | nume | erical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 seme | ester | undergraduate | | | | |
| Conter | nts | · | | | | |
| Basics | in disc | crete mathematics. | | | | |
| Intend | ed lear | ning outcomes | | | | |
| | | s able to work independe use standard literature. | ently on a given scient | ific topic. He or she | can tackle a simple mathematical | |
| Course | es (type, | number of weekly contact hours, | language — if other than Ge | rman) | | |
| A (no i | nforma | tion on SWS (weekly con | tact hours) and cours | e language available | e) | |
| | | sessment (type, scope, langu ble for bonus) | age — if other than German, | examination offered — if no | ot every semester, information on whether | |
| a) talk | (appro | x. 30 minutes) or b) writt | en elaboration (appro | ox. 5 to 10 pages) | | |
| Allocat | tion of | places | | | | |
| | | | | | | |
| Additio | onal in | formation | | | | |
| | | | | | | |
| Worklo | oad | | | | | |
| | | | | | | |
| Teachi | ng cyc | le | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulation | ns for teaching-degree progra | immes) | | |
| | | | | | | |
| Modul | e appe | ars in | | | | |
| | - | gree (1 major) Mathemati | | | | |
| | - | gree (1 major) Mathemati gree (1 major) Computatio | | 09) | | |

| Modul | e title | | | | Abbreviation |
|------------------|--------------------|---|-------------------------------|----------------------------|---|
| Readin | ig Cour | se Functional Analysis | | | 10-M-RCF-082-m01 |
| Modul | e coord | linator | | Module offered by | |
| Dean o | of Studi | es Mathematik (Mathem | atics) | Institute of Mathen | natics |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | |
| 4 | nume | erical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conter | nts | | | | |
| Basics | in fund | ctional analysis. | | | |
| Intend | ed lear | ning outcomes | | | |
| | | s able to work independe use standard literature. | ntly on a given scient | ific topic. He or she | can tackle a simple mathematical |
| Course | S (type, | number of weekly contact hours, | language — if other than Ge | rman) | |
| A (no i | nforma | tion on SWS (weekly con | tact hours) and cours | e language availabl | e) |
| | | sessment (type, scope, langua ole for bonus) | age — if other than German, | examination offered — if n | ot every semester, information on whether |
| a) talk | (appro | x. 30 minutes) or b) writt | en elaboration (appro | ox. 5 to 10 pages) | |
| Allocat | tion of | places | | | |
| | | | _ | | |
| Additio | onal inf | formation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cyc | le | | | |
| | | | | | |
| Referre | ed to in | LPO I (examination regulation | is for teaching-degree progra | immes) | |
| | | | | | |
| Modul | e appe | ars in | | | |
| Bachel Bachel | or' deg or' deg | gree (1 major) Mathematio gree (1 major) Mathematio gree (1 major) Computatio | cal Physics (2009) | 09) | |

| Modul | e title | | | | Abbreviation |
|---------|--|---|------------------------------|-----------------------------|---|
| Readin | ıg Cour | se Operations Research | | | 10-M-RCO-082-m01 |
| Modul | e coord | linator | | Module offered by | |
| Dean c | Dean of Studies Mathematik (Mathematics) | | | Institute of Mathen | natics |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | |
| 4 | nume | erical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 seme | ester | undergraduate | | | |
| Conter | nts | | • | | |
| Basics | in ope | rations research. | | | |
| Intend | ed lear | ning outcomes | | | |
| | | s able to work independe use standard literature. | ntly on a given scient | ific topic. He or she | can tackle a simple mathematical |
| Course | es (type, | number of weekly contact hours, | language — if other than Ge | rman) | |
| A (no i | nforma | tion on SWS (weekly con | tact hours) and cours | e language available | e) |
| | | sessment (type, scope, langua ble for bonus) | age — if other than German, | examination offered — if no | ot every semester, information on whether |
| a) talk | (appro | x. 30 minutes) or b) writte | en elaboration (appro | ox. 5 to 10 pages) | |
| Allocat | tion of | places | | | |
| | | | | | |
| Additio | onal in | formation | | | |
| | | | | | |
| Worklo | bad | | | | |
| | | | | | |
| Teachi | ng cyc | le | | | |
| | | | | | |
| Referre | ed to in | LPOI (examination regulation | s for teaching-degree progra | immes) | |
| | | | | | |
| Modul | e appe | ars in | | | |
| Bachel | lor' deg | gree (1 major) Mathematic gree (1 major) Mathematic gree (1 major) Computatio | al Physics (2009) | 09) | |

| Module | e title | | | | Abbreviation |
|----------|-------------------|---|------------------------------|-----------------------------|---|
| Readin | g Cour | se Dynamical Systems | | | 10-M-RCY-082-m01 |
| Modul | e coord | linator | | Module offered by | I |
| Dean o | f Studi | es Mathematik (Mathema | atics) | Institute of Mathem | natics |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | |
| 4 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conten | its | • | | | |
| Basics | in dyn | amical systems and nonli | near dynamics. | | |
| Intend | ed lear | ning outcomes | | | |
| | | s able to work independe use standard literature. | ntly on a given scient | ific topic. He or she | can tackle a simple mathematical |
| Course | S (type, 1 | number of weekly contact hours, l | anguage — if other than Ger | man) | |
| A (no ii | nforma | tion on SWS (weekly cont | act hours) and cours | e language available | <u>e)</u> |
| | | sessment (type, scope, langua ble for bonus) | ge — if other than German, o | examination offered — if no | ot every semester, information on whether |
| a) talk | (appro | x. 30 minutes) or b) writte | en elaboration (appro | x. 5 to 10 pages) | |
| Allocat | ion of | places | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| | | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cycl | e | | | |
| | | | | | |
| Referre | ed to in | LPO I (examination regulation | s for teaching-degree progra | mmes) | |
| | | | | | |
| Module | e appea | ars in | | | |
| Bachel | or' deg | rree (1 major) Mathematic rree (1 major) Mathematic rree (1 major) Computatio | al Physics (2009) | 09) | |

| Modul | e title | | | | Abbreviation |
|---------|--|---|------------------------------|-----------------------------|---|
| Readin | ig Cour | se Optimisation | | | 10-M-RCP-082-m01 |
| Modul | e coord | linator | | Module offered by | <u> </u> |
| Dean o | Dean of Studies Mathematik (Mathematics) | | | Institute of Mathen | natics |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | |
| 4 | nume | rical grade | | | |
| Duratio | on | Module level | Other prerequisites | | |
| 1 seme | ster | undergraduate | | | |
| Conter | nts | • | • | | |
| Basics | in opti | mization. | | | |
| Intend | ed lear | ning outcomes | | | |
| | | s able to work independe use standard literature. | ntly on a given scient | ific topic. He or she | can tackle a simple mathematical |
| Course | S (type, | number of weekly contact hours, | language — if other than Ge | rman) | |
| A (no i | nforma | tion on SWS (weekly con | tact hours) and cours | e language available | e) |
| | | sessment (type, scope, langua ble for bonus) | age — if other than German, | examination offered — if no | ot every semester, information on whether |
| a) talk | (appro | x. 30 minutes) or b) writt | en elaboration (appro | ox. 5 to 10 pages) | |
| Allocat | tion of | places | | | |
| | | | | | |
| Additio | onal inf | ormation | | | |
| | _ | | | | |
| Worklo | ad | | | | |
| | | | | | |
| Teachi | ng cyc | e | | | |
| | | | | | |
| Referre | ed to in | LPO I (examination regulation | s for teaching-degree progra | immes) | |
| | | | | | |
| Modul | e appe | ars in | | | |
| Bachel | or' deg | rree (1 major) Mathematio rree (1 major) Mathematio rree (1 major) Computatio | cal Physics (2009) | 09) | |

| Module | e title | | | | Abbreviation | |
|--------------------|-------------------|---|---|-----------------------------|----------------------------|-----------------|
| Program | mming | course for students of I | Mathematics and othe | r subjects | 10-M-PRG-082-mo | 1 |
| Module | e coord | inator | | Module offered by | | |
| Dean of | f Studi | es Mathematik (Mathem | natics) | Institute of Mathem | natics | |
| ECTS | | od of grading | Only after succ. com | | | |
| | | successfully completed | | | | |
| 3 | | | | | | |
| Duratio | | Module level | Other prerequisites | | | |
| 1 seme: | ster | undergraduate | Admission prerequis monitored, a maxim | | | |
| Conten | ts | | | | | |
| Basics matics. | | odern programming lang | guage (e. g. C or Fortrar | n) taking into accoui | nt the particular nee | ds in mathe- |
| Intende | ed lear | ning outcomes | | | | |
| The stu in math | | able to work independers. | ently on small program | iming exercises and | standard programn | ning problems |
| Course | S (type, r | umber of weekly contact hours | language — if other than Ger | man) | | |
| P (no in | offormat | ion on SWS (weekly cor | itact hours) and course | e language available | 2) | |
| | | essment (type, scope, langu le for bonus) | age — if other than German, e | examination offered — if no | ot every semester, informa | tion on whether |
| | | form of programming ex ssessment: German, En | | • • | ne course) | |
| Allocat | - | | <u> </u> | | | |
| | | | | | | |
| Additio | nal inf | ormation | | | | |
| | | | | | | |
| Worklo | ad | | | | | |
| Teachir | ng cycl | e | _ | | | |
| | | | | | | |
| Referre | d to in | LPO I (examination regulatio | ns for teaching-degree progra | mmes) | | |
| § 73 (1) | 5. Mat | hematik Angewandte M | athematik | | | |
| Module | - | | | | | |
| | | ree (1 major) Mathemati | (2008) | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Physics (20 | • | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Technolog | | ls (2009) | | |
| | - | ree (1 major) Technolog | | - | | |
| | - | ree (1 major) Nanostruci | | | | |
| | - | ree (1 major) Economath | | | | |
| | - | ree (1 major) Economath | - | | | |
| | - | ree (1 major) Mathemati | | | | |
| | - | - | onal Mathematics (200 | 09) | | |
| Bachel | ueg | | | | | |
| | - | ee (1 major) Physics (20 | 10) | - | | |
| Master | 's degr | | | s (2010) | | |

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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

| Module | e title | | | | Abbreviation | |
|----------------------|--------------------|--|--|--|-----------------------------|----------------|
| Compu | terorie | nted Mathematics | | | 10-M-COM-082-m01 | |
| Module | e coord | inator | | Module offered by | | |
| Dean o | f Studie | es Mathematik (Mathem | atics) | Institute of Mathem | natics | |
| ECTS | Metho | od of grading | Only after succ. con | pl. of module(s) | | |
| 3 | <u> </u> | successfully completed | | | | |
| Duratio | · | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | Admission prerequi | site to assessment: red, a maximum of c | | |
| Conten | Its | | | | | |
| merica 10-M-A | l compi NL) and | o modern mathematical utation (e.g. Matlab) to I 10-M-LNA). Computer-I and integral calculus; v | supplement the basic based solution of prob | modules in analysis plems in linear algeb | and linear algebra | ((10-M-ANA 0 |
| Intend | ed learı | ning outcomes | | | | |
| | | arns the use of advance cation to solve mathema | | cal software package | es, and is able to as | sess their |
| Course | S (type, n | umber of weekly contact hours, | language — if other than Ger | rman) | | |
| V + Ü (ı | no infor | mation on SWS (weekly | contact hours) and co | ourse language avail | able) | |
| | | s essment (type, scope, langu le for bonus) | age — if other than German, | examination offered — if no | ot every semester, informat | ion on whether |
| Assess Langua | ment o age of a | form of programming ex ffered: once a year, sum ssessment: German, En | imer semester | | ne course) | |
| Allocat | ion of p | olaces | | | | |
| | | | | | | |
| Additio | onal info | ormation | | | | |
| | | | _ | | | |
| Worklo | ad | | | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulatio | ns for teaching-degree progra | mmes) | | |
| | | hematik Angewandte M | | | | |
| | e appea | - | | | | |
| | •• | ree (1 major) Computer S | Science (2010) | | | |
| | - | ree (1 major) Mathemati | | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Physics (20 | | | | |
| Bachel | or' deg | ree (1 major) Physics (20 | 012) | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Technology | | - | | |
| | - | ree (1 major) Technology | | | | |
| | - | ree (1 major) Nanostruct ree (1 major) Economath | |) | | |
| Bachelor's (2009) | with 1 maj | or Mathematical Physics | | generated 26-Aug-2024 • ex r (180 ECTS) Mathematische | | page 152 / 156 |
| | | | | | | |

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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

| Module | e title | | | , | Abbreviation | |
|------------------|---|---|------------------------------|--|---|--|
| Advand | ed Ser | ninar Experimental/Theo | retical Physics | | 11-HS-092-m01 | |
| Module | e coord | inator | | Module offered by | 1 | |
| | Managing Directors of the Institute of Applied Physics an he Institute of Theoretical Physics and Astrophysics | | | | | |
| ECTS | Meth | od of grading | Only after succ. con | npl. of module(s) | | |
| 4 | nume | rical grade | | | | |
| Duratio | on | Module level | Other prerequisites | | | |
| 1 seme | ster | undergraduate | | site to assessment: of seminar presenta | regular attendance and suc- tion. | |
| Conten | ts | · | · | | | |
| Current | t issue | s of Theoretical/Experime | ental Physics. | | | |
| Intend | ed lear | ning outcomes | | | | |
| | | have advanced knowledg ntly acquire this knowled | | | Theoretical Physics. They are able ation. | |
| Course | S (type, 1 | number of weekly contact hours, l | anguage — if other than Ge | rman) | | |
| S (no ir | nforma | tion on SWS (weekly cont | act hours) and cours | e language available | e) | |
| | | S essment (type, scope, langua ole for bonus) | ge — if other than German, | examination offered — if no | ot every semester, information on whether | |
| Assess and wi | ment o Il be an | | ten assessment will | | on the method of assessment 3 ASPO (general academic and | |
| Allocat | | | - | | | |
| | | | | | | |
| Additio | onal inf | ormation | - | | | |
| | | | | | | |
| Worklo | ad | | - | | | |
| | | | | | | |
| Teachi | ng cycl | e | | | | |
| | | | | | | |
| Referre | ed to in | LPO I (examination regulation | s for teaching-degree progra | ummes) | | |
| | | | • • • | | | |
| Module | e appea | ars in | | | | |
| | | ree (1 major) Physics (20 | 10) | | | |
| | - | ree (1 major) Physics (20 | | | | |
| | - | ree (1 major) Mathematic | | | | |
| Bachel | or's de | gree (1 major, 1 minor) Ph | nysics (Minor, 2010) | | | |

| Modul | e title | | | | Abbreviation | |
|---|--|---|--|--|---------------------|------------------|
| Compu | Itation | al Physics | | | 11-A1-092-m01 | |
| Module | e coord | linator | | Module offered by | | |
| Manag and As | | ector of the Institute of sics | Theoretical Physics | Faculty of Physics a | and Astronomy | |
| ECTS | 1 | od of grading | Only after succ. cor | npl. of module(s) | | |
| 6 | nume | erical grade | | · · · · · | | |
| Duration Module level Other prere | | Other prerequisites | 5 | | | |
| 1 semester undergraduate | | Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew. | | | | |
| Conten | nts | | | | | |
| - rando - many Intendo The stu They ha solutio | om wall -partic ed lear udents ave kno on of ph | le processes and reaction ning outcomes have knowledge of two owledge of numerical st hysical problems, e.g. a | major programming la tandard methods and a lgorithms for solving n | are able to apply com umerical problems o | nputer-assisted pro | |
| | - | number of weekly contact hour | | | | |
| Metho | d of as | rmation on SWS (weekl sessment (type, scope, lang ble for bonus) | · | | | ation on whether |
| Assess and wi | sment o Il be ar | nation (approx. 120 min offered: When and how nounced in due form u regulations) 2009. | often assessment will | | | |
| Allocat | tion of | places | | | | |
| | | of pool of general key sk | kills (ASQ): 15 places. F | laces will be allocate | ed by lot. | |
| Additio | onal inf | formation | | | | |
| | | | | | | |
| Worklo | bad | | | | | |
| | | | | | | |
| Teachi | ng cyc | le | | | | |
| | | | | | | |
| Referre | ed to in | LPOI (examination regulati | ons for teaching-degree progr | ammes) | | |
| | | | | | | |
| | | | | | | |

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)