

AMTLICHE BEKANNTMACHUNGEN

Jahrgang 2019

Ausgegeben zu Münster am 13. Februar 2019

Nr. 02

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Herausgegeben vom
Rektor der Westfälischen Wilhelms-Universität Münster
Schlossplatz 2, 48149 Münster
AB Uni 2019/02

<http://www.uni-muenster.de/Rektorat/abuni/index.html>



1. Amendments to the “Examination Regulations for the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance (PIONEER Master) at the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia”

approved on 20. February 2018

of 22. January 2019

Article I

The version of the “Examination Regulations for the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance (PIONEER Master) at the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia” of 20. February 2018 is to be amended as follows:

Article I:

1. § 7 (1) contains the following amended version:

“(1) All students start their first semester at the KU Leuven (5 courses). For the second semester, students move to the University of Münster (5 modules), and for the third semester, students move to TalTech (5 courses). The last semester is dedicated to the Master thesis and its thesis defense, which is organised in a rotating system between KU Leuven, University of Münster and TalTech.”

2. § 7 (3) contains the following amended version:

“(3) In detail, the Master programme consists of the following courses / modules:

a) KU Leuven

| Course | Type of Course | Type of Examination | Credits |
|--|----------------|--|---------|
| Public Administration and Public Sector Innovation: Capita Selecta | Lecture | Paper/Project, report, participation during contact hours | 8 ECTS |
| Comparative Public Administration in Europe | Lecture | Oral examination, Paper/Project, Presentation | 4 ECTS |
| Integrated Research Seminar | Practical | Paper/Project, presentation, process evaluation | 6 ECTS |
| Information Management in the Public Sector | Lecture | Oral examination, take-home - assignment, presentation, paper | 6 ECTS |
| Business Information Systems | Lecture | Written examination, participation during contact hours, take-home examination | 6 ECTS |

b) University of Münster

| Module | Type of Course | Type of Examination | Credits |
|---------------------------------------|-----------------------|---|---------|
| Project Management | Lecture + exercise | Written examination, presentation + discussion, essay | 6 ECTS |
| Information Management: Theories | Lecture + exercise | Written examination, written report, presentation, written comment | 6 ECTS |
| Enterprise Architecture Management | Lecture + exercise | Written examination, case study, presentation | 6 ECTS |
| E-Government | Lecture + exercise | Written examination | 6 ECTS |
| Integrated Research Seminar | Seminar | Seminar paper (elaboration), oral examination | 6 ECTS |

c) TalTech

| Course | Type of Course | Type of Examination | Credits |
|--|----------------------------|--|---------|
| Recent Issues in E-Governance | Lecture, seminar, exercise | Home assignment (essay/case study), presentation | 6 ECTS |
| E-Governance and E-Democracy | Lecture, exercise | Home assignment (case study), written exam | 6 ECTS |
| Integrated Research Seminar | Seminar | Seminar paper (case study), presentation | 6 ECTS |
| Entrepreneurship and Technology Management | Lecture, seminar, exercise | Group work, written examination | 6 ECTS |
| Technology, Society and the Future | Lecture, exercise | Group assignments (essays) | 6 ECTS |

”

3. § 10 (2) is amended as follows:

“(2) The topic of the Master thesis is selected in accordance with article 26 of the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance Consortium Agreement and set by the Academic Committee upon request of one member of the Thesis Defence Committee, who is responsible for supervising the thesis process. The student has the right to propose both, the choice of topic and the choice of the supervisor.”

4. § 10 (3) is amended as follows:

- “(3) Upon receiving the student’s application, the topic of the Master thesis is assigned to the student on behalf of the Academic Committee by the examiner who requested the Academic Committee to set the topic of the Master thesis. Topics can only be assigned on the condition that the student has already earned a total of 60 credits. The date of the topic assignment must be put on record. For the Master thesis defense, additionally to the submission of the Master thesis, completing the curriculum up to defending the Master thesis shall be the precondition for being eligible to conduct the defense. The curriculum is completed once all the study modules have been completed.”

5. § 11 (3) is amended as follows:

- “(3) The Master thesis and its defence are reviewed according to standardized, uniform criteria whereby the scoring and the grading process of the Master thesis and its defence and its reasons have to be documented; the documentation must be signed by all examiners. The grade for the Master thesis and its defence must be communicated to the student within a one-week period after the defence. Rectifications can be made within a time period of 10 days after the formal announcement of the result.”

6. § 16 (4) Sentence 1 - 3 are amended as follows:

“The scores of all weighted courses (KU Leuven, TalTech)/modules (University of Münster) and the score of the Master thesis and its defense form the final overall grade. The score of the Master thesis module accounts for 25 per cent of the final overall grade. Unless otherwise specified in the course descriptions, the other course (KU Leuven, TalTech) / module (University of Münster) grades are weighted with respect to their credit points; thereby, all decimal places are rounded up to the next integral number of the points.”

5. The abbreviation “TTÜ” is to be replaced by “TalTech”.**6. § 22 is amended as follows:**

“§ 22

Transitional Provisions, Coming into Force and Publication

- (1) These amended Regulations come into force on the day following their publication in the Official Announcements of the Universities involved in the programme. These Regulations apply to all students who began their studies in the Master’s programme PIONEER in or after the winter semester of 2019/20.

- (2) For students of the preceding cohorts, only the replacement of the abbreviation “TTÜ” by “TalTech” and the modifications regarding § 10 (3) sentence 1 and § 16 (4) sentence 1 - 3 of these amended Regulations apply. Apart of that, the former version of the “Examination Regulations for the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance (PIONEER Master) at the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia” continues to apply for them.

7. The Course/Module Descriptions contain the amended version as stipulated in the attached document “1. Amendments to the “Examination Regulations for the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance (PIONEER Master) at the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia”: Annex”

Art. II.:

- (1) These amended Regulations come into force on the day following their publication in the Official Announcements of the Universities involved in the programme. These Regulations apply to all students who began their studies in the Master’s programme PIONEER in or after the winter semester of 2019/20.

- (2) For students of the preceding cohorts, only the replacement of the abbreviation “TTÜ” by “TalTech” and the modifications regarding § 10 (3) sentence 2 and § 16 (4) sentence 1 - 3 of these amended Regulations apply. Apart of that, the former version of the “Examination Regulations for the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance (PIONEER Master) at the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia” continues to apply for them.

Approved by the legal entities of the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia.

Issued upon resolution of the faculty board of the School of Business and Economics (FB 04) of the University of Münster on 05.12.2018. The above Examination Regulations are hereby announced.

Münster, 22.01.2019

The Rector

Prof. Dr. Johannes W e s s e l s

1. Amendments to the “Examination Regulations for the Erasmus Mundus Master of Science in Public Sector Innovation and eGovernance (PIONEER Master) at the Katholieke Universiteit Leuven, Belgium, the Westfälische Wilhelms-Universität Münster, Germany, and the Tallinn University of Technology, Estonia”:

Annex

I. In the Course/Module Descriptions, the Course Descriptions of KU Leuven contains the following amended version:

“1. Semester: KU Leuven

1a

Lectures and Examinations

Unless otherwise stipulated in the common part of the present regulations, [the current Regulations on Education and Examinations](#) are applied for all educational and examination activities of course units offered by KU Leuven. A selection of articles from the 2018/19 version of the KU Leuven examination regulations is provided for information purposes.

Title II. Examination regulations

Section 1. General provisions

Article 37. General provisions

Each examination is organised according to the provisions set out below in a way that allows students to demonstrate that they master the competences required for the course.

This calls for a permanent engagement from the examiner and all bodies concerned, to guarantee a well-organised examination for each course.

In the organisation of examinations, special attention is given to providing the possibility for students to use the toilet upon individual request.

Section 2. Organisation of examinations

Article 38. Examination periods

Each academic year, three examination periods are organised:

- the first examination period at the end of the first semester, with examinations on the courses completed in this semester;
- the second examination period at the end of the second semester, with examinations on the courses completed in this semester;
- the third examination period after the summer break, where students can take their second examination opportunity of the current academic year.

Examinations on courses spread over more than one semester are taken at the end of the second semester. After the first semester, a partial examination can be organised for courses that are not yet completed.

At the end of each examination period, an examination committee meeting is organised and the results are communicated to the students.

In exceptional cases, the examination committee can decide to postpone the conclusion of the current examination period. The examination committee concludes the last examination period no later than 30 September. However, the examination committee can form a decision after 30

September, but no later than 14 November, for students participating in exchange programmes whose results from the previous academic year have not yet been communicated.

Article 39. Special examination times for complete courses

The faculty can decide to organise examinations outside the regular examination periods:

1° for learning activities other than lectures;

2° for courses taught by visiting professors or by teaching staff who are legitimately absent during an examination period.

3° for students who participate in exchange programmes with other universities or university colleges.

Article 40. Partial examinations and continuous assessment

The faculty can allow for partial examinations to be organised, inter alia, for courses that consist of more than one learning activity or courses that are spread over two semesters. This means that multiple examinations are organised for this course, during one or more examination periods. The result of a partial examination is a partial result.

The faculty can also allow for a form of continuous assessment to be organised for a complete course or for a learning activity. This means that the examination takes place (in part) outside the examination periods. The faculty determines how the continuous assessment will be organised and communicates it clearly and in advance to the students.

The faculty ensures a balanced distribution of the assessments.

When deciding on partial examinations and continuous assessments, the faculty takes the following into account:

- the description of the partial examinations;
- the various partial results' relative contributions to the examination result for the course as a whole;
- the assessment methods and the timing of the examination;
- the course holder's communication of the results of the individual examinations to the students;
- the format of a possible second examination opportunity, or the decision not to offer a second examination opportunity, but instead transferring the partial result to a following examination period within the same academic year.

Article 41. Second examination opportunity

The faculty determines whether a second examination opportunity with a different assessment method can be organised for specific courses or partial examinations, or whether, as an exception, no second examination opportunity will be offered.

Article 43. Time and place

Valid examinations can only be organised during the periods or according to the timing specified in articles 38-40.

Exceptions to this provision:

- cases of force majeure;
- examinations for students with permission to take examinations outside the examination period (article 51).

Students have to be present at the scheduled start of their examination at the latest. Students who arrive late to a written examination can, in case of serious reasons, still be accepted to the examination. However, the scheduled end of the examination will not be adapted for these students.

All examinations are taken in a KU Leuven room.

Exceptions to this provision:

- examinations subject to specific individual circumstances, to be determined by the chair of the examination committee;
- specific course formats.

(1) Special arrangement for incoming exchange students

The faculty can provide exceptional second examination opportunities for incoming exchange students if organising them in the third examination period leads to an unreasonable situation for the students.

Article 45. Examination schedule

The examination schedule for the first and second examination period will be established for every individual student no later than 5 weeks before the start of the examination period. The examination schedule for the third examination period will be established for every individual student no later than the fourth Monday after announcing the results of the second examination period. This should be done according to the procedure laid down for the academic year and the study programme concerned.

Only students following a standard learning path can be guaranteed an exam schedule in which maximum one compulsory course will be examined per day.

Examiners and students strictly comply with the determined examination schedule. Examinations can only be rescheduled for a serious reason. The exam ombudsperson assesses the situation independently and makes new arrangements where needed. The ombudsperson also decides on the examination moments. The faculty determines whether or not, and under which conditions, examinations can be rescheduled to a moment outside the examination periods. No later than five weeks before the start of the first and the second examination period, and no later than two weeks before the start of the third examination period, the faculty clearly communicates to the students who the competent examination committee is, who the chair and the secretary of the committee are, who the examination ombudsperson is and when the results will be announced.

(1) Special arrangement regarding religious facilities

Students who apply for rescheduled examinations due to the examination taking place on a religious holiday, are subject to a prior recognition and advisory procedure. More information on this recognition and advisory procedure can be found here: www.kuleuven.be/diversiteit/reldiv.

(2) Procedure

The faculty decides which of the following procedures they adopt when preparing the examination schedule for individual students.

- a) After registration and before deciding on their individual year programme, students are assigned an examination moment for the courses they have yet to complete as determined by the faculty from a specific programme stage. For all other courses, the examination schedule will be prepared by the faculty student administration or the students sign up for a specific examination moment when deciding on their individual year programme;
- b) after the students have decided on their individual year programme, the faculty student administration prepares their examination schedule.

Students can register for a course for which no examination date has been set at the moment they put together their individual year programme and individual examination schedule. In its scheduling of this examination, the faculty student administration will take strong account of the already scheduled examination moments for courses in the student's year programme. If students include the course in their main study programme consisting of less than 72 credits, the faculty will provide a schedule without overlapping examination moments for courses included in the main study programme.

The faculty can, in accordance with article 21, register a student's individual year programme and individual examination schedule and assign examination moments on its own initiative for students who fail to decide on their individual year programme and individual examination schedule by no later than the third Wednesday of the academic year, or -for courses that are only taught in the second semester- by no later than the third Wednesday of the second semester.

Students with a special examination schedule due to individual circumstances are subject to the provisions laid down in article 51.

Section 3. Participation in examinations

Article 46. Conditions for participation in examinations

§1. Non-payment

Students can only take an examination if they have paid the tuition fees they are due or if they have come to an agreement with the university.

§2. Requirements per course

Participation in an examination can be subject to specific requirements, such as required attendance for practical course components, sufficient participation in group obligations, or timely submission of assignments. The ECTS course description of the course concerned states the consequences for the examination when students do not meet the necessary requirements. If students do not meet the necessary requirements, the faculty can decide to award a zero or a fail in terms of a pass/fail decision for the course concerned or part of the course concerned (see article 67).

§3. Verification of identity

When participating in an examination, students have to be able to prove their identity. Students who are registered with a degree contract or a credit contract have to prove their identity by

means of their student card. For written examinations, the attendance of the students is registered. Students can, upon request, receive official proof of participation in the exam.

§4. Registration for the third examination period

Students who wish to participate in examinations during the third examination period, have to register for this following the procedure specified in article 89 §3. Students who participate in examinations for which they did not register explicitly, despite specific regulations, cannot be awarded an examination result. In this case, the examination is considered void.

Article 47. Resitting examinations from the first examination period

For courses with an examination organised in the first examination period, students can resit the examination in the third examination period at the earliest. This also applies to partial examinations and continuous assessment.

The faculty can decide to allow students in their last programme stage to resit an examination in the second examination period for particular courses for which they have already taken an examination in the first examination period, but for which they have not obtained credit and which they want to, or have to, resit. The faculty determines the conditions this provision is subject to.

Article 48. Catching up examinations from the first examination period

Students who were not able to participate in an examination in the first examination period due to a serious reason, can request permission to take the examination in the second examination period. The deadline for this request is the third Wednesday of the second semester. The faculty makes a decision after receiving advice from the examination ombudsperson and determines the assessment method in consultation with the examiner.

Article 50. Not participating in the examinations

Students who registered for an examination period but are unable to participate in an examination, have to report this as soon as possible, following the procedure set by the faculty.

Students can justify an absence for instance with a medical certificate, provided that the certificate has been written by a physician no later than the day of the absence and provided that the student presents the medical certificate to the faculty student administration as soon as possible and preferably within three working days. The certificate states that the student concerned was unable to participate in class (for continuous assessment) or in the examination. A medical certificate on (non-)participation in (certain) sports activities has to clarify which activities the student cannot perform.

The following medical certificates will not be accepted:

- an incomplete or inconsistent certificate;
- a certificate based solely on the patient's declaration;
- a post factum certificate (a certificate issued posterior to the illness or after the medical consequences of an accident can no longer be identified).

Section 4. Deviating examination schedules

Article 51. Adapted examination scheduling outside the standard examination periods

Students with special individual circumstances (e.g. serious medical reasons) and students with a recognised status (see article 97) can request permission for an adapted examination schedule outside the standard examination periods. Students can only take an examination after the classes of the course concerned have ended. This provision also applies to adapted examination schedules outside the standard examination periods.

Students with a recognised status (see article 97) for whom the accreditation body advised such an adapted examination schedule outside the standard examination periods, will in any case be granted this permission. For students working their way through university (status of working student), the advice for an adapted examination schedule applies only if they have an individual study programme of at least 25 credits.

In addition, an adapted examination schedule outside the standard examination periods is possible for students combining two full-time study programmes provided that, for each of the study programmes, they have included at least 54 credits in their ISP.

Authorising an adapted examination schedule does not automatically imply the possibility to deviate from set submission deadlines, from explicitly stated mandatory attendance or from determined course formats and assessment methods. Where necessary and by way of exception, specific arrangements are made with the faculty concerned. The education ombudsperson mediates in the event of a disagreement; continuing conflicts are settled by the dean.

For examinations taken as a first examination opportunity after the second examination period, the results will be communicated to the students as soon as possible after the examination, in accordance with the faculty regulations concerned. Students who were authorised an adapted examination schedule decide whether or not they want to resit these examinations before the examination board meetings for the third examination period. Students who have not yet taken an examination for all their courses in the second examination period due to the adapted examination schedule granted to them, can already use tolerance credits for other courses, provided that they comply with the provisions set in article 91.

(1) Procedure

Applications have to be send to the manager of Teaching and Learning Processes, no later than 1 December for first semester examinations and no later than 31 March for second semester examinations.

Section 6. Examinations taken in another study programme or institution

Article 54. Time and place of examinations

When students take courses in another study programme or in another higher education institution (within or outside Belgium) according to the provisions set by the faculty, they take an examination on these courses on the time and place and under the conditions set by the study programme or institution concerned.

Article 55. Conversion of results obtained at another institution

Results obtained for an examination taken at another higher education institution are, if necessary, converted to the KU Leuven marking scale, under the supervision of the Programme Committee. Students who follow part of their programme at another institution are informed of the conversion rules before departure.

Section 7. Examination ombudsperson

Article 57. Duties, appointment and availability

The examination ombudsperson mediates between examiners and students. The ombudsperson has to possess the necessary expertise and be able to perform their duty as an intermediary in full independence.

Each academic year, the faculty appoints a member of the academic staff or another staff member with relevant expertise in education to act as examination ombudsperson and another to act as substitute examination ombudsperson, on the recommendation of or in consultation with student representatives and no later than 15 November. These selected persons perform their duties for all examinations in the academic year concerned for a specific group of students. The faculty also makes arrangements for the administrative support for the examination ombudsperson.

The examination ombudsperson clearly communicates to the students where and when they can be contacted and when the substitute examination ombudsperson stands in.

Article 58. Responsibilities and disagreements

Where necessary, the ombudsperson mediates on the date, place, assessment methods and conditions of an examination, without prejudice to the specific responsibilities laid down in other articles. The examination ombudsperson decides independently on the rescheduling of examinations and on the assignment of an examination moment.

In order to perform their duties as an intermediary effectively, the examination ombudsperson is entitled to gain information on each and every examination, including prior to the examination board meeting. The examination ombudsperson is bound by the duty of discretion.

The examination ombudsperson takes part in the negotiations of the examination board meeting and in the negotiations of the select examination committee, without the right to vote.

Article 59. Conflicts of interest

The examination ombudsperson may in no circumstances assess the students he represents as an examination ombudsperson. If, by way of exception, the examination ombudsperson is involved in the assessment of students for a particular course, the substitute examination ombudsperson will, for this group of students, stand in for the examination ombudsperson.

Article 60. Report of the examination ombudsperson

After the third examination period of each academic year, the examination ombudsperson sends a report on the activities to the body specified in the faculty regulations. The body specified in the faculty regulations discusses this report at the start of the next academic year, no later than 15 November.

Section 8. Examination procedure

Article 61. Examiner

The task of the examiner is to determine whether students have achieved the learning outcomes of a specific course.

Every examination or part of an examination is held by the course holder(s) of the course or by the person(s) who officially replaced the course holder in teaching the class concerned or supervising the activities or exercises concerned.

In the event of a relationship by blood or marriage to the fourth degree inclusive between a student and an examiner, or in case of force majeure on part of the examiner, the examiner asks the chair of the examination committee, in consultation with the faculty dean, to appoint a substitute.

Examinations on learning activities other than lectures can be held by examiners who are not course holders, provided that they were co-responsible for the content of the learning activity. The faculty regulations can determine that external parties who are not university staff members can act as examiners. The regulations also establish in which situations this is an option and which quality requirements these external parties have to meet.

The course holder, or the course coordinator (if there are multiple course holders) remains fully responsible for the final assessment.

At the end of the examination or partial examination, the examiner does not communicate the result to the student, without prejudice to articles 51 and 96.

Only the course holder, the course coordinator (if there are multiple course holders) or the official substitute can be a member of an examination committee if the examination committee is composed of one representative for each course.

Examinations on courses taught by visiting professors are, in their absence, conducted by another examiner appointed by the faculty.

Article 62. Information prior to the examinations

The ECTS course description provides detailed information on the content and goals for each course, as well as on the examination content and assessment methods, including, where necessary, the weighting of components with a partial mark and the consequences for not participating in an examination component as stated in article 66. If, by way of exception, the examination content or the assessment methods vary from one examination period to another, this will be specified in the ECTS course description.

Article 63. Submission deadlines for assignments

If certain deadlines are set for the submission of an assignment, but students anticipate that they will not be able to meet the deadline for valid reasons, they have to report this before the deadline:

- for other courses, according to the faculty agreements: to the course holder or the ombudsperson, who can set a new deadline.

The faculty can determine in its regulations that if the deadline is not respected, the assignment will be considered 'not submitted' and the students will obtain a zero or a 'not taken' for this

assignment. This penalty has to be mentioned in the ECTS course description. If this penalty is included in the regulations, it also applies when a new deadline is not respected.

Article 65. Examination type and duration

The examination type is determined in accordance with the learning goals of the course and the teaching method. The faculty establishes the examination type on the recommendation of the course holder or the course coordinator, if there are multiple course holders. The most recently established examination type applies until the faculty decides otherwise. The faculty accepts changes following the same process. This occurs in the academic year previous to the academic year to which the regulation will apply, and in exceptional cases no later than 14 November of the academic year concerned.

When an examination is rescheduled individually, the examination type can differ from the established type.

For oral examinations or partial oral examinations, students are granted a written preparation of at least twenty minutes. Unless otherwise stated in the ECTS course description, there is no preparation time for examinations consisting of the discussion or presentation of an assignment, for examinations aimed at testing the student's oral language proficiency, for courses with the target language as subject, and for OSCE examinations (objective structured clinical examinations).

Unless otherwise explicitly communicated to the students, all examinations are taken without the use of any resources.

For students with a recognized status with accompanying advice for examination accommodations (see article 97) or students with temporary special individual circumstances of physical or psychological nature, an adapted examination type or the use of a technical aid may be allowed upon the faculty's approval. The faculty sets the deadline for the application for these accommodations and consults with the education and diversity expert appointed by the faculty.

An examination consisting of a an assessment on one specific moment, can take no longer than half a day (approximately 4 hours).

Article 66. Assessment scale

An examination is organised for each course within a study programme. Only one examination mark is presented on the examination board meeting for each course.

Each course is assessed according to a 0-20 marking scale. The result is expressed exclusively in whole numbers. [...] The faculty can decide to assess a course or part of a course in terms of a pass/fail decision. In these regulations, a fail in terms of a pass/fail decision is considered equivalent to a non-tolerable fail (see article 81), unless the faculty decides otherwise.

Where necessary, partial marks are converted to one final mark according to the 0-20 marking scale by the course holder or, if there are multiple course holders, by the course coordinator prior to the examination board meeting.

Where necessary, numbers are rounded in accordance with the guidelines set in article 80.

Article 67. Not participating in an examination

If students do not participate in an examination, the examination will be assessed as 'not taken' (NA). In these regulations, NA is considered equivalent to a fail for which no tolerance credits can be used (see article 81). If partial examinations are organised for a course (see article 40) and students do not participate in one of these examinations, the general principle is that they receive a NA mark for the whole course, unless a different assessment is specified in the ECTS course description.

Article 68. Administration process

The examiners send the examination marks to the administration office concerned in the prescribed format as soon as possible after the examination and no later than two working days before the examination board meeting.

Section 10. Examination board meeting

Article 80. Rounding rules

§1.

If no specific rounding rule has been communicated, the standard rounding rules for decimals apply (rounding down for the decimals 0.1-0.4 and rounding up for the decimals 0.5-0.9). The rounding of numbers occurs only after including the partial results in the final result. Individual partial results cannot be rounded. If specific deviating assessment regulations apply for a particular course, the course holder communicates the rounding rules to the students in a transparent way via the ECTS course description.

§2.

For the rounding of percentages, the combined results of the student are rounded down to the nearest integer for decimals 0.1-0.4 and rounded up to the nearest integer for decimals 0.5-0.9.

The number of credits relating to a specific study efficiency provision is rounded down to the nearest integer for decimals 0.1-0.4 and rounded up to the nearest integer for decimals 0.5-0.9

Article 82. Criteria for obtaining a diploma or certificate and a level of achievement

Students who successfully complete a study programme in accordance with criteria laid down in article 81, obtain the diploma or certificate of the study programme.

Students obtaining the diploma of a bachelor's programme, master's programme or subject-specific teacher training programme are awarded one the following levels of achievement:

- cum fructu, if they obtain a weighted percentage of less than 68%;
- cum laude, if they obtain a weighted percentage of at least 68%;
- magna cum laude, if they obtain a weighted percentage of at least 77%;
- summa cum laude, if they obtain a weighted percentage of at least 85%;
- summa cum laude with the congratulations of the examination committee, if they obtain a weighted percentage of at least 90%.

The calculations are made on the study programme as a whole. Having obtained a fail mark does not lead to a lowering of the level of achievement.

The examination committee can award a certain level of achievement to individual students who do not meet the criteria for obtaining this level of achievement provided that the committee:

- establishes a case of force majeure;
- or makes a decision substantiated in the examination board meeting report.

No level of achievement is awarded to students with a registered study programme consisting of less than 20 credits. Likewise, no level of achievement is awarded for bridging programmes or preparatory programmes.

The faculty decides whether or not to award levels of achievement for postgraduate programmes.

Section 11. Irregularities

Article 84. Definitions

Every conduct individual students display with which they (partially) inhibit or attempt to inhibit a correct judgement of their own knowledge, understanding and/or skills or those of other students, is considered an irregularity which may result in a suitable penalty.

A special type of irregularity is plagiarism, i.e. copying the work (ideas, texts, structures, designs, images, plans, codes,...) of others or prior personal work in an exact or slightly modified way without adequately acknowledging the sources.

Every possession of prohibited resources during an examination (see article 64) is considered an irregularity.

Irrelevant to the finding of fact is:

- -whether or not the irregularity is the consequence of a deliberate choice of the students,
- -whether or not the irregularity has led to an unfair advantage for the parties concerned,
- -whether or not the students decided to stop the behaviour that can be considered as an irregularity.

Article 85. Procedures

The examiner informs the chair of the examination committee as soon as possible about every irregularity detected during an assessment activity that could affect the decision of the examination committee. The select examination committee investigates the severity of the irregularity, hears the student and forms a proposal on the penalty and/or on whether or not to implement a prevention plan. In accordance with article 75, the select examination committee can also invite other people.

For irregularities relating to possible plagiarism, the select examination committee preferably consults with the faculty expert on plagiarism. The final decision on discipline regarding examinations is an independent decision of the examination committee.

Pending the decision of the examination committee, the students concerned can finish the examinations of the examination period concerned, including the examination in question, but, if necessary, after the confiscation of the items and the copy of the examination under dispute.

The select examination committee can decide, in consultation with the examiner, to convene the examination committee early.

Article 86. Penalty

§1.

The examination committee independently assesses the severity of the irregularities and the possible penalty related to them.

For irregularities relating to plagiarism, the severity and the level of penalties is assessed according to the following elements:

- 1) the scope;
- 2) the nature;
- 3) the experience of the students concerned (the extent to which students are expected to be aware of the importance and implications of academic integrity standards, taking into account, inter alia, the students position in their study career).

When deciding on a penalty for an irregularity, the intention to commit fraud can be taken into account as an aggravating factor. If the committee considers a penalty to be of limited impact on the curriculum of the students, it can make a substantiated decision to impose a more severe penalty.

§2.

On the grounds of an irregularity committed during the examination, the examination committee can decide, without prejudice to article 90 §2, during the examination board meeting or an early meeting, that the students concerned:

- 1° have taken an invalid examination and have to retake the examination on a moment determined by the faculty;
- 2° will receive an adjusted mark for the examination or assignment of the course or part of the course;
- 3° will receive a 0 for the examination or assignment of the course or part of the course;
- 4° will receive a 0 for some or all of the courses they took an examination on during the examination period concerned;
- 5° will be rejected for one or more courses from the study programme in which the irregularity was detected. In this case, the students concerned will receive a 0 for the courses concerned in the said examination period and will only be able to take an examination for these courses in the next academic year at the earliest;
- 6° will be rejected for a study programme in which the irregularity was detected. In this case, the students can only re-register in the next academic year at the earliest. The rejected students receive a 0 for some or all of the courses they took an examination on during the examination period concerned. This penalty can only be imposed in cases of very severe irregularities. The examination committee decides on the severity of the irregularity.
- 7° will lose the right to register for the next academic year or for the next two academic years. This penalty applies to all KU Leuven study programmes and can only be imposed in combination with a rejection for a study programme.

In addition to penalties 2° to 7°, the examination committee can determine that the rule of retaining the highest examination result will not apply.

In addition to penalties 3° to 7°, the examination committee can require the students concerned to thoroughly revise the assignment concerned based on certain suggestions or to create a new assignment based on a new subject.

For irregularities relating to the unauthorised copying of texts, the examination committee can pair the penalties with a compulsory participation to a self-study module or other type of training related to the prevention of plagiarism.

§3.

In the case of very severe examination fraud, the university can determine to withdraw a favourable decision for the student. In addition, the university can, regardless of the moment the irregularity was detected, decide that the results obtained in the study programme concerned are considered void and, where appropriate, revoke the diplomas, certificates and credit certificates awarded for the study programme.

§4.

In all cases where the faculty imposes one of the penalties from 2° to 7° above, the student progress file will contain the code 'OR', which represents an irregularity.

Section 12. Announcement of and feedback on examination results

Article 87. Announcement of the decisions of the examination committee

The faculty determines the moment and the manner in which, after every examination period, the examination results for all courses and the decisions of the examination committee on the study programme as a whole are communicated to the students through the study progress file. This communication includes the procedure students can follow to appeal against a decision of the examination committee.

The result of a master's programme or advanced master's programme as a whole is also announced publicly during a graduation ceremony.

Students who are registered with a degree contract, a degree-examination contract or for a study programme with a view to a certificate, will receive a recent overview of their study progress in their study progress file.

Students will have the opportunity to consult the generalised examination results of the group of students relevant to them, so they can compare the results they obtained for the courses for which they took an examination in the academic year concerned.

On diploma supplements, the examination results are stated using the following code:

- For courses for which the students obtained a credit certificate: the letter C, accompanied by the examination mark or the letter G in the case of non-numerical assessment.
- For the courses for which they obtained a score of less than 10 or a fail in terms of a fail/pass decision: the letter T.

Article 88. The right to feedback and discussion of the results

Students are granted the opportunity to receive feedback during the first seven calendar days after the day the examination results were announced. This feedback includes a review of the written examination and an individual and/or collective discussion of the examination. An individual discussion consists of a conversation between examiner and student about an individual examination.

The examiners communicate the feedback arrangements for their examination to the faculty administration before each examination period. These arrangements are announced to the students no later than one week before the end of the examination period.

During the individual discussion, students may be accompanied by a person of their choice, who acts as observer. If the observer is a student who was registered for the same course in the same academic year, the observer must have passed the course.

(1) Special arrangement for incoming exchange students

Incoming exchange students whose permitted official period of stay at KU Leuven has been concluded, which prevents them to participate in the feedback or discussion of the results, can contact the exchange coordinator. The coordinator, in consultation with their colleague at the home university, will facilitate the organisation of remote feedback.

Section 13. Resitting examinations on courses and retaining tolerable fail marks

Article 89. Resitting examinations on courses within the same academic year

§1. General principle

Students can take no more than two examination opportunities for the same course or part of a course per academic year, regardless of the (possibly simultaneous or consecutive) contracts they registered for. An examination not taken or an resit not taken is considered to be a used examination opportunity. Students cannot obtain additional examination opportunities by changing their contract. If, based on the course format, only one examination opportunity will be provided (see article 41), this has to be mentioned in the ECTS course description.

§2. Resitting successfully completed examinations within the same academic year

The result of a credit certificate is final. Once a credit certificate has been obtained for a course in a certain examination period, the student cannot resit the examination on this course within the same study programme.

§3. Resitting examinations on failed courses within the same academic year

After the second examination period, the students decide for which failed courses they want to take a resit examination in the third examination period, following the procedure laid down for this purpose. During the third examination period, students can resit courses for which they did not use tolerance credits or obtained a non-tolerable fail mark and for which an examination is organised. In the third examination period, students cannot resit examinations on courses for which they used tolerance credits.

If students resit a failed examination in the same academic year, they preserve the first result they obtained if it was better than the result of the resit.

(1) Procedure

After the examination period in June, the students communicate to the faculty administration using the application intended for this purpose, which examinations they failed in January or June they want to resit in the examination period in September. They have to communicate this no later than the first Thursday after the deliberation week. If the faculty exceptionally allows students to register for the September examination period after the first Thursday after the deliberation week, the possibility of actual participation in the examination depends on the practical organisability taking into account the examination schedule already fixed.

§4.

The type of examination is not necessarily the same for the second examination opportunity.

§5. Transfer of partial results

As a general rule, partial results are not transferred to the next examination period. Only if a transfer of partial results is convenient because of the examination type, the faculty can decide to transfer the partial result (consisting of at least 10/20 or a pass in terms of a fail/pass decision) to a successive examination period within the same academic year. Such a partial transfer can only be granted if it relates to a learning activity or a complete section. Partial results cannot be transferred to the next academic year.

For partial transfers, the initial partial result will be calculated into a new final result for the course. In this case, students only resit the assessment activities for which no result has been transferred.

The ECTS course description states whether or not students can decline a possible partial transfer. If that is the case, the previously obtained result is replaced with the new result.

Section 14. Settlement of disputes

Article 92. Conflicts before or after an examination

Irregularities or conflicts between individual students and examiners occurring before or during an examination that affect the correct coordination of the examination, have to be communicated to the chair of the examination committee by one of both parties as soon as possible, where appropriate via the examination ombudsperson. The chair mediates and takes temporary measures where necessary (where appropriate in consultation with the select examination committee) to safeguard the correct coordination of the examination. The examination committee makes the final decision. In any case, the select examination committee first hears the students and examiner concerned.

Article 93. Material errors

When a material error is detected, this has to be formally communicated to the chair of the examination committee.

If this material error leads to the withdrawal of the decision to declare a student graduated from a study programme, the decision on the rectification of the error has to be made by the full examination committee, as specified in article 70, last paragraph. All other material errors are rectified by the select examination committee.

When a material error is detected, the chair of the examination committee has to convene the examination committee as soon as possible. The results established can still be adapted before the deadlines specified in article 105.

If the students concerned have already been notified of their examination results, the faculty administration communicates the adjusted results to them. The chair and the secretary report this at the next meeting of the examination committee.

2a

Courses/Modules

The most recent versions of the course descriptions as can be found in [the online programme guide](#) are applied to the course unites offered by KU Leuven. The 2018/19 course descriptions of the KU Leuven course unites are provided for information purposes.

Public Administration and Public Sector Innovation: Capita Selecta

Number of ECTS: 8

Aims

- Students can describe the main concepts and theories regarding the organisation and processes of public administrations.
- Students can clarify the context for public administrations (societal, administrative and legal).
- Students are aware of current key developments happening at public administrations worldwide.
- Students have a critical attitude towards public administration models, theories and real-life cases.
- Students are introduced to key research issues relevant for the public administrations.
- Students can compare cases and theories in this field.
- Students can describe the main concepts and theories regarding public sector innovation.
- Students have a critical attitude towards theories and cases in public sector innovation.
- Students can find, select, critically assess and use the correct resources to understand and analyse the role of the different actors and relevant structures in public administration.
- Students apply the basics of scientific writing.
- Students can make their own creative contribution to scientific disciplinary knowledge by writing a scientifically-oriented paper according to the correct ethical rules.
- Students can clearly and unambiguously communicate, their analysis and rationale underpinning these by writing a scientifically-oriented paper and by participating in a debate.

Previous knowledge

There are no specific prerequisites.

Activities

This course consists of interactive (guest)lectures, meaning that students must think and work actively during class. The reader supports the classes and paper work. However, during class, a deeper analysis is made and examples are given. Therefore it is necessary to attend the lessons and students are strongly advised to take notes. To aptly follow, it is advised to read the papers beforehand.

Beside classes, students have to write a small report describing a public administration at a specific administrative level (national, state, local). The assignment also explicitly asks for one's own critical input. The tasks for the report are commented/explained during the lessons and should be dealt with individually.

Beside classes, students have to write a scientifically oriented paper describing a public sector innovation by focusing on the introduced research issues. The topic of the paper needs somehow be related to the introduced key research issues. The assignment also explicitly asks for one's own critical input. The tasks for the paper are commented/explained during the lessons and should be dealt with individually.

Evaluation

Characteristics of the evaluation

The evaluation for this course consists of two partial evaluations

- Participation during class
- Two individual documents (each submission forms 50% of the final mark)
 - 1) A report describing a public administration at a specific administrative level (national, state, local).
 - 2) A scientifically-oriented paper describing a public sector innovation from the perspective of public administrations. The topic needs somehow to be related to the introduced research issues.

Determination of the end result

The evaluation is done by the didactic team, as communicated on Toledo and the examination regulations. The result is calculated and expressed as a round number out of 20.

The grades for this course are given according to the participation during class and the quality of the two documents. Further requirements are specified during the lectures, and in separate documents via Toledo.

The examination determines whether the students have acquired the necessary learning objectives. The examination also tests the ability of the students to analyze, synthesize and evaluate what he has learned.

The deadline for submission must be respected. If the deadline is not met, the student receives a 'not taken' (NA) for the whole course. If a student is unable to comply with it for valid reasons, the student should contact the ombudsperson.

If a student does not participate in one of the partial evaluations of the course, the student receives a 'not taken' (NA) for the whole course.

Comparative Public Administration in Europe

Number of ECTS: 4

Aims

- Students can describe the main concepts and theories regarding the organisation and processes of public administration.
- Students can clarify the context for public administration (societal, administrative and legal).
- Students can compare administrative concepts and theories in the Western European countries.
- Students can analyse and evaluate systems of public administration in the Western European countries.
- Students have a critical attitude towards public administration models.
- Students can find, select, critically assess and use the correct resources to understand and analyse the role of the different actors and relevant structures in public administration.
- Students can make their own creative contribution to scientific disciplinary knowledge by writing a scientific paper according to the correct ethical rules.
- Students can independently and in team plan an assignment, execute it, meet deadlines and make a constructive contribution to a common result.
- Students can communicate, clearly and unambiguously, their analysis and rationale underpinning these, by giving a presentation and writing a scientific paper.

Previous knowledge

- Students have a basic understanding of either public administration and policy, or of European organizations and politics.
- Students have sufficient proficiency in the English language.

Activities

This course consists of interactive lectures, meaning that students must think and work actively during class. The reader supports the classes and assignments. However, during class, a deeper analysis is made. Therefore it is necessary to attend the classes and students are strongly advised to take notes. It is advised to read the text material beforehand to ensure that students get a good understanding of the topics discussed in the course. To help them develop the skill of reflecting on the literature, this course makes use of different assignments. Information needed for carrying out the assignments is communicated via Toledo and in class.

Beside classes, students also write a paper and give a group presentation.

Students integrate the content of the lessons to a coherent, cohesive and balanced whole in the assignments, paper, presentation and on the exam.

Evaluation

Characteristics of the evaluation

The evaluation for this course consists of three partial evaluations:

- Class-discussion and simulation game (2/20)
- A group paper and poster presentation (6/20)
- An oral exam (12/20)
-

Determination of the end result

The evaluation is done by the didactic team, as communicated on Toledo and according to the examination regulations. The result is calculated and expressed as a round number out of 20.

The grades for this course are given according to the final examination and the quality of the assignments, paper and the presentation. Further requirements are specified during the lectures, and in separate documents on the electronic learning platforms.

The examination determines whether the students have the necessary theoretical insights and knowledge of the public administration in Europe. The examination also tests the ability of the students to analyse, synthesise and evaluate this knowledge and to test if they can apply the literature and theory to a case or an article and evaluate their findings.

The deadline for submission must be respected. If the deadline is not met, the student receives a 'not taken' (NA) for the whole course. If a student is unable to comply with it for valid reasons, the student should contact the ombudsperson.

If a student does not participate in one of the partial evaluations of the course, the student receives a 'not taken' (NA) for the whole course.

Information Management in the Public Sector

Number of ECTS: 6

Aims

- The student is familiar with the key components of information systems in organizations (particularly those of the public sector), evolution, management perception of IT (within the government);
- The student is acquainted with key technology issues relevant for public sector organizations dealing with software, hardware, telecommunications, data resource management and database types;
- The student is familiar with relevant applications including e-business systems (among others ERP (Enterprise Resource Planning), CRM (Customer / Citizen Relationship Management) and decision support systems (Traditional - Future));
- The student can describe and explain the main principles, trends and practices related to information management in the public sector (including e-governance and public sector innovation) and can identify the tools and concepts for its' successful implementation;
- The student can identify and describe the recent developments in information management (including e-governance and public sector innovation) (for example: Open Data, Big Data, Cloud Computing), as well as identify the tools and concepts to implement this successfully (in a public sector organization);
- The student can recognize the possibilities and limitations of current information management services for public service deliveries and policy making;
- The student can explain how new and emerging technologies can be applied in order to innovate the public sector in a changing society;
- The student can describe possible ways for solving existing problems and overcoming the (legal, ethical, technological, security, financial and governance) challenges in the context of information management in the public sector;
- The student can clarify how public innovative applications can be used at all levels of management (operational, tactical, strategic);
- The student can identify the different actors that should be involved in the development, implementation and management of information management applications within the public sector;
- Students can report on the policy of information management in the public sector at different administrative levels: local, regional, national, European and global;
- The student can develop and present a strategy for an organization in the context of information management (in particular to e-governance and public sector innovation);
- The student can communicate in written, oral and visual ways about various aspects of information management in the public sector;
- The student can demonstrate a broad interest in information management in the public sector;
- The student can show a critical attitude towards information management and its value for the public sector as a whole as well as an individual public organization. This implies both an estimate of the opportunities of information management (e-governance/public sector innovation) as well as assessing the problems and the (legal, ethical, technological, security, financial, and governance) challenges.

Previous knowledge

The students have already achieved the following learning goals before the start of this course:

- Sound knowledge of the societal reality, its problems, norms and values;
- Basic knowledge about the public sector in all its branches, its layers as well as its most important basic characteristics;
- General and specific academic skills such as writing papers, abstract reasoning, arguing and (oral/written) communication;
- Basic skills with computers.

Activities

Management- and Information Technology (2 ECTS)

During the lectures, the role and key issues of IT in organizations in general but with focus on public sector, are explained. The lectures are organized partly as traditional lectures presenting theory and illustrations and partly as interactive lectures including short discussions and more extensive (international) case studies. In order to broaden the insights, guest lecturers are invited.

Information Management Policy (2 ECTS)

During the lectures, the key principles, concepts, models, (technological as well as non-technological) trends of E-Governance and Public Sector Innovation are introduced as well as relevant information management policies at different administrative levels (local - regional, federal / national, European, world) with their strengths and implications. Moreover, key challenges from ethical, legal, financial, governance and technical (including security) perspectives are presented and explained. References are made to (inter)national case examples. In addition, guest speakers from different administrative levels are invited to explain the 'real' implementations with the associated implications.

Strategies for Information Management (2 ECTS)

Students learn (mainly online) how to develop their own organizational strategy for information management with a focus on E-Governance and Public Sector Innovation through exercises, assignments, feedback and discussions. This online part of the course aims to stimulate the debate about the future of information management in the public sector. Using a blended approach for teaching about information management can help students to learn about the relevant methods, tools, data and applications by using a more hands-on-approach. It allows the students to immediately apply and discover what they have learned. The classes are used for theoretical introductions as well as more interactive discussions.

Evaluation

Characteristics of the evaluation and determination of the final mark

The assessment of this course consists of four partial evaluations:

- A group assignment and presentation (9 points out of 20): consisting of the written as well as oral presentation of the strategic plan.
- An oral exam on the basis of an individual paper submission (9 points out of 20).

- An assessment during the oral exam on the overall content of the course (2 points out of 20). Student get minimum 20 minutes of preparation time. Maximum duration of the oral exam is 15 minutes.
- The participation to and completing all online modules, exercises and assignments (condition to participate in the evaluation).

The deadline for submission must be respected. If the deadline is not met, the student receives a 'not taken' (NA) for the whole course. If a student is unable to comply with it for valid reasons, the student should contact the ombudsperson.

If a student does not participate in one of the partial evaluations of the course, the student receives a 'not taken' (NA) for the whole course.

Integrated Research Seminar

Number of ECTS: 6

Aims

- Students are able to understand, conceptualize and clearly define a research problem and relevant research questions.
- Students are able to find, select, critically assess and use relevant literature and build a theoretical framework for the research problem.
- Students know relevant methods and tools for doing research in public administrative science and public governance.
- Students know the different phases of scientific research and know the opportunities and limits of each of them.
- Students recognize the importance of an empirical foundation for knowledge acquisition.
- Students are able to conduct scientific research in team, meet deadlines and make a constructive contribution to a common result.
- Students are able to take into account the ethical rules of scientific research.
- Students are able to communicate, clearly and unambiguously, their analysis and rationale underpinning these, by giving an oral presentation and writing research-oriented report.
- Students can accept criticism from peers and adapt to it. In addition, they can be critical themselves.

Previous knowledge

- The student masters the basic academic skills that allow him/her to make a thorough and truthful argument, report and presentation.
- The student can critically deal with conceptual frameworks.
- The student has basic computer skills regarding the writing of reports and making presentations.

Activities

By means of eight (contact) sessions, students receive theoretical and practical guidance in writing their research report and presenting it to other student colleagues.

Evaluation

Characteristics of the evaluation and determination of the final mark

The assessment of this course is consists of two partial evaluations:

- Quality of Research group report (75%) (evaluation criteria: originality/ sound methodology, relevance, content, scientific justification, reflective, readability, structure, and length). The size of this report should be ± 50 pages (Minimum: 40 pages; Maximum: 60 pages) including: Strong problem definition, set of clear research questions, a sound research design description, key research findings, discussion, and conclusions.
- Quality of Individual presentations based on presented content, verbal skills, slides, defense, incl. participation to lectures (25%).

The deadline for all the submissions must be respected. If the deadline is not met, the student receives a 'not taken' (NA) for the whole course. If a student is unable to comply with it for valid reasons, the student should contact the ombudsperson.

If a student does not participate in one of the partial evaluations of the course, the student receives a 'not taken' (NA) for the whole course.

Business Information Systems

Number of ECTS: 6

Aims

Upon completion of this course, the student

- is able to understand the relationship between business strategy, information strategy and the operationalization of the two in information systems,
- is able to compare the information strategy and the business strategy and decide whether these are aligned,
- is able to explain the role of information systems for internal and external control in the context of IS governance frameworks,
- knows the most important theoretical frameworks of technology acceptance and value of IS and is able to apply them in practical examples; the student understands the different dimensions of these frameworks and how they can be measured,
- is able to explain the purpose and value of Enterprise Architecture and is able to explain EA frameworks with concrete examples,
- can read and understand BPMN process models,
- knows the key steps of the business process management cycle and is able to apply fundamental BPM principles to simple examples,
- can read and understand ER, EER, and relational information models,
- can query relational databases with SQL,
- can explain the role of information systems for decision support as well as how business intelligence systems can be designed and used,
- understands the difference between predictive and descriptive data mining and understands how basic analytics techniques work,
- understands different aspects, technologies, and business models in an e-business context.

Previous knowledge

At the beginning of this course the student should:

- be familiar with and interested in the fundamentals of computer science and its business applications such as for example taught in "Grondslagen van de Beleidsinformatica (D0T06A, D0H17A, D0W14A)".
- be familiar with the basics of Office software, computer hardware, file handling and management, and networking and internet technology.

Background knowledge of business economics is useful, but not strictly necessary.

Activities

The purpose of the lectures is on explaining the learning content and illustrating it through demonstrations and examples of business information systems.

Evaluation

Evaluation elements

- Permanent evaluation will account for 2 points out of 20.
- The final exam will count for 18 out of 20 points.

Permanent evaluation

- The total number of points for permanent evaluation is 2 points (out of 20).
- The permanent evaluation may consist of assignments and in-class questions. Assignments may be online or take-home assignments.
- For each assignment the score is rescaled to a non-rounded score on 1. A missing or unfinished assignment yields a score of 0.
- In-class questions are rated on a fail-pass basis: the student should answer a minimum number of questions correctly throughout the semester to obtain a score of 1. If the student fails to answer a minimum number of questions correctly, the score is 0.
- The weighing of the assignments and the in-class questions in the total score of the permanent evaluation will be communicated on Toledo at the start of the semester.

Final exam

- The (written) exam consists of a number of multiple choice questions (typically 30).
- A correction is applied for guessing by means of the "multiple choice using elimination" method. Further details are communicated via Toledo.
- The result is rescaled to a score on a scale of 18.
- In case of an individual move of an examination, the form of the examination may differ from this form.

Determination of final grades

- The final grade is determined as the sum of the final exam score (out of 18) and permanent evaluation score (out of 2).

II. In the Course/Module Descriptions, the Module Descriptions of the University of Münster contain the following amended version:

“2. Semester: University of Münster

§ 1b

Types of Lectures and Examinations

There are three major types of instruction methods: lectures, exercises and seminars. A lecture normally lasts between 60 and 120 minutes and is held by a staff-member (at least a doctoral degree) with exceptional knowledge in the respective field. Lectures are the main mean of enhancing the student’s knowledge. Exercises usually last 60-120 minutes and are held by a staff-member with very good knowledge of the respective field. In exercises the student needs to complete assignments that deepen his/her knowledge in the respective. A seminar normally lasts at least 60 minutes and is held by a staff-member with very good knowledge in the respective field. In seminars, certain topics are discussed more profoundly, including seminar papers. There are three major examination types: written exams, seminar papers and oral exams.

§ 2b

Required Coursework and Examinations, Registration

(1) The prerequisites for participation in specific modules offered by the University of Münster are outlined in these course descriptions.

(2) Within each module, students must complete at least one examination, which comprises a part of the master’s examination as a part of the calculation of the module grade and the overall grade. As a rule, each module concludes with only one examination. Besides, in accordance with the provisions in these examination regulations, students may be obliged to complete non examinations / coursework as directed and announced by the instructor.

(3) § 7 and these course descriptions define the type, duration and scope of the examination(s) for the respective module in general, whereby invigilated written/electronic examinations can take up to four hours and the maximum duration of non-invigilated examinations (e.g. term papers) corresponds to half the time allocated for the master’s thesis. Subject to sentences 5 - 8 and within the framework provided by these examination regulations, the Local Coordinator is responsible for determining and announcing the type of examination, its modalities and the time allotted to complete the examination, or the duration of the examination. The announcement should be delivered in a uniform and

binding manner for all candidates of the respective examination at least a month prior to the examination date. In accordance with these examination regulations, each required coursework or examination can be completed in the form of group work as long as the candidate's degree-relevant contribution is clearly separated and distinguishable from that of the other members to enable individual evaluation, e.g. by means of separate sections, page numbers or other objective criteria. Instructors who hold courses comprised of only a few students may administer oral instead of written examinations. These should generally take 20 % of the duration of the correspondent written examination per candidate. In this case (and if these examination regulations offer no relevant or deviating provisions), the decision to administer an oral examination is made by the Local Coordinator in agreement with the instructors. The decision must be announced well in advance in order to allow ample time for candidates to exercise their right to withdraw from the examination if desired.

(4) Examinations may also consist of or include multiple-choice sections. In the case of pure multiple-choice examinations, all examinees receive the same questions. All examination questions must be related to the content of the module and ensure reliable examination results. When preparing the questions, the responsible instructor must specify which answers will be recognised as correct. Examination questions must be checked for correctness with respect to the stated educational objective of the module before the examination paper is graded. Should questions be incorrect in this regard, they may not be considered for grading and only the remaining questions may be taken into account. Reducing the number of multiple-choice questions may not lead to a disadvantage for the examinees. An examination consisting entirely of multiple-choice questions is graded as passed if at least 60 per cent of the questions are answered correctly or if the number of correct answers is not more than 22 per cent below the average performance of all examinees.

If the candidate has answered the minimum number of items required to pass correctly, the examination is scored and graded according to § 16 (1) and the following criteria:

90 – 100 points / 1,3 – 1,0 / "excellent" if at least 75 per cent,

75 – 89 points / 2,3 – 1,7 / "good" if at least 50 per cent, but less than 75 per cent,

60 – 74 points / 3,3 - 2,7 / "satisfactory" if at least 25 per cent, but less than 50 per cent,

60 – 59 points / 4,0 – 3,7 / "pass" if no or less than 25 per cent

of the additional examination questions are answered correctly.

The criteria listed above also apply to examinations which are partially comprised of multiple-choice sections. The overall grade of the examination is then calculated from the weighted arithmetic mean of the multiple-choice section and the other part of the

examination. The parts are weighted according to their share of the overall examination in per cent.

(5) All parts of written examinations that contain wording or content taken from other sources must be identified as such and cited accordingly. The candidate must attach a written declaration which states that he/she has written the examination himself/herself, has not used sources and means other than those indicated and has identified all direct quotes. The declaration also applies to tables, sketches, drawings, graphic illustrations etc. Furthermore, the Local Coordinator can request a written declaration of the student consenting to have the written examination stored in a database and compared with other texts to detect possible plagiarism.

(6) In order to take part in any examination, students must register in advance with the Examination Office of the Faculty Business and Economics (Prüfungsamt der wirtschaftswissenschaftlichen Fakultät). The registration has to take place in person or through a representative. As far as technical requirements are fulfilled, registration may take place via the online registration system of the Examination Office. The registration deadlines and further details are announced via notice board by the local administrative coordinator. In cases of emergency, e.g. sudden and severe illness, a registration by phone is possible within the announced deadlines; the reasons for the registration by phone have to be submitted immediately. Students may withdraw their registration without explanation within two weeks prior to the examination, either in written or electronic form without negative consequences for them.

§ 3b

Examiners and Assessors

(1) Any individual who regularly holds relevant courses in the subject of the examination is entitled to serve as an examiner, in accordance with § 65 (1) of the Universities Act (*HG NRW*). The Local Coordinator is responsible for deciding on exceptions to this rule.

(2) Only individuals who hold a relevant *Diploma* or Master's degree or an academic qualification of an equivalent or higher-level degree can serve as an assessor.

(3) Examiners and assessors are independent in their actions. For written *examinations*, academic staff members can draft examinations and suggest preliminary grades on behalf of the examiner.

(4) Oral examinations are conducted by an examiner in the presence of an assessor. Before calculating the grade, the examiner must hear the assessor's evaluation. The grade and key themes of the oral examination are recorded in minutes which are signed by the examiner and the assessor. Thereby, the oral examinations, as well as their evaluation, should be documented in such a way that, if an objection is raised, the results can be validated by a second examiner by means of additional oral clarifications, if necessary; this also applies to objections to those allowed to sit in on oral presentations in accordance with § 3b (7).

(5) All written examinations administered in modules are graded by a single examiner.

(6) If an oral or written examination is the final attempt, the examination must be scored and graded by two examiners. In this case, the score and the grade for the examination is calculated as the arithmetic mean of the individual scores. § 16 (3), sentences 3 and 4 apply.

(7) Students of the same degree programme may attend oral examinations if the candidate does not object. This does not apply to the discussion of the grade and its announcement to the candidate.

§ 4b

Passing and Retaking of the Master's Examination

(1) Students have two attempts at passing the examination of a module. Examinations cannot be retaken just to improve the grade. If a student has not passed such a module examination within two attempts, he/she is considered to have permanently failed the module.

(2) If the candidate permanently fails a module, then the Master's examination is considered as permanently failed, see § 15 (4).

§ 5b

Access to the Examination Files

After completing each examination, students can, upon request, gain access to their examination papers, the examiners' assessments and examination minutes. Requests must be filed with the Local Coordinator via the Examinations Office of the Faculty Business and Economics no later than two weeks after the results of the examination are announced. The Examinations Office stipulates the time and place of access on behalf of the Local Coordinator.

§ 6b

Rectification of Results, Absence, Withdrawal, Deception and Violation of Regulations

(1) An examination is considered a fail if the student, for no valid reason, does not appear at the examination on the designated date, or if he/she withdraws for no valid reason after beginning an assignment/examination. The same applies if a written examination is not completed within the allocated time limit. Examples of valid reasons include severe illness and maternity leave according to the Federal Parental Benefit Act (Bundeselterngeld- und Elternzeitgesetz), or nursing or caring for a spouse, a registered civil partner, a direct relative, or a first-degree relative by marriage if such care or assistance is necessary. Examinations may not be conducted if the University of Münster does not let students take an active role in their education in accordance with the Maternity Protection Act (Mutterschutzgesetz).

(2) The reasons for absence or withdrawal according to § 6b (1) must be submitted immediately and substantiated in writing to the Local Coordinator via the Examination Office of the Faculty Business and Economics. In the case of illness, the Local Coordinator may request a medical certificate (ärztliches Attest). If the Local Coordinator does not accept the reasons given, the student is to be notified in writing. If the student does not receive written notification within a 4-weeks period, then the reasons have been accepted. If a student claims illness as the reason for his/her inability to take an examination but there are sufficient indications that make it likely that he/she was, in fact, able to take the examination or that there was a different reason for missing the examination, then the Local Coordinator can, in accordance with § 63 Absatz 7 Universities Act (HG NRW), request a medical certificate (ärztliches Attest) issued by a University-appointed doctor (Vertrauensärztin/Vertrauensarzt). Such sufficient indications specifically exist if the student has missed four or more examination dates or has withdrawn (see § 6b (1)) from two or more examinations concerning the same examination. The student must be informed of this decision and the reasons for it immediately and be given the names of at least three University-appointed doctors to choose from.

(3) If a student attempts to influence the outcome of a examination or the Master thesis through dishonest means such as the use of unauthorised material or devices, the examination is regarded as not having been completed and is considered a fail. The reasons must be put on record. The same applies for other kinds of severe erroneous behaviour against generally accepted standards of conduct and violation of good academic practice, as plagiarism. In case of plagiarism, the local coordinator has to inform the Academic Committee to decide, depending on the level of plagiarism, whether the student will fail the examination in question or be excluded from the Master's Examination entirely, and the Master's examination has then been permanently failed, see § 20 (4).

(4) Whoever disrupts a examination may, usually after a warning by the invigilator, be excluded from continuing that particular examination. In this case, the examination is not completed and is considered a fail, too. The reasons for the exclusion must be put on record.

(6) Adverse decisions must be immediately disclosed to the student concerned by the Local Coordinator in written form. The decision(s) must be justified and accompanied by information on the legal remedies available. Before a decision can be made, the student concerned must be given the opportunity to state his/her case.

(7) If a result has to be rectified without the student is found to have violated regulations, the local administrator is responsible for deciding on the legal consequences, subject to the Administrative Procedures Act for North Rhine-Westphalia (Verwaltungsverfahrensgesetz für das Land Nordrhein-Westfalen).

§7b

Requirements for Students with Special Needs

(1) If a student can demonstrate that due to disability or chronic illness he/she is partially or entirely unable to complete degree-relevant examinations in their intended form or by the deadlines set forth in the Examination Regulations, the responsible units of the University of Münster must increase the duration of time allocated for completing the examinations, extend examination deadlines or permit the student to complete equivalent examinations more suited to his/her special needs. The same applies to required coursework.

(2) At the student's request, the faculty representative for disabled students must be consulted with regard to decisions according to (1). If consultation with a representative is not possible within the faculty, the University representative is to be consulted.

(3) Students may be required to submit adequate documentation substantiating their chronic illness or disability. This includes, for example, medical certificates or, if applicable, a disability certificate.

§ 8b

Modules

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|----------------------|---------------------------|
| Module Title: | Project Management |
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|----------|-------------------|--------------------------|
| 1 | Module No: | State: Compulsory |
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|----------|--------------------------------|-------------------------|------------------|--------------|--------------------------|
| 2 | Turn: Every summer term | Duration: 1 term | Semester: | CP: 6 | Workload (h): 180 |
|----------|--------------------------------|-------------------------|------------------|--------------|--------------------------|

| 3 | Module Structure: | | | | | |
|----------|--------------------------|------|---------------------------------|----|-------------------|----------------|
| | No | Type | Course | CP | Presence (h + CH) | Self-Study (h) |
| | 1 | L | Project Management | 6 | 30 (2 SWS) | 60 |
| | 2 | E | Exercises on Project Management | | 30 (2 SWS) | 60 |

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| 4 | Contents: Project Management includes the planning, execution, monitoring, and controlling of projects. The lecture Project Management provides basic knowledge of (IT) Project Management and addresses the entire project life cycle / project management process. |
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Besides introducing and integrating the distinct phases of the project lifecycle, current methods and tools for project management are introduced. Tutorials and Assignments allow for repeating the contents of the lecture and applying project management methods and tools in a problem-oriented way. Furthermore, guest lectures of experienced industry representatives add to the practical applicability of the lecture program.

Background and relations to other modules / courses:

Project Management skills are an essential part of conducting IT projects. The methods and software tools learned in this module are a crucial basis for further modules in the Information Systems curriculum, especially for managing project seminars. Additionally, general knowledge on managing projects might prove helpful to students for organizing their Bachelor or Master theses.

Teaching methods are lectures, tutorials, software tutorials, and lab exercises. Students will prepare solutions for group assignments and present them to the audience, which enables them to improve their problem-solving and presentation skills.

Main topics and learning objectives:

| Topics | Learning objectives |
|--|--|
| Introduction to (IT) Project Management | Basic information about IT project management, learn about project management theories and project management fundamentals |
| Project Lifecycle / Project Management Process | Deepen knowledge of the integrated project management process and the project life cycle with a special focus on the life cycle of Process Management projects |
| Project Integration Management | Understand the challenges of project integration into the general organizational structures |
| Project Scope Management | Learn about framing and focusing on achieving the outcomes of a project |
| Project Time Management | Recognise challenges, needs and prospects related to time management in projects |
| Project Cost Management | Understand how to calculate costs and budgets in projects appropriately |
| Project Quality Management | Analyse project results in terms of quality requirements |
| Project HR Management | Learn how to manage project staff in the different lifecycle stages of a project |
| Project Communications Management | Understand the importance, needs and methods of communicating project results to stakeholders |

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| Project Risk Management | Learn how to identify, estimate, and deal with risks in the project life cycle |
| Project Procurement Management | Understand how to conduct purchases and how to configure subcontracts with external vendors in projects |
| Specialised Topics of IT Project Management | Deepen knowledge in dealing with particular topics in IT projects (e.g., Project Management in IT Outsourcing, IT Service Management, IT Strategy Projects, Software selection projects or in special domains such as eGovernment Projects) |
| Software Tutorials | Apply and improve project management methods by using selected software tools (such as SAP Project System, Microsoft Project) |
| Assignments | Apply project management methods and software tools to solve group assignments that have a reference to real-world project management scenarios |

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| 5 | Learning outcomes: |
| | <p>Academic: Students are able to describe the basic theoretical foundations and theories of project management. Students understand and manage the project management life cycle and its project management processes. Students can describe and apply further issues and needs required in a holistic project management approach. Students deepen their understanding of different project management methods and software tools and apply appropriate method(s) to solve real-world project management situations.</p> <p>Soft skills: Students learn and deepen their problem-solving capabilities in small groups as well as their presentation skills during the presentation of their results to a general audience. Through self-study, the contents of the module are further explored by the students in order to improve their skills for literature review. Searching and analyzing academic literature is done in order to prepare for class and to put the contents of the class in a general context.</p> |

| 6 | Relevant Work: | | | | | |
|---------------------------------------|---|---------------------------------------|----------|-------------------------|----------------------------|----------|
| | <table border="1"> <thead> <tr> <th>Number and Type; Connection to Course</th> <th>Duration</th> <th>Part of final mark in %</th> </tr> </thead> <tbody> <tr> <td>Final written exam (No. 1)</td> <td>120 Min.</td> <td>80</td> </tr> </tbody> </table> | Number and Type; Connection to Course | Duration | Part of final mark in % | Final written exam (No. 1) | 120 Min. |
| Number and Type; Connection to Course | Duration | Part of final mark in % | | | | |
| Final written exam (No. 1) | 120 Min. | 80 | | | | |

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| | Short Group presentation + discussion (group of about 5 students) (No. 2) | 20 min | 10 |
| | Group work essay (group of about 5 students) (No. 3) | 4000 words | 10 |

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| 7 | Prerequisites for Credit Points: The points for the module will be credited if the module was successfully completed in total, i.e. the student has passed all examinations. |
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| 8 | Module Prerequisites: There are no prerequisites, however, having completed the module Application Systems would be beneficial in order to understand the inner workings of project management software (such as SAP PS). |
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| 9 | Presence: The attendance at lectures and active participation in the tutorials and group assignments is highly recommended. |
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| 10 | Responsible Lecturer: Dr. Michael Räckers |
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| 11 | CP Assignment | | |
| | Presence | 2.00 CP | |
| | Relevant Work | No. 1 | 3.00 CP |
| | | No. 2 | 0.50 CP |
| | | No. 3 | 0.50 CP |
| Total | 6 CP | | |

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|----------------------|---|
| Module Title: | Information Management: Theories |
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| 1 | Module No: | State: Compulsory |
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| 2 | Turn: Every summer term | Duration: 1 term | Semester: | CP: 6 | Workload (h): 180 |
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| 3 | Module Structure: | | | | | |
| | No | Type | Course | CP | Presence (h + CH) | Self-Study (h) |
| | 1 | L | Theories | 3 | 30 (2 CH) | 60 |
| | 2 | E | Exercises on theories | 3 | 30 (2 CH) | 60 |

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| 4 | <p>Contents:</p> <p>Background and relations to other modules / courses: A sound understanding of management and information management as provided in the courses “Managing the Information Age Organization” and “Information Management Tasks & Techniques”.</p> <p>Main topics and learning objectives: This module deepens the students’ understanding of IM tasks and techniques in that it enables them to assess underlying theoretical propositions in more detail. To this end, the lecture introduces important management theories, including market, resource and capability based theories of strategic information systems, IT strategy theory, IT value and productivity theory, organization theory of IT and theories of sourcing and governing the information function. Moreover, on the basis of this theoretical knowledge, critical issues of IM are discussed in the light of the controversial academic discussions surrounding them. The module builds on well-prepared class discussions rather than traditional lectures. The lecturer will support learning by carefully selecting papers and placing them into a broader “theoretical landscape”. He will moderate and facilitate the discussions, and provide feedback on the assignments during the semester (reading papers, preparing presentations, writing minutes).</p> |
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| 5 | Learning outcomes: |
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| | <p>Academic: After the completion of this course, students will a) have access to the academic debate on IM, specifically, the international academic debate on the most important or discussed issues of information management. The students will b) discern theories underlying the frameworks and techniques proposed for solving IM tasks, including market, resource and capability based theories of strategic information systems, IT strategy theory, IT value productivity theory, organization theory of IT and theories of sourcing and governing the information function. They will be able to c) will develop a repertoire of theoretical approaches and be able to apply them to issues of information management and d) will understand the contributions of important management theories to the IS field and will be able to assess these tools and the underlying theories critically.</p> |
| | <p>Soft skills: In addition to providing students with the capabilities to deal with academic literature reflectively, the course trains them in presenting their take on selected academic papers to the class and furthers their general ability to take an active part in academic discussions. This ability is based on a combination of reading, thinking, writing, discussing and listening skills. Students will practice their collaboration skills and develop techniques for efficient collaboration</p> |

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| 6 | Relevant Work: | | |
| | Number and Type; Connection to Course | Duration | Part of final mark in % |
| | Written Exam (N° 1) | Up to 120 Min. | 60 |
| | Reflexion on readings by presentation (groups of 3-5 students), written report and 12 comments on reading (N° 2) | Ca. 20 min, ca. 5 pages, each ca. 0,5 pages | 40 |

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| 7 | Prerequisites for Credit Points: The points for the module will be credited if the module was successfully completed in total, i.e. the student has passed all examinations. |
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| 8 | Module Prerequisites: none |
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| 9 | Presence: Presence is recommended |
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| 10 | Responsible Lecturer: Prof. Dr. Stefan Klein |
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| 11 | CP Assignment | | |
| | Presence | No. 1 | 1.00 CP |
| | | No. 2 | 1.00 CP |
| | Relevant Work | No. 1 | 2.50 CP |
| | | No. 2 | 1.50 CP |
| | Total | | 6 CP |

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|----------------------|---|
| Module Title: | Enterprise Architecture Management |
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| 1 | Module No: | State: Compulsory |
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| 2 | Turn: Every summer term | Duration: 1 term | Semester: | CP: 6 | Workload (h): 180 |
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| 3 | Module Structure: | | | | | |
|----------|--------------------------|------|------------------|----|-------------------|----------------|
| | No | Type | Course | CP | Presence (h + CH) | Self-Study (h) |
| | 1 | L | EAM | 3 | 30 (2 CH) | 60 |
| | 2 | E | Exercises on EAM | 3 | 30 (2 CH) | 60 |

4 Contents:

Background and relations to other modules / courses:

This module stresses the aspect of IM as an engineering discipline, in contrast to being a management discipline only. The fundamental idea is to describe organizations as a whole, consisting of goals and strategies, business models, processes, people and information technology. Enterprise Architecture Management propagates a holistic approach that primarily aims at aligning the spheres of business and IT within one or across several companies and at facilitating and governing transformation processes. The Information Manager thereby has the role of an architect of the corporate information infrastructure. The course “Managing IT in the Information Age” introduces students to the tasks and tools in Information Management thus setting the scene for this module.

Main topics and learning objectives:

This module provides insights into the concepts and methods of Enterprise Architecture Management. The need for architectures in complex organizations as an instrument for transformation is motivated by the challenges enterprises face in today’s business.

Architectures

support the effective planning and governance of enterprises as a whole consisting of business and IT. Consistently implemented, they facilitate the understanding of business entities’ interrelationships, set them in relation to strategic goals and help define the desired to be state and the roadmap for its realization. For this purpose, concepts, methods, models and tools are discussed and enriched with insights from practice. The introduction of a specialised modeling language introduces the students to the creation of architectural

| artifacts. The concrete architecture realization process is underlined by the study of architecture frameworks currently discussed in research and practice. | |
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| Topics | Learning objectives |
| Motivation of EAM | To learn about the challenge today's enterprises are facing and the answers EAM provides in this context |
| Positioning EAM | To learn the definition and major concepts of EAM, about its key applications and its role as a bridge from strategy to design |
| Management areas and best practices | To learn about the management areas relevant to EAM and associated best practices commonly applied |
| Modeling of EAM | To learn how to create different architectural artifacts and to connect them to create a holistic, purposeful picture of the enterprise. Moreover, to learn to use viewpoints to generate stakeholder-specific views of the architecture |
| Frameworks on EAM | To learn why frameworks play an important role in EAM and to get to know prominent frameworks that are vividly discussed in research and practice. |

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| 5 | Learning outcomes: |
| | <p>Academic:</p> <p>The students' ability to develop and manage Enterprise Architectures is the module's major goal. An understanding of current developments and frameworks in the domain of architecture implementation should be obtained. Students are equipped with methods for planning, creating and governing such architectures. Furthermore, practical skills in architecture development will be conveyed with work on case studies and presentation of the results.</p> |
| | <p>Soft skills:</p> <p>Students are encouraged to prepare the contents of the lecture and exercises and to perform follow-up work in teams. This is supported by a Learnweb discussion forum that is guided by the chair. The case study is organised as group work and thus promotes the students' ability to cooperate in teams and to manage their time efficiently. The intermediary results are presented regularly by the groups in front of the complete audience. This enhances the students' presentation and discussion skills. The creation of architectural models by using a syntactically and semantically defined modeling language sharpens analytical and logic skills.</p> |

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| 6 | Relevant Work: | | |
| | Number and Type; Connection to Course | Duration | Part of final mark in % |
| | Written Exam (N° 1) | 120 Min. | 60 |
| | Case Study with EAM-Software, Presentation (N° 2) | 40 pages, 40 min. presentation | 40 |

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| 7 | Prerequisites for Credit Points: The points for the module will be credited if the module was successfully completed in total, i.e. the student has passed all examinations. |
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| 8 | Module Prerequisites: none |
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| 9 | Presence: Presence is recommended |
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| 10 | Responsible Lecturer: Prof. Dr.-Ing. Bernd Hellingrath |
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| 11 | CP Assigment | | |
| | Presence | No. 1 | 1.00 CP |
| | | No. 2 | 1.00 CP |
| | Relevant Work | No. 1 | 2.50 CP |
| | | No. 2 | 1.50 CP |
| | Total | | 6 CP |

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|---------------------|---------------------|
| ModuleTitle: | E-Government |
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| 1 | Module No: | State: Compulsory |
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| 2 | Turn: Every summer term | Duration: 1 term | Semester: | CP: 6 | Workload (h): 180 |
|----------|--------------------------------|-------------------------|------------------|--------------|--------------------------|

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|----------|--------------------------|-------------|---------------------------|-----------|--------------------------|-----------------------|
| 3 | Module Structure: | | | | | |
| | No | Type | Course | CP | Presence (h + CH) | Self-Study (h) |
| | 1 | L | E-Government | 3 | 30 (2 CH) | 60 |
| | 2 | E | Exercises on E-Government | 3 | 30 (2 CH) | 60 |
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| 4 | Contents: | | | | | |
|---|---|--------|---------------------|---|---|--------------------------------------|
| | <p>Background and relations to other modules / courses: eGovernment is a discipline-spanning phenomenon. Coming from a public management background learned in the first semester in Leuven, the technical aspects will be added.</p> <p>Main topics and learning objectives: This module offers insights into the technological challenges of eGovernment. Besides the organizational and managerial aspects, eGovernment implementation has to face, there are also several technological aspects to address and understand to implement a livable and working eGovernment architecture. Concepts and techniques will be introduced and practically used during the module.</p> | | | | | |
| | <table border="1"> <thead> <tr> <th>Topics</th> <th>Learning objectives</th> </tr> </thead> <tbody> <tr> <td>Roots and basic principles of administrative structures</td> <td>Learn, how administrations work (recap) and what influence on Public Sector information technology this has. Learn, how information technology in and for public administrations evolved.</td> </tr> <tr> <td>Standardization and Interoperability</td> <td>Learn how (IT-)standardization is working. Learn about the importance of standardization and interoperability for efficient it-architectures, esp. in federal structures (e.g. as in Germany).</td> </tr> </tbody> </table> | Topics | Learning objectives | Roots and basic principles of administrative structures | Learn, how administrations work (recap) and what influence on Public Sector information technology this has. Learn, how information technology in and for public administrations evolved. | Standardization and Interoperability |
| Topics | Learning objectives | | | | | |
| Roots and basic principles of administrative structures | Learn, how administrations work (recap) and what influence on Public Sector information technology this has. Learn, how information technology in and for public administrations evolved. | | | | | |
| Standardization and Interoperability | Learn how (IT-)standardization is working. Learn about the importance of standardization and interoperability for efficient it-architectures, esp. in federal structures (e.g. as in Germany). | | | | | |

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| Business Process Management for the Public Sector | Learn how to structure public sector processes. Learn how to prepare public sector organizations for the introduction/implementation of information technologies. |
| Data Modeling | Learn how to structure data. Learn how to prepare public sector organizations for the introduction/implementation of information technologies. |
| eParticipation, mGovernment | Learn about the functioning of specific concepts that gain importance in the field of eGovernment. |
| European best practices and approaches for eGovernment | Learn about different approaches in different European countries and the rationales behind them. |

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| 5 | Learning outcomes: |
| | <p>Academic: The students gain deepened insight into eGovernment and its organizational and technical implications. They can apply techniques associated to eGovernment like domain-specific business process modelling techniques and further techniques.</p> |
| | <p>Soft skills: Students learn to understand/interpret documents related to eGovernment strategies. Students learn to discuss their own eGovernment-background with others and reflect their specific background based on international strategies. Students discuss and present relevant topics to the class.</p> |

| 6 | Relevant Work: | | | | | | |
|--------------------|--|---------------------------------------|-------------------------|-------------------------|--------------------|----------|-----|
| | <table border="1"> <thead> <tr> <th>Number and Type; Connection to Course</th> <th>Duration</th> <th>Part of final mark in %</th> </tr> </thead> <tbody> <tr> <td>Final written exam</td> <td>120 Min.</td> <td>100</td> </tr> </tbody> </table> | Number and Type; Connection to Course | Duration | Part of final mark in % | Final written exam | 120 Min. | 100 |
| | Number and Type; Connection to Course | Duration | Part of final mark in % | | | | |
| Final written exam | 120 Min. | 100 | | | | | |
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| 7 | Prerequisites for Credit Points: The points for the module will be credited if the module was successfully completed in total, i.e. the student has passed all examinations. |
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| 8 | Module Prerequisites: none |
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| 9 | Presence: Presence is recommended |
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| 10 | Responsible Lecturer: Prof. Dr. Jörg Becker |
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| 11 | Course Work | |
| | Number and Type; Connection to Course | Duration |
| | Process Management preparation | Appr. 6 pages. |
| | Simulation game | Appr. 12 pages |

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| 12 | CP Assignment | | |
| | Presence | No. 1 | 1.00 CP |
| | | No. 2 | 1.00 CP |
| | Relevant Work | | 3.00 CP |
| | Course Work | No. 1 | 0.50 CP |
| | | No. 2 | 0.50 CP |
| Total | | 6 CP | |

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|----------------------|------------------------------------|
| Module Title: | Integrated Research Seminar |
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| 1 | Module No: | State: Compulsory |
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| 2 | Turn: Every summer term | Duration: 1 term | Semester: | CP: 6 | Workload (h): 180 |
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| 3 | Module Structure: | | | | | |
| | No | Type | Course | CP | Presence (h + CH) | Self-Study (h) |
| | 1 | Seminar | Integrated Research Seminar | 6 | 60 (4 CH) | 120 |

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| 4 | Contents: |
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| | <p>Background and relations to other modules / courses:</p> <p>Basic idea of the integrated research seminar is to reflect and study a real-life case following the three countries and universities integrated into the programme. Coming from Leuven, the real-life case will be further developed and refined.</p> <p>Main topics and learning objectives:</p> <p>General objective of the seminar is to be able to understand, compare and contrast the experiences working on real-life case studies in the area of public sector innovation and e-governance in the three participating host countries. The students, having studied in Leuven, have gained basic understanding in the field of public management and hence are able to discuss the case from this perspective. During this course, they will be able to add specific concepts of information technology into the real-life case.</p> |
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| 5 | <p>Learning outcomes:</p> <p>Academic:</p> <p>The students deepen their knowledge on the information technology side of eGovernment. They are able to use such technologies and integrate them into the real-life case. They are able to understand the problems and dependencies of using IT in the public sector.</p> <p>Soft skills:</p> <p>Students improve their skills in acquiring profound scientific knowledge and presentation. Depending on the topic, group working abilities are supported.</p> |
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| 6 | Relevant Work: | | |
| | Number and Type; Connection to Course | Duration | Part of final mark in % |
| | Seminar elaboration and talk | Ca. 20 pages, ca. 60 min. | 100 |

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| 7 | <p>Prerequisites for Credit Points: The points for the module will be credited if the module was successfully completed in total, i.e. the student has passed all examinations.</p> |
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| 8 | <p>Module Prerequisites: none</p> |
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| 9 | <p>Presence: Presence is recommended</p> |
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| 10 | Responsible Lecturer: Prof. Dr. Jörg Becker |
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| 11 | Misc.: |
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III. In the Course/Module Descriptions, the Course Descriptions of Tallinn University of Technology contain the following amended version:

“3. Semester: Tallinn University of Technology

§ 1c

Types of Lectures and Examinations

Studies take place in the form of face-to-face learning (lectures and seminars) and independent work (exercise). Face-to-face learning means studies for the purposes of achieving the learning outcomes in the learning environment, including online learning environment, in the form of a lecture, seminar, practical training, laboratory work or practice session, in which both, the student and the teacher, take part. Face-to-face learning shall be conducted according to a schedule. A schedule shall be prepared based on the standard study plan. A lecture normally lasts between 45 and 120 minutes and is held by a staff-member with exceptional knowledge in the respective field. Lectures are the main mean of enhancing the student’s knowledge. In exercises the student needs to complete assignments that deepen his/her knowledge in the respective field of study. A seminar usually lasts for 60 minutes and is held by a staff-member or a teaching assistant (PhD student) with very good knowledge in the respective field. In seminars, certain topics are discussed more profoundly, including seminar papers and other assignments. The methods and criteria of assessment are defined in syllabi, which are available to students before the commencement of study. The assessment methods define the manner of attesting the acquisition of knowledge and skills, which include an oral or written examination, an essay, a report, group work, a questionnaire etc. In case of various methods being used for the assessment of learning outcomes, their relevant weights in determining the final grade are specified in the syllabus. An assessment criterion shall specify the expected level and scope of knowledge, which can be proved by the assessment methods. Assessment may be either graded or non-graded. An essay should usually amount up to 2000-3000 words.

The bases of and procedure for continuous assessment of studies (tests, laboratory work, and papers) shall be defined by the teacher in the extended syllabus, taking into account the provisions on examinations and assessments. If the final grade is based partially or entirely on the results of continuous assessment, the assessment criteria and the weight of the results of continuous assessments in the final grade, as well as the deadlines for the performance thereof, shall be specified in the extended syllabus of the relevant subject. Items of graded work that have been completed as part of a course are usually part of the final grade. Graded work that is prerequisite for an exam but does not count for the overall grade should be an exception and marked as such.

§ 2c

Required Coursework and Examinations, Registration

Study takes place on a course basis. In a course-based system the student studies subjects based on an individual study plan he or she has drawn up, taking into account the prerequisites established for the subjects. To ensure the logic of sequence of study, up to two prerequisite subjects may be laid down for each subject that, as a rule, need to be completed before commencement of studies in the relevant subject.

A syllabus shall specify the brief description, objectives, learning outcomes, evaluation criteria, literature and prerequisite courses of the subject. An extended syllabus shall stipulate, in addition to the things specified in the syllabus, the list of topics to be covered and a short description of their content, a list of independent assignments, a list of practical assignments, a schedule, the literature, the organization of studies and the prerequisites for the examination and assessment. The extended syllabus shall indicate the weight of continuous assessment in the final grade. The extended syllabus shall be presented to the students in the first class at the beginning of the relevant semester and shall be available in ÖIS.

The methods and criteria of assessment shall be defined in syllabi, which shall be available to students before the commencement of study. Prerequisites for taking an examination may be established for a subject, which shall be available in the expanded syllabus on the subject website in Study Information System and they shall not be changed during the semester.

Examinations shall be administered in the language of instruction. Upon approval by the teacher, another language may be used. There shall be at least three dates for taking an examination with an interval of at least three days between the examinations. As a rule, registration for a primary and repeat examination shall be via the Study Information System.

§ 3c

Examiners and Assessors

As a rule, examinations and assessments shall be graded by the person teaching or supervising the subject, to whom the student has declared the subject. A student has the right to request the opportunity to take an examination or assessment before a board.

The teacher shall make sure that the results of a written examination or assessment are made available for the students within a week after taking the examination or assessment. The results of an oral examination or assessment shall be made available to the students on the day of the examination or assessment. The results of the examinations or assessments taken in the final week of the examination session shall be made available within the next workday after the end of the examination session.

Assessment results shall be entered into Study Information System by the teacher or employee, appointed by the institute director of educational institution. The teacher is responsible for forwarding the completed assessment forms printed from Study Information System and signed by the teacher to the Dean's Office/Office of Academic Affairs of the educational institution.

§ 4c

Passing and Retaking of the Master's Examination

A subject shall be deemed passed or a graduation thesis shall be deemed to be defended when a student obtains positive assessment.

A student has the right to take an examination on the basis of one declaration in the given subject for a maximum of two times. There shall be at least three dates for taking an examination in an examination session with an interval of at least three days between the examinations. A subject not completed by the end of the semester must be re-declared.

If a student fails to appear at the examination or fails the primary examination, he or she may take a repeat examination in a repeat examination session. A student may retake once an examination, for which he or she received a positive grade. The grade of the last examination in the subject shall apply. With the approval of the dean, a student may repeat an examination with a positive grade once after the deadline for passing the examination. The last grade shall apply, whereas a student graded with "0" is required to re-declare the subject.

A non-graded assessment is a form of testing knowledge or assessing the completed practical work. For non-graded assessment a threshold shall be established; when learning outcomes of a student comply with or exceed the threshold, the assessment shall be indicated as adequate – A (pass), or, in case the student's learning outcomes fail to comply with the threshold, the assessment shall be indicated as inadequate – M (fail). In case of non-graded assessment of learning outcomes, a subject can be deemed to have passed if all the terms and conditions laid down in the syllabus for passing the subject have been met. In cases where

the result of the assessment is “M” (fail), re-declaration of the subject is required for taking the assessment again.

§ 5c

Access to the Examination Files

A student has the right to receive feedback from the teacher concerning his or her performance.

§ 6c

Rectification of Results, Absence, Withdrawal, Deception and Violation of Regulations

Non-attendance at an examination shall be marked as “absent”.

In justified cases and with the teacher’s consent, the Dean/Director of the educational institution has the right, on the basis of a student’s application, to extend the term for completing an examination in the autumn semester for up to two weeks and in the spring semester up to the end of the academic year.

Organization of an examination shall be determined by the teacher. Any resources or materials compiled by the student may be used at the examination only with the teacher’s permission and under stipulated terms. A teacher has the right to remove a student from the examination if the student is making use of help from others. The result of the examination in that case is a “0” (failed).

If a student violates the academic practice, the Dean has, depending on the gravity of violation, the right to: 1) issue a letter of reprimand to the student; 2) request the Vice Rector for Academic Affairs in writing to delete the student from the matriculation register. The following activities shall be considered violation of academic practice and contemptible behaviour: 1) use of support materials at the examination, except those explicitly allowed by the teacher; 2) any kind of inadmissible sharing of knowledge (prompting, copying, copying homework, etc.) by students in case of assessment of learning outcome; 3) submitting another

person's writing under one's own name; 4) plagiarism or extensive rewording of someone else's work, referencing or quoting without proper academic reference; 5) re-submission of one's own work when credit points have already been received for the work; 6) participating in examination/assessment for another student or allowing another person to participate in the examination/assessment in one's own name; 7) deliberate submission of untrue information (false information) in one's assignments, applications; 8) damaging the reputation of the university, which includes providing ungrounded negative value judgements concerning the university, unauthorised mediation of the study opportunities and services provided by the university or compilation and dissemination of materials promoting the university for the purposes of material gain and other activities causing material damage or damage to the reputation of the university.

§7c

Requirements for Students with Special Needs

Students with a disability are entitled to reasonable adjustments. For students in permanent or temporary special individual circumstances of physical or psychological nature, an amendment of the exam format, examination facilities or the use of a technical device may be allowed after approval by the faculty. The faculty determines the deadline for the application and consults with the university expert on education and diversity. The adjustments are only granted after a status approval and an accompanying advice procedure.

§8c

Courses/Modules

Recent Issues in E-Governance

1. Number of ECTS: 6
2. Grading: Exam
3. Language: English
4. Teaching semester: Fall semester

5. Learning objectives:

General objective of the subject is to get an understanding of recent developments in eGovernance, including outcomes of large-scale pilots and recent adoption of new technologies on national, European and international level.

6. Learning outcomes:

After successfully passing the subject the student should be able:

- to identify uses of specific IT systems in public sector;
- to identify the IT-induced organizational changes in public sector;
- to identify the basic principles of managing IT in the public sector.

7. Description of the course:

The course gives an overview of recent developments in eGovernance, including outcomes of large-scale pilots and recent adoption of new technologies on national, European and international level. The success-stories and failures of e-governance projects with factors behind them are discussed. Different case studies with the best existing examples from Estonia and other countries are introduced.

8. Evaluation methods and criteria:

The grade is based on the home assignment (80%) and a class presentation (20%). Passing the written tests taken at the end of each class based on compulsory reading material (multiple choice questions and open questions) is a prerequisite for grading.

Students` understanding about the content of lectures and reading materials will be evaluated with tests and home assignment.

9. Literature:

Gascó-Hernández, Mila (2014): Open Government: Opportunities and Challenges for Public Governance. Springer.

Brocke, J., Rosemann, M. (2010): Handbook on Business Process Management. Springer.

Irani Z., Love, P. (2008): Evaluating Information Systems. Public and Private Sector. Routledge.

| | Full-time (weekly hours) |
|---------------------|--------------------------|
| Lectures | 3,0 |
| Practice / seminars | 1,0 |
| Total | 4,0 |

10. Independent work:

The goal of the coursework is to allow students to demonstrate their critical thinking and conceptual analysis skills, cohesion of arguments, use of sources and evidence, and the breadth and relevance of reading. At least 10 references and 2000 – 3000 words to be used. Topics for the coursework are to be coordinated with the main course instructor.

| Evaluation method | Evaluation criteria |
|--|---|
| Learning outcomes | <p>After successfully passing the subject the student should be able:</p> <ul style="list-style-type: none"> - to identify uses of specific IT systems in public sector; - to identify the IT-induced organizational changes in public sector; - to identify the basic principles of managing IT in the public sector. |
| Home assignment + presentation (evaluates learning outcomes 1-3) | The coursework evaluates, how students demonstrate their critical thinking and conceptual analysis skills, cohesion of arguments, use of sources and evidence, and the breadth and relevance of reading. |
| Prerequisites for grading | <p>Keeping to the deadlines; lecture-seminar participation; passing written tests taken at the end of each class based on compulsory reading material (multiple choice questions and open questions). Participation in seminars and lectures is mandatory, absence from maximum 1 seminar-lecture is allowed. Missing more than one lecture-seminar will result in failure to pass the course. For health or serious personal reasons, a second absence may be justified.</p> |
| Final Grade | 100% - Home assignment + presentation. |

E-Governance and E-Democracy

1. Number of ECTS: 6
2. Grading: Exam (graded)
3. Language: English
4. Teaching semester: Fall semester
5. Learning objectives:

General objectives of the subject are to:

- introduce main theories about information society, their evolution, and ‘hot topics’ derived from the information age such as digital governance, open government, data management, new voting technologies, co-creation of public services, m-governance, e-health, e-learning, etc;
- introduce the concept of e-governance and the role of it in government and in public management reforms;
- present avenues for public sector innovation with the use of big data and analytics in public service design;
- give an overview of the current state and development of the information society and e-governance in Estonia;
- bring out the fundamental critique of e-governance;
- provide an overview of the information and communication technology’s (ICT) impact on democratic processes in society such increasing transparency and citizen trust in political decision-making processes;
- introduce assessment methods to measure impact of e-governance applications, the concept of business process analysis and entity relationship modeling and their applicability in e-governance.

6. Learning outcomes:

After successfully passing the subject the student:

- has acquired basic knowledge about the main information society theories, historical evolution, development and the current state;
- understands the linkage between public administration and information society theories and practice;
- understands the logic of public organisations and can evaluate the solutions and drawbacks for efficiency while using information and communication technology;

- understands the logic of public service delivery and can evaluate the solutions and drawbacks for effectiveness and efficiency while using information and communication technology;
- can successfully differentiate and apply the obtained theoretical knowledge in practice;
- knows the basic concepts of e-democracy and the related sectoral developments;
- has an overview of e-democracy applications and classifications
- is able to plan deployment of e-democracy applications.

7. Description of the course:

The course introduces main theories and practices about information society in the context of public administration systems and reforms. The course will cover such topics as the current state of the information society and e-Governance and digital transformation (including the Estonian case); the concept and basic ideologies of e-governance; use of big data; innovation in the public sector; the impact of the information society on public service delivery and critique of e-governance. Students will be introduced to various 'hot topics' derived from the information age such as digital governance, open government, data management, new voting technologies, co-creation of public services, e-security, etc. It also opens the relationship between e-democracy and society at various levels: citizens' activity at grass-roots level, the interaction between citizens and public authorities, cooperation between them, the use of ICT in political campaigns etc. Students will get explanations on the implementation of ICT solutions in terms of increasing transparency and citizen trust in political decision-making processes. Furthermore, both the legal framework as well as changes in the evolution of the various technological platforms shall be surveyed.

8. Evaluation methods and criteria:

The grade forms as follows:

100% = Written examination (50%) + Case study (50%)

Students` understanding about the content of lectures will be evaluated.

| | Full-time (weekly hours) |
|---------------------|--------------------------|
| Lectures | 2,5 |
| Practice / seminars | 1,5 |
| Total | 4,0 |

| Evaluation method | Evaluation criteria |
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| Learning outcomes | After successfully passing the subject the student: |

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| | <ul style="list-style-type: none"> - has acquired basic knowledge about the main information society theories, historical evolution, development and the current state; - understands the linkage between public administration and information society theories and practice; - understands the logic of public organisations and can evaluate the solutions and drawbacks for efficiency while using information and communication technology; - understands the logic of public service delivery and can evaluate the solutions and drawbacks for effectiveness and efficiency while using information and communication technology; - can successfully differentiate and apply the obtained theoretical knowledge in practice; - knows the basic concepts of edemocracy and the related sectoral developments; - has an overview of e-democracy applications and classifications; - is able to plan deployment of e-democracy applications. |
| <p>Home assignment (case-study) (evaluates learning outcomes 2, 3, 4, 7, 8)</p> | <p>Two independent research essays about the impact of ICT on one public service delivery and/or on everyday functioning of one public sector organization are required. The selection of the particular case studies is up to the student. The theoretical framework of the analyses has to apply to the reading material of the course and can be supplemented with additional theoretical literature dependent on the case studies. The essays have to be fully referenced and written in English. Other criteria for the essays will be presented in the beginning of a semester.</p> |

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| | <p>The coursework evaluates, how students demonstrate their critical thinking and conceptual analysis skills, cohesion of arguments, use of sources and evidence, and the breadth and relevance of reading. Differential grading: it is possible to earn maximum 50 points for the case study analyses:</p> <p>50 points – the topic selected is up-to date and bounded to the course’s main objectives, theoretical concepts used are appropriate and convincing and in terms of a case study their selection justified and argued; analysis builds up a complete and logic picture in the issue; the student’s contribution in terms of critical thinking clearly detectable; terms are used correctly; style and formatting correct and other formal criteria (e.g. length and usage of scholarly sources) fulfilled.</p> <p>40 points – the topic selected is up-to date and bounded to the course’s main objectives, theoretical concepts used are suitable, but in terms of a case study their selection not justified and argued enough; in general the analysis builds up a complete and logic picture in the issue; the student’s contribution in terms of critical thinking not clear enough; terms are used correctly in most cases; some problems in following the rules set for style, formatting (except usage of references) and other formal criteria (e.g. length and usage of scholarly sources).</p> <p>30 points – the topic is too broad and/or discussed in details already in the lectures; considerable problems in usage of appropriate theoretical concepts related to</p> |
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| | <p>the selected case; the analysis lacks a clear logic in a set-up and has given a too great emphasis on empirical and descriptive parts; the student's ability to think critically minimal; there are considerable problems in following the rules set for style, formatting (except usage of references) and other formal criteria (e.g. length and usage of scholarly sources).</p> <p>Below 25 points – strong violence against formatting (including usage of references etc) rules. The assignment of a case study analyses should meet a deadline, otherwise certain points will be lost.</p> |
| Written exam (evaluates learning outcomes 1, 4, 5, 6) | <p>A written exam is composed of short and open-end questions to control the knowledge derived from the compulsory reading assignments and lectures. Differential grading: it is possible to earn maximum 40 points for the written examination, from which 2/3 is composed of test questions and 1/3 of questions oriented on field-specific discussions. The share of correct answers forms the basis for the points earned altogether.</p> |
| Prerequisites for grading | <p>Keeping to the deadlines; lectureseminar participation. Participation in seminars and lectures is mandatory, absence from maximum 2 seminar-lectures is allowed. Missing more than two lecture-seminars will result in failure to pass the course. For health or serious personal reasons, a second absence may be justified.</p> |
| Final Grade | <p>In order to get the final grade, it is obligatory to perform on all the components and earn at least half of the points in each of the components.</p> <p>The final grade is calculated as follows: Written examination: 50% Case study: 50%.</p> |

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| | <p>The final grade is based on the general sum of the points earned for the different components:</p> <p>91% and more: grade 5 81-90%: 4 71-80%: 3 61-70%: 2 51-60%: 1 50% and less: 0</p> |
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Integrated Research Seminar

1. Number of ECTS: 6
2. Grading: Exam
3. Language: English
4. Teaching semester: Fall semester
5. Learning objectives:

General objective of the subject is to be able to understand, compare and contrast the experiences working on real-life case studies in the area of public sector innovation and e-governance in the three participating host countries. The aim is also to reflect and explain the essence and applicability of different scientific methods in the context of public sector innovation and eGovernance as well as to enhance students` ability and skills to recite, argue and criticise in scientific discourse.

6. Learning outcomes:

After successfully passing the subject the student:

- is able to apply their theoretical knowledge of public sector innovation and e-governance in practical settings whereby they utilise their interdisciplinary knowledge;
- demonstrates an interdisciplinary expertise in a specific topic of public sector innovation and eGovernance;
- is capable of translating the studied specific topic into a Belgian, German and Estonian public sector context;
- explains, how public organizations through the use of ICT are able to become more adaptable, flexible and innovative;
- is able to discuss, how can ICT contribute to the efficiency of specific policy domains, such as health, education or justice, and how can big data provide solutions for the public sector.
- is able to defend his/her positions both orally and written, and oppose any critique;
- evaluates adequately the applicability of different scientific methods for dealing with different research questions.

7. Description of the course:

The subject deals with the understanding and comparison of the experiences working on real-life case studies in the area of public sector innovation and e-governance in the three participating host countries. It also reflects and explains the essence and applicability of different scientific methods in the context of public sector innovation and eGovernance as well as enhances students` ability and skills to recite, argue and criticise in scientific discourse. The seminar also offers a venue for various guest lectures by leading

international scholars from various sub-fields of public sector innovation and e-governance.

8. Evaluation methods and criteria:

The grade is based on a graded case study (80%) and a class presentation (20%).

9. Literature:

* Budd, Leslie, Harris, Lisa 2009: e-Governance. Managing or Governing? Routledge.

* Noveck, Beth Simone 2009: Wiki Government, R.R. Donnelly.

* Lathrop, Daniel, Ruma, Laurel 2010: Open Government. Collaboration, Transparency, and Participation in Practice. O'Reilly.

| | Full-time (weekly hours) |
|----------------------|--------------------------|
| Lectures | 1,0 |
| Practices / seminars | 3,0 |
| Total | 4,0 |

10. Independent work:

The goal of the coursework (case study) is to allow students demonstrate their critical thinking and conceptual analysis skills, cohesion of arguments, use of sources and evidence, and the breadth and relevance of reading.

| Evaluation method | Evaluation criteria |
|-------------------|---|
| Learning outcomes | <p>After successfully passing the subject the student:</p> <ul style="list-style-type: none"> - is able to apply their theoretical knowledge of public sector innovation and e-governance in practical settings whereby they utilise their interdisciplinary knowledge; - demonstrates an interdisciplinary expertise in a specific topic of public sector innovation and eGovernance; - is capable of translating the studied |

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| | <p>specific topic into a Belgian, German and Estonian public sector context;</p> <ul style="list-style-type: none"> - explains, how public organizations through the use of ICT are able to become more adaptable, flexible and innovative; - is able to discuss, how can ICT contribute to the efficiency of specific policy domains, such as health, education or justice, and how can big data provide solutions for the public sector. - is able to defend his/her positions both orally and written, and oppose any critique; - evaluates adequately the applicability of different scientific methods for dealing with different research questions. |
| Home assignment + presentation (evaluates learning outcomes 1-7) | The coursework (case study) and presentation evaluate, how students demonstrate their critical thinking and conceptual analysis skills, cohesion of arguments, use of sources and evidence, and the breadth and relevance of reading. |
| Prerequisites for grading | Keeping to the deadlines; lecture-seminar participation. Participation in seminars and lectures is mandatory, absence from maximum 1 seminar-lecture is allowed. Missing more than one lecture-seminar will result in failure to pass the course. For health or serious personal reasons, a second absence may be justified. |
| Final Grade | 100% - Home assignment + presentation |

Entrepreneurship and Technology Management

1. Number of ECTS: 6

2. Grading: Exam

3. Language: English

4. Teaching semester: Fall Semester

5. Learning objectives:

General objectives of the subject are:

- to analyse entrepreneurship and entrepreneurial process with the focus on R&D and innovation;
- to analyse innovation and technology management on company level;
- to analyse public sector innovation and how its management is different from private sector innovation management;
- to analyse the impact of wider environment on company activities and business models;
- to analyse entrepreneurship related policy, and especially on R&D and innovation policy, and enterprise support system.

6. Learning outcomes:

After successfully passing the subject the student:

- explains the main concepts and processes of entrepreneurship, and relates these to R&D and innovation;
- names the main aspects of the enterprise's economic activities in Estonia and internationally;
- identifies problems and possible solutions in establishing an enterprise;
- demonstrates knowledge on innovation and technology management at the company level;
- evaluates business opportunities, analyses the impact of business environment on the company's activities, and plans a business model, a business plan and a financial plan, including on a practical level;
- proves the ability to think creatively and entrepreneurially and to develop ideas (especially technology- and innovation-intensive) in teamwork, as he/she is aware of how to generate, develop and evaluate business ideas;
- analyzes the impact of the wider environment (including digitalization) on the company's activities and knows the entrepreneurship, research and development, and innovation policies and the support system;

- demonstrates knowledge on the evolution of the academic discourse on entrepreneurship and the most important research topics.

7. Description of the course:

Entrepreneurship is multifaceted, interdisciplinary field that does relate only to management issues, but included wider spectrum of knowledge and skills, and justifies the threefold approach.

First, main entrepreneurship, R&D and innovation related concepts, processes and tendencies are discussed. Company level innovation processes and company strategies in advancing (technological) innovation and research and development are discussed. The focus is both Estonia as well as international developments. Company establishment as well as technology management, and overcoming possible problems, are discussed. These skills are applied in the first group work where business plans are elaborated and defended in front of other students.

The second block relates entrepreneurship, R&D and innovation with societal and economic development. The impact of wider context on company management and development is analysed. Innovation system concept is applied and the impact of R&D on entrepreneurship is discussed in detail. The group assignment relates to the analysis of various development phases of companies and the analysis of potential further business opportunities. The business plan of the first group assignment is developed further.

The third block focuses on entrepreneurship related policy, and especially on R&D and innovation policy, and on enterprise support system. In the group assignment the potential impact of various policy instruments on different types of enterprises is discussed, and related to the business plan developed.

Leading entrepreneurs and policy makers are involved in the course. The course is set-up based on process.

8. Evaluation methods and criteria:

The grade forms as follows:

40% - Written exam

30% - Two group works

30% - Home assignment

Students` understanding about the content of lectures will be evaluated.

9. Literature:

Bjerke, B. (2014) About Entrepreneurship. Edward Elgar.

Chell, E., Karataş-Özkan, M. (2014) Handbook of Research on Small Business and Entrepreneurship Edward Elgar.

Drucker, P. (1999) Innovation and Entrepreneurship.

Welter, F., Smallbone, D., Gils, A. Entrepreneurial Processes in a Changing Economy. Frontiers in European Entrepreneurship. Edward Elgar.

Tidd, J., Bessant, J., Pavitt, K. (2006). Innovatsiooni juhtimine. Tehnoloogiliste, organisatsiooniliste ja turu muudatuste integreerumine. Tallinn: Pegasus.

Fagerberg, J.; Mowery, D. C.; Nelson, R. R. (toim) (2004) The Oxford Handbook of Innovation, Oxford University Press.

Dodgson, M.; Gann, D. M.; Salter, A. (2008) The Management of Technological Innovation Strategy and Practice, Oxford University Press.

| | Full-time (weekly hours) |
|---------------------|--------------------------|
| Lectures | 2,0 |
| Practice / seminars | 2,0 |
| Total | 4,0 |

| Evaluation method | Evaluation criteria |
|-------------------|---|
| Learning outcomes | <p>After successfully passing the subject the student:</p> <ul style="list-style-type: none"> - explains the main concepts and processes of entrepreneurship, and relates these to R&D and innovation; - names the main aspects of the enterprise's economic activities in Estonia and internationally; - identifies problems and possible solutions in establishing an enterprise; - demonstrates knowledge on innovation and technology management at the company level; - evaluates business opportunities, analyses the impact of business environment on the company's activities, and plans a business |

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| | <p>model, a business plan and a financial plan, including on a practical level;</p> <ul style="list-style-type: none"> - proves the ability to think creatively and entrepreneurially and to develop ideas (especially technology- and innovation-intensive) in teamwork, as he/she is aware of how to generate, develop and evaluate business ideas; - analyzes the impact of the wider environment (including digitalization) on the company's activities and knows the entrepreneurship, research and development, and innovation policies and the support system; - demonstrates knowledge on the evolution of the academic discourse on entrepreneurship and the most important research topics. |
| <p>I Group project and its presentation at the seminar (evaluates course outputs 2-7)</p> <p>Requirements according to the syllabus</p> | <p>Group assignment (50% of the grade) consists of written analysis (analytical paper) and presentation.</p> <p>Grading:</p> <ul style="list-style-type: none"> - 91% and more: the student has acquired all core theoretical and practical concepts and can apply these for analyzing practical problems; - 81-90%: the student has acquired most core theoretical and practical concepts and can apply these for analyzing practical problems; - 71-80%: the student has acquired minimum necessary theoretical and practical concepts and can apply these for analyzing practical problems; - 61-70%: the student has acquired minimum necessary theoretical and practical concepts, but cannot systemize these and apply enough for analyzing practical problems; |

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| | <p>- 51-60%: the student has acquired minimum necessary theoretical and practical concepts, but cannot apply these for analyzing practical problems; -</p> <p>50% and less: the student has not acquired minimum necessary theoretical and practical concepts.</p> |
| <p>Written exam (evaluates learning outcomes 1-8)</p> | <p>Final exam (50% of the grade) is in-class written exam based on compulsory reading materials and lectures. For positively passing the course, the exam result has to be at least 26 points of 50. Grading:</p> <p>- 91% and more: the student has acquired all core theoretical and practical concepts and can apply these for analyzing practical problems;</p> <p>- 81-90%: the student has acquired most core theoretical and practical concepts and can apply these for analyzing practical problems;</p> <p>- 71-80%: the student has acquired minimum necessary theoretical and practical concepts and can apply these for analyzing practical problems;</p> <p>- 61-70%: the student has acquired minimum necessary theoretical and practical concepts, but cannot systemize these and apply enough for analyzing practical problems;</p> <p>- 51-60%: the student has acquired minimum necessary theoretical and practical concepts, but cannot apply these for analyzing practical problems;</p> <p>- 50% and less: the student has not acquired minimum necessary theoretical and practical concepts.</p> |
| <p>Prerequisites for grading</p> | <p>Keeping to the deadlines; lecture-seminar participation. Missing two sessions for a good reason (health, family, extraordinary professional), when excused by the instructors, is possible. If three or more classes are missed, there is no option to</p> |

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| | make up for them, and the missed segments must be retaken during a later semester. |
| Final Grade | <p>Differentiated grading.</p> <p>100% = Group work and presentation (50%) + Final exam (50%).</p> <p>91% and more: grade 5</p> <p>81-90%: 4</p> <p>71-80%: 3</p> <p>61-70%: 2</p> <p>51-60%: 1</p> <p>50% or less: 0</p> |

Technology, Society and the Future

1. Number of ECTS: 6
2. Grading: Exam (graded)
3. Language: English
4. Teaching semester: Fall Semester
5. Learning objectives:

General objectives of the subject are:

- to introduce the motives behind the creation and implementation of technologies and their impact on society;
- to explain possible hazards stemming from technologies, the dark side of technology as such;
- to reflect standpoints of critically-minded schools of thought towards technology and to understand the argumentation behind their positions in historical perspective;
- to survey opportunities and weaknesses deriving from the application of technologies in public administration and overall governance - the critique of e-solutions;
- to shape the understanding about the essence of sharing/collaborative economy and in particular, commons-oriented projects and organizations;
- to give an overview about the collaborative potentialities of new technological capabilities, such as 3d printing, blockchain technologies and others.

6. Learning outcomes:

After successfully passing the subject the student:

- explains the motives behind the positions of technology critics and schools of thought;
- demonstrates and evaluates threats stemming from technologies, especially ICT, by ethical and social criteria;
- evaluates critically competing understandings about the innovation process and the essence and impacts of technological development on society;
- compares and contrasts different e-solutions in public administration and broader governance framework;

- knows not only the main theories of the information/network society and sharing/collaborative economy but also has acquired deeper knowledge on commons-oriented technologies and practices;
- understands opportunities/threats deriving from the emerging modes of immaterial (information) and material production (manufacturing);
- demonstrates the skills of critical thinking, conceptual analysis and argumentation both in written form and orally.

7. Description of the course:

The course consists of two inter-related parts.

The first part of the course is a classical, highly interactive but frontal talk about Technology & Society. Following a discussion of techno-determinism in its various forms, we will then use classical technology critique to see the might of techno-development. We will address ICT as a form of technology within that debate, and we will focus especially on areas such as e-Governance, the interplay of technology, innovation, and policy, and the fields of education and information. Another level of technology critique and a reading of key non-techno utopias will open the gates to the second part of the course.

That second part is a theoretical as well as hands-on exploration of the theory and practice of online and offline collaboration and sharing. The goal is to engage in a critically creative discussion of the ICT-enabled collaborative initiatives. We will engage multi-disciplinary literature about what commons/digital commons is; how ICT has changed collaboration etc. Readings will explore various business models, including mainstream social media platforms and commons-oriented organizations, as well as discuss incentives of cooperation, and potentialities for sustainable transitions. This course will employ techniques from non-formal education for a hands-on exploration of the sharing economy. Through role-playing games and improvised group presentations, you will build on and interplay with the ideas discussed with the aim to face practical problems.

8. Evaluation methods and criteria:

The grade forms as follows:

100% = Mid-term group assignment (50%) + Final group assignment (50%)

Students` understanding about the content of lectures will be evaluated.

9. Literature:

Selection of books, articles, popular media (journals, blogs, vlogs, video clips etc) – annually uploaded and updated on Moodle.

| | Full-time (weekly hours) |
|---------------------|--------------------------|
| Lectures | 2,5 |
| Practice / seminars | 1,5 |
| Total | 4,0 |

| Evaluation method | Evaluation criteria |
|-------------------|--|
| Learning outcomes | <p>After successfully passing the subject the student:</p> <ul style="list-style-type: none"> - explains the motives behind the positions of technology critics and schools of thought; - demonstrates and evaluates threats stemming from technologies, especially ICT, by ethical and social criteria; - evaluates critically competing understandings about the innovation process and the essence and impacts of technological development on society; - compares and contrasts different resolutions in public administration and broader governance framework; - knows not only the main theories of the information/network society and sharing/collaborative economy but also has acquired deeper knowledge on commons-oriented technologies and practices; - understands opportunities/threats deriving from the emerging modes of immaterial (information) and material production (manufacturing); - demonstrates the skills of critical thinking, conceptual analysis and |

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| | <p>argumentation both in written form and orally.</p> |
| <p>Mid-term group assignment (evaluates learning outcomes 1-4, 7)</p> | <p>Midterm (50% of the grade) in-class exam in which the students have to choose one out of three essay topics and provide an analytical discussion.</p> <p>Grading:</p> <ul style="list-style-type: none"> - 91% and more: the student has acquired all core theoretical and practical concepts and can apply these for analyzing practical problems; - 81-90%: the student has acquired most core theoretical and practical concepts and can apply these for analyzing practical problems; - 71-80%: the student has acquired minimum necessary theoretical and practical concepts and can apply these for analyzing practical problems; - 61-70%: the student has acquired minimum necessary theoretical and practical concepts, but cannot systemize these and apply enough for analyzing practical problems; - 51-60%: the student has acquired minimum necessary theoretical and practical concepts, but cannot apply these for analyzing practical problems; - 50% and less: the student has not acquired minimum necessary theoretical and practical concepts. |
| <p>Final group assignment (evaluates learning outcomes 5-7)</p> | <p>Final exam (50% of the grade) is in-class exam in which the students have to choose one out of three topics and provide an analytical discussion. The Final exam may, depending on the concrete course iteration and size, be replaced by the instructors by a take-home essay that likewise have to be chosen among three topics to be announced during the last class, of appr. 4000-6000</p> |

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| | <p>words and that may or may not be offered as group work.</p> <p>Grading:</p> <ul style="list-style-type: none"> - 91% and more: the student has acquired all core theoretical and practical concepts and can apply these for analyzing practical problems; - 81-90%: the student has acquired most core theoretical and practical concepts and can apply these for analyzing practical problems; - 71-80%: the student has acquired minimum necessary theoretical and practical concepts and can apply these for analyzing practical problems; - 61-70%: the student has acquired minimum necessary theoretical and practical concepts, but cannot systemize these and apply enough for analyzing practical problems; - 51-60%: the student has acquired minimum necessary theoretical and practical concepts, but cannot apply these for analyzing practical problems; - 50% and less: the student has not acquired minimum necessary theoretical and practical concepts. |
| Prerequisites for grading | <p>Keeping to the deadlines; lecture-seminar participation. Complete attendance is necessary. Missing two sessions for a good reason (health, family, extraordinary professional), when excused by the instructors, is possible. If three or more classes are missed, there is no option to make up for them, and the missed segments must be retaken during a later semester</p> |
| Final Grade | <p>Differentiated grading. 100% = Mid-term group assignment (50%) + Final group assignment (50%).</p> |

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| | 91% and more: grade 5 81 -90%: 4 71 -80%: 3 61 -70%: 2 51 -60%: 1 50% or less: 0 |
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IV. In the Course/Module Descriptions, the Module Description of the Master's thesis contains the following amended version:

„4. Semester: Master's Thesis

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| Module Title: | Master thesis |
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| 1 | Module No: | State: Compulsory |
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|----------|-------------------------|-------------------------|------------------|---------------|--------------------------|
| 2 | Turn: Every term | Duration: 1 term | Semester: | CP: 30 | Workload (h): 780 |
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| 3 | Module Structure: | | | | | |
| | No | Type | Course | CP | Presence (h + CH) | Self-Study (h) |
| | 1 | | Writing the thesis | 25 | 0 h (0 CH) | 650 |
| | 2 | | Thesis defence | 5 | 0 h (0 CH) | 130 |

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| 4 | <p>Contents:</p> <p>Background and relations to other modules / courses:</p> <p>The master thesis is written in the research context of one of the fields of study. The topic of the Master thesis is set by one of the members of the Thesis Defense Committee, see § 10 and § 11. The student has the right to propose both the choice of topic and supervisor, see § 10.</p> <p>Main topics and learning objectives:</p> |
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| | <p>Those are subject to the topic and area where the thesis is intended. The thesis defence covers the thesis' topic. With his/her master thesis, a student is supposed to prove his/her ability to take part in the scientific process by doing a small piece of research and write an appropriate paper on it. The thesis should have a length of approximately 80 pages. The thesis defence contains a presentation of the thesis' contents as well as a discussion.</p> |
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| 5 | Learning outcomes: | |
| | <p>Academic: The Master thesis and its defense should demonstrate that a student is capable of independently working on a topic from the field of public management, information systems and e-Governance within a specified period of time in accordance with scholarly methods and that he/she is able to document and present the results appropriately, see § 10. The student can handle a research topic in a scientific way and apply the results to practical problems. He or she can present and defend approaches, underlying theory and results.</p> | |
| | <p>Soft skills:</p> <p>The student can handle the formal requirements associated to a research paper: investigating the research context, collecting material from the scientific literature, performing and processing bibliographical inquiries, presenting own ideas in the scientific environment of the given topic.</p> | |

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| 6 | Relevant Work: | | |
| | Number and Type; Connection to Course | Duration | Part of final mark in % |
| | Master thesis | See § 10 | 83 |
| | Master thesis' defence | ca. 45 min, see § 10 | 17 |

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| 7 | <p>Prerequisites for Credit Points: The points for the module will be credited if the module was successfully completed in total, i.e. the student has passed all examinations.</p> |
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| 8 | Module Prerequisites: Master thesis topics can only be assigned on the condition that the student has already earned a total of 60 credits. For the Master thesis defense, additionally to the submission of the Master thesis, completing the curriculum up to defending the Master thesis shall be the precondition for being eligible to conduct the defense. The curriculum is completed once all the study modules have been completed, see § 10. |
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| 9 | Presence: |
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| 10 | Responsible Lecturer: Prof. Dr. Jörg Becker; Prof. Dr. Joep Crompvoets, Prof. Dr. Robert Krimmer |
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| 11 | Misc.: |
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**Zweite Ordnung
zur Änderung der Prüfungsordnung für
den Bachelorstudiengang Informatik an der
Westfälischen Wilhelms-Universität vom 10. Juni 2014
vom 28. Januar 2019**

Aufgrund der §§ 2 Abs. 4, 64 Abs. 1 des Gesetzes über die Hochschulen des Landes Nordrhein-Westfalen (Hochschulgesetz - HG) in der Fassung des Hochschulzukunftsgesetzes vom 16.09.2014 (GV NRW, S. 547) hat die Westfälische Wilhelms-Universität folgende Ordnung erlassen:

Artikel I

Die Prüfungsordnung für den Bachelorstudiengang Informatik an der Westfälischen Wilhelms-Universität vom 10. Juni 2014 (AB Uni 26/2014, S. 1657 ff.), zuletzt geändert durch die Erste Änderungsordnung vom 18. Juli 2017 (AB Uni 22/2017, S. 1895 ff.), wird wie folgt geändert:

1. § 7 Absatz 1 erhält folgende neue Fassung:

„(1) Das Bachelorstudium im Studiengang Informatik umfasst neben der Bachelorarbeit das Studium folgender Module sowie eines Nebenfachs nach § 7a nach näherer Bestimmung durch die als Anhang beigefügten Modulbeschreibungen, die Teil dieser Prüfungsordnung sind:

- Pflichtmodule
 - INF-B-101 (Informatik 1: Grundlagen der Programmierung, 12 LP)
 - INF-B-102 (Informatik 2: Algorithmen und Datenstrukturen, 9 LP)
 - INF-B-103 (Theoretische Grundlagen der Informatik, 12 LP)
 - INF-B-104 (Softwareentwicklung, 6 LP)
 - INF-B-105 (Softwarepraktikum, 9 LP)
 - INF-B-106 (Rechnerstrukturen und Betriebssysteme, 15 LP)
 - INF-B-107 (Datenbanken, 7 LP)
 - INF-B-110 (Projektseminar, 10 LP)
 - INF-B-150 (Bachelor-Abschluss-Modul, 15 LP, inkl. Bachelorarbeit)

- Wahlpflichtmodule

- Wahlpflichtbereich Mathematische Grundlagen der Informatik

Eines der beiden Module INF-B-140 bzw. INF-B-141 muss absolviert werden:

- INF-B-140 (Mathematische Grundlagen der Informatik A, 20 LP), muss bei Wahl eines nicht-mathematischen Nebenfachs absolviert werden.

- INF-B-141 (Mathematische Grundlagen der Informatik B, 20 LP), muss bei Wahl des Nebenfachs Mathematik gewählt werden.
 - Wahlpflichtbereich Praktische Informatik (6 LP)
 - Eines der Module INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125.
 - Wahlpflichtbereich Formale Methoden (6 LP)
 - Eines der Module INF-B-130, INF-B-131, INF-B-132, INF-B133.
 - Pflichtmodul Allgemeine Studien (13 LP)
 - Veranstaltungen im Umfang von 13 LP aus dem Veranstaltungsangebot „Allgemeine Studien“ der Westfälischen Wilhelms-Universität Münster, die weder aus dem Angebot des Instituts für Informatik noch aus dem Angebot des für das Nebenfach/die Nebenfächer zuständigen Fachbereichs stammen. Über die Zulassung von Veranstaltungen des Zentrums für Informationsverarbeitung entscheidet die/der Prüfungsbeauftragte.“
- 2. Die im Anhang der Prüfungsordnung aufgeführten Modulbeschreibungen werden wie folgt geändert:**

a) Das Modul INF-B-120 „Einführung in die Computergraphik“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Einführung in die Computergraphik |
| Modultitel englisch: | <i>Introduction to Computer Graphics</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-120 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4 oder 6 | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 45 / 3 | 75 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 2 | 15 / 1 | 45 |

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| 4 | <p>Lehrinhalte:</p> <p>Dieses Modul vermittelt theoretische und praktische Grundlagen der Computergraphik, wobei effizientes und realistisches Rendern dreidimensionaler Szenen im Mittelpunkt steht. Es werden die folgenden Themen behandelt: Geometrische Transformationen und Projektionen, Rastergrafikalgorithmen, lokale und globale Beleuchtung, Schattierung, Farbmodelle und Texturen. Von praktischer Seite wird in die Grafikprogrammierung mit OpenGL inklusive Shaderprogrammierung eingeführt.</p> |
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| 5 | <p>Erworbene Kompetenzen:</p> <p>Die Teilnehmer beherrschen die grundlegenden Konzepte und Algorithmen der Computergraphik und können mit Hilfe von OpenGL einfache Graphikanwendungen erstellen.</p> |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls:</p> <p>keine</p> |
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| 7 | <p>Leistungsüberprüfung:</p> <p><input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | <p>Prüfungsleistung/en:</p> <p>Anzahl und Art; Anbindung an Lehrveranstaltung¹</p> | <p>Dauer bzw. Umfang</p> | <p>Gewichtung für die Modulnote in %</p> |
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¹ Entfällt bei Modulabschlussprüfung

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| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine | | |
| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Geoinformatik (B.Sc.), Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Lars Linsen | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Praktische Informatik“. Von den Modulen dieses Wahlbereichs (INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125) ist eines erfolgreich zu absolvieren. | | |

b) Das Modul INF-B-121 „Einführung in die Bildverarbeitung“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Einführung in die Bildverarbeitung |
| Modultitel englisch: | <i>Introduction to Image Processing</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-121 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. oder 6. | LP: 6 | Workload (h): 180 |
|----------|---|--|-----------------------------|--------------|--------------------------|

| 3 | Modulstruktur: | | | | | | |
|----------|-----------------------|-----|------------------------------------|---|----|-------------------|-------------------|
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung (mit integrierter Übung) | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 6 | 60 / 4 | 120 |

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| 4 | Lehrinhalte: Das Modul vermittelt die Konzepte und Grundlagen der digitalen Bildverarbeitung und gibt eine praxisbezogene Einführung in grundlegende Algorithmen. Es werden folgende Themen vorgestellt: Filterungsoperationen, geometrische Bildtransformationen, Registrierung, Binärisierung und Verarbeitung von Binärbildern, morphologische Bildverarbeitung, Fourier-Transformation und Bildverarbeitung im Frequenzraum, Kompression, Wavelets, Digitale Wasserzeichen. |
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| 5 | Erworbene Kompetenzen: <ul style="list-style-type: none"> - Beherrschung der wichtigsten Algorithmen zur Bildverarbeitung - Fähigkeit, die erlernten Prinzipien und Methoden in der Praxis einzusetzen |
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| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: (entfällt) |
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| 7 | Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) |
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| 8 | Prüfungsleistung/en: | | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung ² | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | Klausur; Anbindung an (1) | 1,5 h | 100% |

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| 9 | Studienleistungen: |
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² Entfällt bei Modulabschlussprüfung

| | | |
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| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang |
| | Zu (1): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der integrierten Übungen |

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| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. |
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| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. |
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| 12 | Modulbezogene Teilnahmevoraussetzungen: keine |
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| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. |
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| 14 | Verwendbarkeit in anderen Studiengängen: Geoinformatik (B.Sc.), Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) |
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| 15 | Modulbeauftragte/r: Prof. Dr. Xiaoyi Jiang | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik |
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| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Praktische Informatik“. Von den Modulen dieses Wahlbereichs (INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125) ist eines erfolgreich zu absolvieren. |
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c) Das Modul INF-B-122 „Einführung in parallele und verteilte Systeme“ erhält folgende neue Fassung:

| | |
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| Modultitel deutsch: | Einführung in parallele und verteilte Systeme |
| Modultitel englisch: | <i>Introduction to Parallel and Distributed Systems</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-122 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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|----------|---|--|-----------------------------|--------------|--------------------------|
| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. oder 6. | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 45 / 3 | 75 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 2 | 15 / 1 | 45 |

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| 4 | <p>Lehrinhalte: Das Modul gibt eine Einführung auf dem Gebiet „Parallele und Verteilte Systeme“. Die Schwerpunkte liegen auf einem oder mehreren der folgenden Teilgebiete:</p> <ul style="list-style-type: none"> - Architekturen moderner Parallelrechner und verteilter Systeme; - Aktuelle Programmieransätze für parallele und verteilte Systeme; - Formale Modelle und Sprachen zur Beschreibung und Überprüfung wichtiger Eigenschaften paralleler und nebenläufiger Systeme; - Leistungsmodelle und Vorhersage der Performance; - Multithreading und Networking Konzepte in Programmiersprachen, z.B. Java; - Programmierung von Systemen mit multi-core Prozessoren und GPUs; - Verteilte und Internet-basierte Anwendungen. |
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| 5 | <p>Erworbene Kompetenzen: Ziel des Moduls ist die Erlangung einiger der folgenden Fähigkeiten:</p> <ul style="list-style-type: none"> - moderne parallele und Mehrkern-Architekturen zu vergleichen, - wichtigste Konzepte zur Synchronisation nebenläufiger Prozesse anwenden zu können, - einfache parallele und verteilte Anwendungen zu designen und implementieren, - gegenwärtige Prinzipien und Trends im Hochleistungsrechnen zu verstehen. |
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| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: (entfällt) |
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| 7 | Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) |
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| 8 | Prüfungsleistung/en: | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung ³ | Dauer bzw. Umfang |
| | Klausur; Anbindung an (1) | 1,5 h |
| 9 | Studienleistungen: | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: | |
| | Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: | |
| | Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: | |
| | keine | |
| 13 | Anwesenheit: | |
| | Es besteht keine Anwesenheitspflicht. | |
| 14 | Verwendbarkeit in anderen Studiengängen: | |
| | Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | |
| 15 | Modulbeauftragte/r: | Zuständiger Fachbereich: |
| | Prof. Dr. Sergei Gorlatch | Fachbereich 10 – Mathematik und Informatik |
| 16 | Sonstiges: | |
| | Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | |
| | Dieses Modul gehört zum Wahlbereich „Praktische Informatik“. Von den Modulen dieses Wahlbereichs (INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125) ist eines erfolgreich zu absolvieren. | |

³ Entfällt bei Modulabschlussprüfung

d) Das Modul INF-B-123 „Computernetze und ihre Leistung“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Computernetze und ihre Leistung |
| Modultitel englisch: | <i>Computer Networks and their performance</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-123 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4 oder 6 | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 45 / 3 | 75 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 2 | 15 / 1 | 45 |

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| 4 | <p>Lehrinhalte: Dieses Modul vermittelt theoretische und praktische Grundlagen von Computernetzen. Es werden Netzwerkprotokolle für die verschiedenen Schichten eingeführt. Neben praktischen Anwendungen steht insbesondere die Leistungsbewertung von verschiedenen Protokollvarianten im Vordergrund. Hierzu werden die Grundideen von Warteschlangentheorie und Simulation vermittelt.</p> |
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| 5 | <p>Erworbene Kompetenzen: Die Teilnehmer können das Zusammenspiel der unterschiedlichen Kommunikationsschichten erklären und beherrschen die verschiedenen Kommunikationsprotokolle. Weiterhin können Wartezeiten und Durchsatz mit einfachen Warteschlangenmodellen abgeschätzt und oder simuliert werden.</p> |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: keine</p> |
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| 7 | <p>Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | <p>Prüfungsleistung/en: Anzahl und Art; Anbindung an Lehrveranstaltung⁴</p> | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
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⁴ Entfällt bei Modulabschlussprüfung

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| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine | | |
| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Anne Remke | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| | | | |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | | |
| | Dieses Modul gehört zum Wahlbereich „Praktische Informatik“. Von den Modulen dieses Wahlbereichs (INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125) ist eines erfolgreich zu absolvieren. | | |

e) Das Modul INF-B-124 „Eingebettete Systeme“ wird neu hinzugefügt:

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| Modultitel deutsch: | Eingebettete Systeme |
| Modultitel englisch: | <i>Embedded Systems</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-124 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. oder 6. | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 3 | 30 / 2 | 60 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 3 | 30 / 2 | 60 |

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| 4 | <p>Lehrinhalte:</p> <p>Über 98% aller programmierbaren Prozessoren werden in eingebetteten Systemen eingesetzt. Das Modul gibt eine Einführung in das Gebiet „Eingebettete Systeme“. Die Schwerpunkte liegen auf einem oder mehreren folgender Teilgebiete:</p> <ul style="list-style-type: none"> - Besonderheiten und Definition eingebetteter Systeme; - Formale Modelle und Sprachen zur Spezifikation eingebetteter Systeme; - Programmiermethoden für eingebettete Systeme; - Hardware/Software-Co-Design und Synthese eingebetteter Systeme; - Software- und System-Architekturen moderner eingebetteter und cyber-physischer Systeme; |
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| 5 | <p>Erworbene Kompetenzen:</p> <p>Ziel des Moduls ist die Fähigkeit,</p> <ul style="list-style-type: none"> - Methoden und Techniken, mit denen eingebettete Systeme korrekt, zuverlässig und effizient entwickelt werden können, zu beherrschen und - die Besonderheiten von eingebetteten Systemen zu erläutern und geeignete Spezifikations- und Programmiersprachen anzuwenden. |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls:</p> <p>keine</p> |
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| 7 | <p>Leistungsüberprüfung:</p> <p><input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | Prüfungsleistung/en: |
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| | Anzahl und Art; Anbindung an Lehrveranstaltung ⁵ | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine | | |
| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Geoinformatik (B.Sc.), Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Paula Herber | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Praktische Informatik“. Von den Modulen dieses Wahlbereichs (INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125) ist eines erfolgreich zu absolvieren. | | |

⁵ Entfällt bei Modulabschlussprüfung

f) Das Modul INF-B-125 „Data Mining“ wird neu hinzugefügt:

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| Modultitel deutsch: | Data Mining |
| Modultitel englisch: | Data Mining |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-125 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. oder 6. | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 45 / 3 | 75 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 2 | 15 / 1 | 45 |

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| 4 | <p>Lehrinhalte:</p> <p>Das Modul gibt eine Einführung in die Konzepte und Techniken aus dem Bereich Data Mining. Die Inhalte sind wie folgt:</p> <ol style="list-style-type: none"> 1. Einleitung: KDD Prozess, Data Mining Aufgaben 2. Daten und Data Warehouse: Datenvorverarbeitung, Generalisierung und Konzeptbeschreibung, OLAP, usw. 3. Frequent Pattern Mining: Verfahren zum Finden von häufigen Assoziationsregeln, Apriori-Algorithmus, FP-Growth-Algorithmus, usw. 4. Clustering: partitionierende, dichtebasierte und hierarchische Clustering-Algorithmen, usw. 5. Klassifikation: Nächste-Nachbarn-, Lineare-, Bayes-, SVM-Klassifikationsmodelle, Entscheidungsbäume |
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| 5 | <p>Erworbene Kompetenzen:</p> <p>Kenntnisse:</p> <ul style="list-style-type: none"> • Kenntnis grundlegender Konzepte und Methoden des Data Mining für große Datenbanken • Kenntnis der Funktionalität und Leistungsfähigkeit von Algorithmen zum Data Mining <p>Fähigkeiten / Kompetenzen:</p> <ul style="list-style-type: none"> • Fähigkeit, Data Mining-Lösungen für theoretische und praktische Anwendungen zu analysieren und zu bewerten sowie Algorithmen zu deren Lösung zielgerichtet einzusetzen. |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls:</p> <p>keine</p> |
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| 7 | <p>Leistungsüberprüfung:</p> <p><input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | Prüfungsleistung/en: |
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| | Anzahl und Art; Anbindung an Lehrveranstaltung ⁶ | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d. h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine | | |
| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Geoinformatik (B.Sc.), Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Christian Becks | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Praktische Informatik“. Von den Modulen dieses Wahlbereichs (INF-B-120, INF-B-121, INF-B-122, INF-B-123, INF-B-124, INF-B-125) ist eines erfolgreich zu absolvieren. Dieses Modul kann nur gewählt werden, wenn im Wahlbereich „Formale Methoden“ nicht gleichzeitig das Modul INF-B-133 gewählt wird. | | |

⁶ Entfällt bei Modulabschlussprüfung

g) Das Modul INF-B-130 „Effiziente Algorithmen“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Effiziente Algorithmen |
| Modultitel englisch: | <i>Efficient Algorithms</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-130 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. oder 6. | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
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| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 45 / 3 | 75 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 2 | 15 / 1 | 45 |

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| 4 | <p>Lehrinhalte:</p> <p>Aufbauend auf bzw. in Ergänzung zu den im Modul „Algorithmen und Datenstrukturen“ behandelten Problemlösungsstrategien werden sowohl Verfahren zur Lösung weiterer Problemstellungen, z.B. im Bereich der Verarbeitung von Zeichenketten oder Graphen behandelt als auch Entwurfs- und Analysetechniken wie approximative oder randomisierte Ansätze behandelt.</p> |
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| 5 | <p>Erworbene Kompetenzen:</p> <p>Ziel des Moduls ist die Fähigkeit,</p> <ul style="list-style-type: none"> - Entwurfs- und Analysetechniken für Algorithmen und Datenstrukturen zu beherrschen und - Problemstellungen aus theoretischen und praktischen Anwendungen zu analysieren und Algorithmen zu deren Lösung zielgerichtet einzusetzen. |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls:</p> <p>keine</p> |
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| 7 | <p>Leistungsüberprüfung:</p> <p><input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | <p>Prüfungsleistung/en:</p> <p>Anzahl und Art; Anbindung an Lehrveranstaltung⁷</p> | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
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⁷ Entfällt bei Modulabschlussprüfung

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| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: Erfolgreiche Absolvierung des Moduls INF-B-102 (Algorithmen und Datenstrukturen) | | |
| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Geoinformatik (B.Sc.), Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Jan Vahrenhold | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Formale Methoden“. Von den Modulen dieses Wahlbereichs (INF-B-130, INF-B-131, INF-B-132, INF-B-133) ist eines erfolgreich zu absolvieren. | | |

h) Das Modul INF-B-131 „Formale Methoden der Softwareentwicklung“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Formale Methoden der Softwareentwicklung |
| Modultitel englisch: | <i>Formal Methods in Software Engineering</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-131 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4 oder 6 | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 45 / 3 | 75 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 2 | 15 / 1 | 45 |

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| 4 | <p>Lehrinhalte:</p> <p>Ausgewählte Themen aus dem Gebiet der Formalen Methoden der Softwareentwicklung werden in der Vorlesung vorgestellt und in der Übung vertieft. Der mathematische Hintergrund der vorgestellten Methoden wird behandelt und ihre praktische Anwendung wird anhand prototypischer Beispiele diskutiert. Mögliche Themen sind u.a.: Petrinetze und ihre Analyse, Methoden zur formalen Spezifikation des funktionalen Verhaltens, Programmverifikation, Programmanalyse, Semantik von Programmiersprachen, automatisches Theorembeweisen.</p> |
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| 5 | <p>Erworbene Kompetenzen:</p> <p>Die Teilnehmer kennen den mathematischen Hintergrund der in der Veranstaltung behandelten Methoden und können sie auf praktische Beispiele anwenden. Sie sind in der Lage, einfache Aussagen über die Methoden zu beweisen und sie auf veränderte Anwendungskontexte zu adaptieren,</p> <p>Das Modul bereitet auf ein in der Regel im Folgesemester stattfindendes Projektseminar vor, in dem die behandelten Themengebiete vertieft oder weitere Themengebiete erarbeitet werden. Der Zyklus bestehend aus diesem Modul und dem anschließenden Projektseminar bereitet auf eine Bachelorarbeit auf dem Gebiet der Formalen Methoden vor.</p> |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls:</p> <p>keine</p> |
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| 7 | <p>Leistungsüberprüfung:</p> <p><input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | Prüfungsleistung/en: |
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| | Anzahl und Art; Anbindung an Lehrveranstaltung ⁸ | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Zu (2): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der Übungen | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine | | |
| 13 | Anwesenheit: Die Anwesenheit in Vorlesung und Übung wird dringend empfohlen. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Markus Müller-Olm | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| 16 | Sonstiges: Die Zulassung zur Modulprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Formale Methoden“. Von den Modulen dieses Wahlbereichs (INF-B-130, INF-B-131, INF-B-132, INF-B-133) ist eines erfolgreich zu absolvieren. | | |

⁸ Entfällt bei Modulabschlussprüfung

i) Das Modul INF-B-132 „Compilerbau“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Compilerbau |
| Modultitel englisch: | <i>Compiler Construction</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-132 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4 oder 6 | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur | | | | | | |
|----------|----------------------|-----|-----------------------------|---|----|-------------------|-------------------|
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung mit integr. Übung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 6 | 60 / 4 | 120 |

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| 4 | <p>Lehrinhalte:</p> <p>Die Vorlesung behandelt zunächst klassische Themen der Syntaxanalyse:</p> <ul style="list-style-type: none"> • Chomsky-Hierarchie • lexikalische Analyse mit regulären Ausdrücken • syntaktische Analyse mit kontextfreien Grammatiken • allgemeine Analysemethoden • LL(k) und LR(k)-Verfahren <p>Danach werden attributierte Grammatiken eingeführt und es wird konkret auf die Codeerzeugung für einige Architekturen eingegangen.</p> |
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| 5 | <p>Erworbene Kompetenzen:</p> <p>Die Studierenden können Grammatiken existierender Programmiersprachen flüssig verstehen und eigene Grammatiken und Übersetzungsschemata für kleinere Sprachen schnell angeben. Sie können Konflikte bei der Sprachdefinition sinnvoll beseitigen und haben ein grundsätzliches Verständnis der Probleme, abstraktere Sprachen auf einfachere Architekturen abzubilden. Sie besitzen ein vertieftes Verständnis der Semantik von Programmiersprachen.</p> |
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| 6 | <p>Beschreibung von Wahlmöglichkeiten innerhalb des Moduls:</p> <p>keine</p> |
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| 7 | <p>Leistungsüberprüfung:</p> <p><input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP)</p> |
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| 8 | <p>Prüfungsleistung/en:</p> <p>Anzahl und Art; Anbindung an Lehrveranstaltung⁹</p> | <p>Dauer bzw. Umfang</p> | <p>Gewichtung für die Modulnote in %</p> |
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⁹ Entfällt bei Modulabschlussprüfung

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| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 20-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 90 Min. | 100 % |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Wöchentliche Aufgabenzettel | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine | | |
| 13 | Anwesenheit: Die Anwesenheit in den Lehrveranstaltungen wird dringend empfohlen. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | | |
| 15 | Modulbeauftragte/r: Prof. Dr. Xiaoyi Jiang / Dr. Dietmar Lammers | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik | |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Formale Methoden“. Von den Modulen dieses Wahlbereichs (INF-B-130, INF-B-131, INF-B-132, INF-B-133) ist eines erfolgreich zu absolvieren. | | |

j) Das Modul INF-B-133 „Mustererkennung und Maschinelles Lernen“ wird neu hinzugefügt:

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| Modultitel deutsch: | Mustererkennung und Maschinelles Lernen |
| Modultitel englisch: | <i>Pattern Recognition and Machine Learning</i> |
| Studiengang: | Bachelor of Science Informatik |

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| 1 | Modulnummer: INF-B-133 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: Nach Bedarf, im Sommersemester | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. oder 6. | LP: 6 | Workload (h): 180 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung (mit integrierter Übung) | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 6 | 60 / 4 | 120 |

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| 4 | Lehrinhalte: Methoden der Mustererkennung und des maschinellen Lernens sind zentraler Gegenstand der Forschung im Bereich künstlicher Intelligenz und werden bereits vielfältig praktisch eingesetzt. Die Vorlesung behandelt Konzepte und Algorithmen zu die Kernthemen Klassifikation, Regression, Dimensionsreduktion und Clustering. Neben etablierten Themen wird auch auf die neuesten Entwicklungen wie Deep Learning eingegangen. |
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| 5 | Erworbenene Kompetenzen: <ul style="list-style-type: none"> • Verständnis der theoretischen Grundlagen der Algorithmen • Fähigkeit, praktische Problemstellungen zu abstrahieren und diese Algorithmen zum Problemlösen anzuwenden. |
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| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: keine |
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| 7 | Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) |
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| 8 | Prüfungsleistung/en: Anzahl und Art; Anbindung an Lehrveranstaltung ¹⁰ | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | Klausur; Anbindung an (1) Bei geringer Teilnehmerzahl kann die Prüferin/der Prüfer anstelle einer Klausur eine 30-minütige mündliche Prüfung stellen, diese Änderung der Prüfungsart wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. | 1,5 h | 100% |

¹⁰ Entfällt bei Modulabschlussprüfung

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| 9 | Studienleistungen: | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang |
| | Zu (1): Lösen von Übungsaufgaben, Vorstellen und Diskussion der Ergebnisse | Aufgabenzettel im Turnus der integrierten Übungen |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d. h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: Das Modul wird bei der Bildung der Gesamtnote mit einem Gewicht von 6/158 herangezogen. | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: Es bestehen keine Teilnahmevoraussetzungen. | |
| 13 | Anwesenheit: Es besteht keine Anwesenheitspflicht. | |
| 14 | Verwendbarkeit in anderen Studiengängen: Geoinformatik (B.Sc.), Informatik (ZFB), Mathematik (B.Sc., Nf. Informatik), Mathematik (M.Sc., Nf. Informatik), Physik (B.Sc., Nf. Informatik) | |
| 15 | Modulbeauftragte/r: Prof. Dr. Xiaoyi Jiang und JProf. Dr. Benjamin Risse | Zuständiger Fachbereich: Fachbereich 10 – Mathematik und Informatik |
| 16 | Sonstiges: Die Zulassung zur Modulabschlussprüfung kann nach Maßgabe der Prüferin/des Prüfers von der Erbringung der Studienleistungen abhängig gemacht werden. Eine solche Regelung wird rechtzeitig zu Beginn des Moduls in geeigneter Weise bekannt gegeben. Dieses Modul gehört zum Wahlbereich „Formale Methoden“. Von den Modulen dieses Wahlbereichs (INF-B-130, INF-B-131, INF-B-132, INF-B-133) ist eines erfolgreich zu absolvieren. Dieses Modul kann nur gewählt werden, wenn im Wahlbereich „Praktische Informatik“ nicht gleichzeitig das Modul INF-B-125 gewählt wird. | |

k) Das Modul INF-B-NF-Math-104 „Wahlbereich Mathematik“ erhält folgende neue Fassung:

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| Modultitel deutsch: | Wahlbereich Mathematik |
| Modultitel englisch: | <i>Mathematics</i> |
| Studiengang: | Nebenfach Mathematik im <i>Bachelor of Science</i> Informatik |

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| 1 | Modulnummer: INF-B-NF-Math-104 | Status: <input checked="" type="checkbox"/> Pflichtmodul <input type="checkbox"/> Wahlpflichtmodul |
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| 2 | Turnus: <input type="checkbox"/> jedes Sem. <input type="checkbox"/> jedes WS <input checked="" type="checkbox"/> jedes SS | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4. | LP: 10 | Workload (h): 300 |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 2. | Ü | Übungen | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 30 (2 SWS) | 120 |

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| 4 | Lehrinhalte: Die Studierenden wählen eigenverantwortlich eine fachwissenschaftliche Lehrveranstaltung (Vorlesung mit zugehörigen Übungen) im Umfang von 6 SWS aus dem Angebot der Veranstaltungen des Studiengänge <i>Bachelor of Science</i> Mathematik oder Zwei-Fach-Bachelor Mathematik. Diese Veranstaltungen werden mit 10 LP kreditiert. Wurde im Rahmen des Moduls INF-B-141 (Mathematische Grundlagen der Informatik B) die Veranstaltung „Analysis I“ an Stelle von „Analysis für Informatiker“ gewählt, so kann hier die Veranstaltung „Analysis II“ mit den zugehörigen Übungen gewählt werden. |
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| 5 | Erworbene Kompetenzen: Die Studierenden erwerben je nach gewählter Veranstaltung die in den entsprechenden Modulbeschreibungen ausgewiesenen fach- und methodenbezogenen Kompetenzen. |
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| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: Der Fachbereich behält sich vor, zusätzlich zum Angebot geeigneter 4+2-Veranstaltungen z. B. zur Algebra oder Analysis (d. h. 4 SWS Vorlesung + 2 SWS Übungen) auch geeignete 2+1-Veranstaltungen anzubieten, so dass jeweils zwei solcher Veranstaltungen anstelle einer 4+2-Veranstaltung gewählt werden können. |
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| 7 | Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) |
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| 8 | Prüfungsleistung/en: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
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| | <p>Klausur, es stehen vier Prüfungsversuche zur Verfügung; Anbindung an (1).</p> <p>In Ausnahmefällen (etwa bei geringer Teilnehmerzahl) oder im Wiederholungsfall kann die Klausur nach Maßgabe des Dozenten/der Dozentin durch eine 20-minütige mündliche Prüfung ersetzt werden. Solch ein Wechsel der Prüfungsform wird von der Dozentin/dem Dozenten rechtzeitig in geeigneter Weise bekannt gegeben.</p> <p>Im Fall einer Kombination zweier 2+1-Veranstaltungen anstelle einer 4+2-Veranstaltung wird eine Klausur oder eine 20-minütige mündliche Prüfung über beide Teilgebiete angeboten.</p> | 2-3 h | 100% |
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| 9 | <p>Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung</p> | Dauer bzw. Umfang |
| | <p>Zu (2): Erfolgreiches Bearbeiten von in der Regel wöchentlichen Übungsaufgaben in dem vom jeweiligen Dozenten geforderten Umfang. Das beinhaltet auch, dass die Präsentation der Ergebnisse in den Übungen eingefordert werden kann.</p> <p>In der Regel wird die Teilnahme an der Klausur von der erfolgreichen Bearbeitung der Übungsaufgaben im geforderten Umfang abhängig gemacht; dies und der geforderte Umfang werden rechtzeitig zu Beginn der Veranstaltung in geeigneter Weise bekannt gegeben.</p> | |
| 10 | <p>Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d. h. alle Prüfungsleistungen und Studienleistungen bestanden wurden.</p> | |

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| 11 | <p>Gewichtung der Modulnote für die Bildung der Nebenfach- bzw. Gesamtnote: Das Modul wird bei der Bildung der Nebenfachnote mit einem Gewicht von 10/40 herangezogen.</p> | |
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| 12 | <p>Modulbezogene Teilnahmevoraussetzungen: keine</p> | |
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| 13 | <p>Anwesenheit: Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten.</p> | |
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| 14 | <p>Verwendbarkeit in anderen Studiengängen:</p> | |
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| 15 | <p>Modulbeauftragte/r: Die beteiligten Dozent/inn/en und der/die Studiengangsbeauftragte</p> | <p>Zuständiger Fachbereich: Fachbereich 10</p> |
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| 16 | <p>Sonstiges: Ausgeschlossen für dieses Modul sind Lehrveranstaltungen, die im Rahmen anderer Pflichtmodule des Haupt- oder Nebenfachs, insbesondere im Rahmen der Module INF-B-141, INF-B-NF-Math-101, INF-B-NF-Math-102 oder INF-B-NF-Math-103, eingebracht werden können.</p> | |
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Artikel II

(1) Diese Änderungsordnung tritt am Tage nach ihrer Veröffentlichung in den Amtlichen Bekanntmachungen der Westfälischen Wilhelms-Universität (AB Uni) in Kraft.

(2) Diese Änderungsordnung gilt für alle Studierenden, die ab dem Sommersemester 2019 in den Bachelorstudiengang Informatik eingeschrieben werden. Diese Änderungsordnung gilt ebenso für alle Studierenden, die vor dem Sommersemester 2019 in den Bachelorstudiengang Informatik eingeschrieben wurden und nach der Prüfungsordnung für den Bachelorstudiengang Informatik vom 10. Juni 2014 studieren; in Bezug auf das durch diese Änderungsordnung geänderte Modul INF-B-NF-Math-104 jedoch nur, wenn und soweit sie dieses Modul vor dem Inkrafttreten dieser Änderungsordnung gemäß Absatz 1 noch nicht begonnen haben.

Ausgefertigt aufgrund des Beschlusses des Fachbereichsrats des Fachbereichs Mathematik und Informatik der Westfälischen Wilhelms-Universität vom 9. Januar 2019. Die vorstehende Ordnung wird hiermit verkündet.

Münster, den 28. Januar 2019

Der Rektor

Prof. Dr. Johannes W e s s e l s

Zweite Ordnung
zur Änderung der Prüfungsordnung für
den Bachelorstudiengang Mathematik an der
Westfälischen Wilhelms-Universität vom 10. Juni 2014
vom 28. Januar 2019

Aufgrund der §§ 2 Abs. 4, 64 Abs. 1 des Gesetzes über die Hochschulen des Landes Nordrhein-Westfalen (Hochschulgesetz – HG) in der Fassung des Hochschulzukunftsgesetzes vom 16.09.2014 (GV NRW 2014, S. 547) hat die Westfälische Wilhelms-Universität folgende Ordnung erlassen:

Artikel I

Die Prüfungsordnung für den Bachelorstudiengang Mathematik an der Westfälischen Wilhelms-Universität vom 10. Juni 2014 (AB Uni 27/2014, S. 1829 ff.), zuletzt geändert durch die Erste Änderungsordnung vom 5. September 2016 (AB Uni 36/2016, S. 2680 ff.), wird wie folgt geändert:

1. § 10 erhält folgenden neuen Absatz 8:

„(8) Studienleistungen zur Numerik-Veranstaltung, die im Grundlagenerweiterungsmodul M6 erbracht wurden, können in die Vertiefungsmodule M8-4 oder M8-6 umgebucht werden, sofern noch keine Modulprüfung in der entsprechenden Numerik-Veranstaltung im Grundlagenerweiterungsmodul abgelegt wurde. Eine Umbuchung im Sinne von Satz 1 ist jedoch nur zulässig, wenn es sich bei der für das Vertiefungsmodul zu erbringenden Leistung ebenfalls um eine Studienleistung handelt.“

2. § 10 erhält folgenden neuen Absatz 9:

„(9) Studienleistungen in Form von Übungen zur Numerischen Linearen Algebra oder Numerischen Analysis, die in den Vertiefungsmodulen M8-4 oder M8-6 erbracht wurden, können in das Grundlagenerweiterungsmodul M6 umgebucht werden, sofern noch nicht die in den Vertiefungsmodulen M8-4 und M8-6 ebenfalls vorgesehene Studienleistung in Form der 2- bis 3-stündigen Klausur zu der entsprechenden Numerik-Veranstaltung abgelegt wurde. Eine Umbuchung im Sinne von Satz 1 ist jedoch nur zulässig, wenn es sich bei der für das Grundlagenerweiterungsmodul zu erbringenden Leistung ebenfalls um eine Studienleistung handelt.“

3. Die im Anhang der Prüfungsordnung aufgeführten Modulbeschreibungen werden wie folgt geändert:

a) Das Modul M7-3 „Vertiefungsmodul Höhere Algebra“ erhält folgende neue Fassung:

| | | | | | | | |
|--|---|--|---|---|-----------------------------------|--------------------------|--------------------------|
| Modultitel deutsch: Vertiefungsmodul Höhere Algebra | | | | | | | |
| Modultitel englisch: Advanced module Algebra | | | | | | | |
| Studiengang: Bachelor of Science Mathematik | | | | | | | |
| | | | | | | | |
| 1 | Modulnummer: M7-3 | | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul | | | | |
| | | | | | | | |
| 2 | Turnus: <input type="checkbox"/> jedes Sem. <input checked="" type="checkbox"/> jedes WS <input type="checkbox"/> jedes SS | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 5 | LP: 10 | Workload (h): 300 | | |
| | | | | | | | |
| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung Höhere Algebra I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 2. | Ü | Übungen zu Höhere Algebra I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 30 (2 SWS) | 120 |
| | | | | | | | |
| 4 | Lehrinhalte: Die Themengebiete können je nach Ausrichtung variieren, umfassen jedoch in der Regel: Kategorien, Funktoren, universelle Objekte, Adjunktion. Artinsche, Noethersche Ringe und Moduln. Sowie eine Weiterführung der Vorlesung zu Inhalten aus der kommutativen Algebra oder Artin-Wedderburn-Theorie und Darstellungstheorie endlicher Gruppen. | | | | | | |
| | | | | | | | |
| 5 | Erworbene Kompetenzen: Die Studierenden sollen fundierte Kenntnisse in Algebra erlangen, und sie sollen befähigt werden, die erlernten Methoden beim Lösen von Übungsaufgaben einzusetzen. Sie erhalten die nötigen fachlichen Grundlagen, um im Rahmen eines anschließenden Seminars/Bachelorarbeit die hier behandelten Methoden mathematisch korrekt anzuwenden und weitergehende Literatur selbstständig zu erarbeiten. | | | | | | |
| | | | | | | | |
| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: keine | | | | | | |
| | | | | | | | |
| 7 | Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) | | | | | | |
| | | | | | | | |
| 8 | Prüfungsleistung/en: Anzahl und Art; Anbindung an Lehrveranstaltung | | | Dauer bzw. Umfang | Gewichtung für die Modulnote in % | | |
| | 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung Die Art der Prüfungsleistung wird zu Beginn der Veranstaltung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | | | 2-3 Stunden/ 20-30 min | 100% | | |

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| 9 | Studienleistungen: | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang |
| | Bearbeiten von wöchentlichen Übungsaufgaben in einem vom Dozenten vorgegebenen Umfang. | |
| | Die Zulassung zur Klausur bzw. mündlichen Prüfung wird von der erfolgreichen Bearbeitung der Übungsaufgaben im geforderten Umfang abhängig gemacht; dies und der geforderte Umfang werden rechtzeitig zu Beginn der Veranstaltung in geeigneter Weise bekanntgegeben. | |
| | In der Regel müssen 40—50% der gestellten Übungsaufgaben richtig bearbeitet werden. | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: | |
| | Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: | |
| | 10 % | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: | |
| | keine (aber siehe auch 16) | |
| 13 | Anwesenheit: | |
| | Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten. | |
| 14 | Verwendbarkeit in anderen Studiengängen: | |
| | keine | |
| 15 | Modulbeauftragte/r: | Zuständiger Fachbereich: |
| | Urs Hartl | Fachbereich 10 |
| 16 | Sonstiges: | |
| | Erwartet werden fundierte Kenntnisse der Linearen Algebra und die Inhalte der Vorlesung Einführung in die Algebra. | |
| | Das Bestehen des Moduls eröffnet die Möglichkeit, eine Bachelorarbeit in dem Bereich der Algebra mit der entsprechenden Ausrichtung zu schreiben und liefert die fachliche Voraussetzung für die Teilnahme am Modul „Algebraische Spezialisierung“ im Masterstudiengang Mathematik des Fachbereichs. | |

b) Das Modul M7-5 „Kurzes Vertiefungsmodul Partielle Differentialgleichungen“ erhält folgende neue Fassung:

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|-----------------------------|--|---|---|---|-----------------------------|--------------------------|--------------------------|
| Modultitel deutsch: | | Kurzes Vertiefungsmodul Partielle Differentialgleichungen | | | | | |
| Modultitel englisch: | | Short Advanced Module Partial Differential Equations | | | | | |
| Studiengang: | | Bachelor of Science Mathematik | | | | | |
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| 1 | Modulnummer: M7-5 | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul | | | | | |
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| 2 | Turnus: <input type="checkbox"/> jedes Sem. <input type="checkbox"/> jedes WS <input checked="" type="checkbox"/> jedes SS | Dauer: <input checked="" type="checkbox"/> 1 Sem. <input type="checkbox"/> 2 Sem. | Fachsem.: 4 | LP: 10 | Workload (h): 300 | | |
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| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| 2. | Ü | Übungen zu Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 30 (2 SWS) | 120 | |
| | | | | | | | |
| 4 | Lehrinhalte: Lehrinhalte für partielle Differentialgleichungen: Grundtypen von partiellen Differentialgleichungen. Trennung der Variablen. Charakteristiken. Laplacegleichung und Lösung des Dirichletproblems. Mittelwertigenschaften harmonischer Funktionen. Maximumprinzipien. Sobolevräume, Distributionen. Variationsmethoden. Regularitätsfragen. Schwache Lösungen. Randwertprobleme für Evolutionsgleichungen (insbes. Wärmeleitungs- und Wellengleichung). Existenz- und Eindeutigkeitsfragen | | | | | | |
| | | | | | | | |
| 5 | Erworbene Kompetenzen: Die Studierenden sollen mit den Grundlagen der partiellen Differentialgleichungen vertraut gemacht werden, und sie sollen befähigt werden, die erlernten Methoden beim Lösen von Übungsaufgaben einzusetzen. Sie erhalten die nötigen fachlichen Grundlagen, um im Rahmen eines/r anschließenden Seminars/Bachelorarbeit die hier behandelten Methoden mathematisch korrekt anzuwenden und weitergehende Literatur selbstständig zu erarbeiten. | | | | | | |
| | | | | | | | |
| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: keine | | | | | | |
| | | | | | | | |
| 7 | Leistungsüberprüfung: <input checked="" type="checkbox"/> Modulabschlussprüfung (MAP) <input type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) | | | | | | |

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| 8 | Prüfungsleistung/en: | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang |
| | | Gewichtung für die Modulnote in % |
| | 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung | 2-3 Stunden/ 20-30 min |
| | Die Art der Prüfungsleistung wird zu Beginn der Veranstaltung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | 100% |
| Studienleistungen: | | |
| 9 | Anzahl und Art; Anbindung an Lehrveranstaltung | |
| | Dauer bzw. Umfang | |
| | Bearbeiten von wöchentlichen Übungsaufgaben in einem vom Dozenten vorgegebenen Umfang. | |
| | Die Zulassung zur Klausur bzw. mündlichen Prüfung wird von der erfolgreichen Bearbeitung der Übungsaufgaben im geforderten Umfang abhängig gemacht; dies und der geforderte Umfang werden rechtzeitig zu Beginn der Veranstaltung in geeigneter Weise bekanntgegeben.. | In der Regel müssen 40—50% der gestellten Übungsaufgaben richtig bearbeitet werden. |
| Voraussetzungen für die Vergabe von Leistungspunkten: | | |
| 10 | Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | |
| Gewichtung der Modulnote für die Bildung der Gesamtnote: | | |
| 11 | 10 % | |
| Modulbezogene Teilnahmevoraussetzungen: | | |
| 12 | keine (aber siehe auch 16) | |
| Anwesenheit: | | |
| 13 | Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten. | |
| Verwendbarkeit in anderen Studiengängen: | | |
| 14 | Die erworbenen Leistungspunkte können im Zweifachbachelor-Studiengang Mathematik angerechnet werden. Die Inhalte sind außerdem für Studierende im Masterstudium der Physik geeignet. | |
| Modulbeauftragte/r: | | |
| 15 | Angela Stevens und Benedikt Wirth | Zuständiger Fachbereich: Fachbereich 10 |
| Sonstiges: | | |
| 16 | Studierende sollten die Grundlagenmodule Analysis und die LA sowie das Grundlagenweiterungsmodul Angewandte Mathematik bestanden haben. Kenntnis der Analysis III wird dringend empfohlen. | |

Das Modul darf nicht mit den Vertiefungsmodulen „Partielle Differentialgleichungen und Höhere Numerik“ oder „Partielle Differentialgleichungen und Mathematische Modellierung“ oder „Partielle Differentialgleichungen und Angewandte Analysis“ kombiniert werden.

Das Bestehen des Moduls eröffnet die Möglichkeit, eine Bachelorarbeit in dem Bereich der Numerik oder der Partiellen Differentialgleichungen zu schreiben. Im letzten Fall wird auch Kenntnis in Mathematischer Modellierung empfohlen.

Die in diesem Modul erworbenen Kenntnisse ermöglichen die Teilnahme an den Spezialisierungsmodulen „Angewandte Mathematik“ oder „Wissenschaftliches Rechnen“ des Masterstudiengangs Mathematik.

c) Das Modul M8-4 „Vertiefungsmodul Partielle Differentialgleichungen und Höhere Numerik“ erhält folgende neue Fassung:

| | | | | | | | |
|-----------------------------|---|--|---|---|-------------------------|--------------------------|-----------------------------|
| Modultitel deutsch: | | Vertiefungsmodul Partielle Differentialgleichungen und Höhere Numerik | | | | | |
| Modultitel englisch: | | Partial Differential Equations and advanced Numerical Mathematics | | | | | |
| Studiengang: | | Bachelor of Science Mathematik | | | | | |
| 1 | Modulnummer: M8-4 | Status: <input type="checkbox"/> Pflichtmodul | | <input checked="" type="checkbox"/> Wahlpflichtmodul | | | |
| 2 | Turnus: | <input checked="" type="checkbox"/> jedes Sem. <input type="checkbox"/> jedes WS <input type="checkbox"/> jedes SS | Dauer: | <input type="checkbox"/> 1 Sem. <input checked="" type="checkbox"/> 2 Sem. | Fachsem.: 4-5 | LP: 18 | Workload (h): 540 |
| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 2. | Ü | Übungen zu Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 |
| | 3. | V | Vorlesung Numerische Lineare Algebra | <input type="checkbox"/> P <input checked="" type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 4. | Ü | Übungen zu Numerische Lineare Algebra | <input type="checkbox"/> P <input checked="" type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 |
| | 5. | V | Vorlesung Numerische Analysis | <input type="checkbox"/> P <input checked="" type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| 6. | Ü | Übungen zu Numerische Analysis | <input type="checkbox"/> P <input checked="" type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 | |
| 4 | Lehrinhalte: | | | | | | |
| | <p>Lehrinhalte für Partielle Differentialgleichungen I: Grundtypen von partiellen Differentialgleichungen. Trennung der Variablen. Charakteristiken. Laplacegleichung und Lösung des Dirichletproblems. Mittelwertigenschaften harmonischer Funktionen. Maximumprinzipien. Sobolevräume, Distributionen. Variationsmethoden. Regularitätsfragen. Schwache Lösungen. Randwertprobleme für Evolutionsgleichungen (insbes. Wärmeleitungs- und Wellengleichung). Existenz- und Eindeutigkeitsfragen</p> <p>Numerische Lineare Algebra: Grundlegende numerische Verfahren zur Lösung von linearen und nichtlinearen Gleichungssystemen: Direkte und iterative Verfahren, überbestimmte Gleichungssysteme, Gradientenverfahren. Eigenwertprobleme. Bearbeitung der praktischen Übungen in einer geeigneten Programmiersprache. Optional: Approximation.</p> | | | | | | |

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| | Numerische Analysis: Interpolation von Funktionen Numerische Integration. Algorithmen zu numerischen Lösung von gewöhnlichen Differentialgleichungen: Anfangswertprobleme (Einschritt- und Mehrschrittverfahren), Randwertprobleme. Bearbeitung von praktischen Übungen in einer geeigneten Programmiersprache. Optional: Differenzenverfahren für einfache Partielle Differentialgleichungen (z.B. Advektions-, Diffusionsgleichung), Randwertprobleme elliptischer Differentialgleichungen. | | |
| 5 | Erworbene Kompetenzen: Die Studierenden sollen mit den Grundlagen der partiellen Differentialgleichungen und höheren Numerik vertraut gemacht werden, und sie sollen befähigt werden, die erlernten Methoden beim Lösen von Übungsaufgaben einzusetzen. Darüber hinaus wird die numerische Lösung von angewandten mathematischen Problemen am Rechner geübt. Sie erhalten ferner Sie die nötigen fachlichen Grundlagen, um im Rahmen eines anschließenden Seminar/Bachelorarbeit die hier behandelten Methoden mathematisch korrekt anzuwenden und weitergehende Literatur selbstständig zu erarbeiten. | | |
| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: Die Teilnehmer haben die Wahl zwischen „Numerische Lineare Algebra“, die in jedem WiSe angeboten wird, und „Numerischen Analysis“, die in jedem SoSe angeboten wird. Die gewählte Veranstaltung darf aber nicht schon im Rahmen des Grundlagenerweiterungsmoduls Angewandte Mathematik angerechnet worden sein. | | |
| 7 | Leistungsüberprüfung: <input type="checkbox"/> Modulabschlussprüfung (MAP) <input checked="" type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) | | |
| 8 | Prüfungsleistung/en: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung über die Vorlesung Partielle Differentialgleichungen I Die Art der Prüfungsleistung wird zu Beginn der Veranstaltung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | 2-3 Stunden/ 20-30 min | 100 % |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | In der Regel müssen 40—50% der gestellten Übungsaufgaben richtig bearbeitet werden. |
| | Bearbeiten von wöchentlichen Übungsaufgaben zu beiden Veranstaltungen in einem vom Dozenten vorgegebenen Umfang sowie eine 2- bis 3-stündige Klausur zur Vorlesung Numerische Analysis oder Numerische Lineare Algebra. Die Zulassung zur Klausur bzw. mündlichen Prüfung über die Vorlesung Partielle Differentialgleichungen I sowie zur Klausur zur Vorlesung Numerische Analysis oder Numerische Lineare Algebra wird von der erfolgreichen Bearbeitung der Übungsaufgaben im geforderten Umfang anhängig gemacht; dies und der geforderte Umfang werden rechtzeitig zu Beginn der Veranstaltung in geeigneter Weise bekanntgegeben. | | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |

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| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: 10 % | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine (aber siehe auch 16) | |
| 13 | Anwesenheit: Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten. | |
| 14 | Verwendbarkeit in anderen Studiengängen: Die erworbenen Leistungspunkte können im Zwei-Fach-Bachelor-Studiengang Mathematik angerechnet werden. Die Inhalte sind außerdem für Studierende im Masterstudium der Physik geeignet. | |
| 15 | Modulbeauftragte/r: Angela Stevens, Benedikt Wirth und Frank Wübeling | Zuständiger Fachbereich: Fachbereich 10 |
| 16 | Sonstiges: Studierende sollten die Grundlagenmodule Analysis und die LA sowie das Grundlagenerweiterungsmodul Angewandte Mathematik bestanden haben. Kenntnis der Analysis III wird dringend empfohlen. Dieses Modul darf nicht mit dem Vertiefungsmodul „Kurzes Vertiefungsmodul Numerik Partieller Differentialgleichungen“ kombiniert werden. Dieses Modul darf nicht mit den Vertiefungsmodulen „Partielle Differentialgleichungen und Mathematische Modellierung“ oder „Partielle Differentialgleichungen und Angewandte Analysis“ kombiniert werden. Das Bestehen des Moduls eröffnet die Möglichkeit, eine Bachelorarbeit im Bereich der Numerik oder der Partiellen Differentialgleichungen zu schreiben. In letzterem Fall wird Kenntnis von Mathematischer Modellierung dringend empfohlen. Die in diesem Modul erworbenen Kenntnisse ermöglichen die Teilnahme an den Spezialisierungsmodulen „Angewandte Mathematik“ oder „Wissenschaftliches Rechnen“ des Masterstudiengangs Mathematik. | |

d) Das Modul M8-5 „Vertiefungsmodul Partielle Differentialgleichungen und Mathematische Modellierung“ erhält folgende neue Fassung:

| | | | | | | | |
|-----------------------------|--|---|---|---|-----------------------------|--------------------------|--------------------------|
| Modultitel deutsch: | | Vertiefungsmodul Partielle Differentialgleichungen und Mathematische Modellierung | | | | | |
| Modultitel englisch: | | Advanced Module Partial Differential Equations and Mathematical Modelling | | | | | |
| Studiengang: | | Bachelor of Science Mathematik | | | | | |
| 1 | Modulnummer: M8-5 | Status: <input type="checkbox"/> Pflichtmodul | | <input checked="" type="checkbox"/> Wahlpflichtmodul | | | |
| 2 | Turnus: <input checked="" type="checkbox"/> jedes Sem. <input type="checkbox"/> jedes WS <input type="checkbox"/> jedes SS | Dauer: <input type="checkbox"/> 1 Sem. <input checked="" type="checkbox"/> 2 Sem. | Fachsem.: 4--5 | LP: 18 | Workload (h): 540 | | |
| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 2. | Ü | Übungen zu Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 |
| | 3. | V | Vorlesung Mathematische Modellierung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| 4. | Ü | Übungen zu Mathematische Modellierung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 | |
| 4 | Lehrinhalte: | | | | | | |
| | <p>Lehrinhalte für partielle Differentialgleichungen I: Grundtypen von partiellen Differentialgleichungen. Trennung der Variablen. Charakteristiken. Laplacegleichung und Lösung des Dirichletproblems. Mittelwerteigenschaften harmonischer Funktionen. Maximumprinzipien. Sobolevräume, Distributionen. Variationsmethoden. Regularitätsfragen. Schwache Lösungen. Randwertprobleme für Evolutionsgleichungen (insbes. Wärmeleitungs- und Wellengleichung). Existenz- und Eindeutigkeitsfragen.</p> <p>Lehrinhalte für Mathematische Modellierung: Mathematische Modellbildung an Hand konkreter Probleme aus den Natur- und Lebenswissenschaften und/oder der Ökonomie. Das jeweilige Anwendungsproblem wird dargestellt, ein mathematisches Modell hergeleitet, vereinfacht und analysiert. Die dabei verwendeten mathematischen Theorien werden ausführlich diskutiert und die Ergebnisse interpretiert. Es werden Modelle basierend auf stochastischen Prozessen und gewöhnlichen und partielle Differentialgleichungen betrachtet und dafür qualitative Phänomene analysiert, wie z.B.: Stabilität von Lösungen, Diffusion, Wellenausbreitung, Strömungen, Schwingungen.</p> | | | | | | |
| 5 | <p>Erworbene Kompetenzen: Die Studierenden sollen mit partiellen Differentialgleichungen sowie mit der Modellierung von Problemen vertraut gemacht werden, und sie sollen befähigt werden, die erlernten Methoden beim Lösen von Übungsaufgaben einzusetzen. Ferner erhalten Sie die nötigen fachlichen Grundlagen, um im Rahmen eines anschließenden Seminar/Bachelorarbeit die hier behandelten Methoden mathematisch korrekt anzuwenden und weitergehende Literatur selbstständig zu erarbeiten.</p> | | | | | | |

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|----|--|---|-----------------------------------|
| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: keine | | |
| 7 | Leistungsüberprüfung: [] Modulabschlussprüfung (MAP) [x] Modulprüfung (MP) [] Modulteilprüfungen (MTP) | | |
| 8 | Prüfungsleistung/en: | | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung über Partielle Differentialgleichungen I | 2-3 Stunden/ 20-30 min | 100 % |
| | Die Art der Prüfungsleistung wird zu Beginn der Veranstaltung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | | |
| 9 | Studienleistungen: | | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Bearbeiten von Übungsaufgaben in einem vom Dozenten vorgegebenen Umfang sowie eine 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung zur Vorlesung Mathematische Modellierung. Die Art der Studienleistung (Klausur oder mündliche Prüfung) wird zu Beginn der Veranstaltung Mathematische Modellierung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | In der Regel müssen 40—50% der gestellten Übungsaufgaben richtig bearbeitet werden. | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: 10 % | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine (aber siehe auch 16) | | |
| 13 | Anwesenheit: Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten. | | |
| 14 | Verwendbarkeit in anderen Studiengängen: Die erworbenen Leistungspunkte können im Zweifachbachelor-Studiengang angerechnet werden. Die Inhalte sind außerdem für Studierende im Masterstudiengang der Physik geeignet. | | |
| 15 | Modulbeauftragte/r: Angela Stevens und Benedikt Wirth | Zuständiger Fachbereich: Fachbereich 10 | |

| | |
|----|--|
| 16 | <p>Sonstiges: Studierende sollten die Grundlagenmodule Analysis und LA sowie das Grundlagenerweiterungsmodul „Angewandte Mathematik“ bestanden haben. Kenntnis der Analysis III wird dringend empfohlen.</p> <p>Dieses Modul darf nicht mit dem Vertiefungsmodul „Kurzes Vertiefungsmodul Partielle Differentialgleichungen“ kombiniert werden.</p> <p>Dieses Modul darf nicht mit den Vertiefungsmodulen „Partielle Differentialgleichungen und Höhere Numerik“ oder „Partielle Differentialgleichungen und Angewandte Analysis“ kombiniert werden. Das Bestehen des Moduls eröffnet die Möglichkeit, eine Bachelorarbeit in einem Bereich der Angewandten Mathematik zu schreiben.</p> <p>Die in diesem Modul erworbenen Kenntnisse ermöglichen die Teilnahme an den Spezialisierungsmodulen „Angewandte Mathematik“ oder „Wissenschaftliches Rechnen“ des Masterstudiengangs Mathematik.</p> |
|----|--|

e) Das Modul M8-8 „Logische Vertiefung“ erhält folgende neue Fassung:

| | | | | | | | |
|--|--|--|---|---|---------------------------|--|-----------------------------|
| Modultitel deutsch: Logische Vertiefung | | | | | | | |
| Modultitel englisch: Advanced Module Logic | | | | | | | |
| Studiengang: Bachelor of Science Mathematik | | | | | | | |
| | | | | | | | |
| 1 | Modulnummer: M8-8 | | Status: <input type="checkbox"/> Pflichtmodul <input checked="" type="checkbox"/> Wahlpflichtmodul | | | | |
| | | | | | | | |
| 2 | Turnus: | <input type="checkbox"/> jedes Sem. <input type="checkbox"/> jedes WS <input checked="" type="checkbox"/> jedes SS | Dauer | <input type="checkbox"/> 1 Sem. <input checked="" type="checkbox"/> 2 Sem. | Fachsem.: 4- 5 | LP: 18 | Workload (h): 540 |
| | | | | | | | |
| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Logik I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 2. | Ü | Übungen zu Logik I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 |
| | 3. | V | Logik II | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| 4. | Ü | Übungen zu Logik II | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 | |
| | | | | | | | |
| 4 | Lehrinhalte: Methoden der Modellkonstruktion, der Gödelsche Vollständigkeitssatz, entscheidbare und vollständige Theorien, Nichtentscheidbarkeit und die Gödelschen Unvollständigkeitssätze. Axiomatisierung der Mengenlehre, Ordinalzahlen und Kardinalzahlen, deskriptive Mengenlehre. | | | | | | |
| | | | | | | | |
| 5 | Erworbene Kompetenzen: Die Studierenden sollen mit den Grundlagen der Beweistheorie, Rekursionstheorie, Modelltheorie und Mengenlehre vertraut gemacht werden, und sie sollen befähigt werden, die erlernten Methoden beim Lösen von Übungsaufgaben einzusetzen. | | | | | | |
| | | | | | | | |
| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: keine | | | | | | |
| | | | | | | | |
| 7 | Leistungsüberprüfung: <input type="checkbox"/> Modulabschlussprüfung (MAP) <input checked="" type="checkbox"/> Modulprüfung (MP) <input type="checkbox"/> Modulteilprüfungen (MTP) | | | | | | |
| | | | | | | | |
| 8 | Prüfungsleistung/en: | | | | Dauer bzw. Umfang | Gewichtung für die Modulnote in % | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | | | | | | |
| | 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung zur Vorlesung Logik II | | | | 2-3 Stunden/ 20-30 min | 100 % | |
| Die Art der Prüfungsleistung wird zu Beginn der Veranstaltung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | | | | | | | |

| | | |
|----|---|---------------------------------|
| 9 | Studienleistungen: | |
| | Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang |
| | Bearbeiten von wöchentlichen Übungsaufgaben zu beiden Veranstaltungen in einem vom Dozenten vorgegebenen Umfang. Die Zulassung zur Klausur bzw. mündlichen Prüfung wird von der erfolgreichen Bearbeitung der Übungsaufgaben im geforderten Umfang abhängig gemacht; dies und der geforderte Umfang werden rechtzeitig zu Beginn der Veranstaltungen in geeigneter Weise bekanntgegeben. | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: | |
| | Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: | |
| | 10 % | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: | |
| | keine | |
| 13 | Anwesenheit: | |
| | Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten. | |
| 14 | Verwendbarkeit in anderen Studiengängen: | |
| | keine | |
| 15 | Modulbeauftragte/r: | Zuständiger Fachbereich: |
| | Martin Hils | Fachbereich 10 |
| 16 | Sonstiges: | |
| | Das Bestehen des Moduls eröffnet die Möglichkeit, eine Bachelorarbeit im Bereich der Logik zu schreiben. | |
| | Die in diesem Modul erworbenen Kenntnisse ermöglichen die Teilnahme am Modul „Logische Spezialisierung“ des Masterstudiengangs Mathematik. | |
| | Studierende mit Nebenfach Logik können dieses Modul nicht als Vertiefungsmodul im Hauptfach Mathematik absolvieren. | |
| | Wird dieses Modul im Rahmen des Nebenfachs Logik absolviert, geht dieses Modul gewichtet nach Leistungspunkten in die Nebenfachnote ein. | |

f) Das Modul M8-9 „Vertiefungsmodul Partielle Differentialgleichungen und Angewandte Analysis“ erhält folgende neue Fassung:

| | | | | | | | |
|--|--|---|---|---|-----------------------------|--------------------------|--------------------------|
| Modultitel deutsch: Vertiefungsmodul Partielle Differentialgleichungen und Angewandte Analysis | | | | | | | |
| Modultitel englisch: Advanced Module Partial Differential Equations and Applied Analysis | | | | | | | |
| Studiengang: Bachelor of Science Mathematik | | | | | | | |
| | | | | | | | |
| 1 | Modulnummer: M8-9 | Status: <input type="checkbox"/> Pflichtmodul | | <input checked="" type="checkbox"/> Wahlpflichtmodul | | | |
| | | | | | | | |
| 2 | Turnus: <input type="checkbox"/> jedes Sem. <input type="checkbox"/> jedes WS <input checked="" type="checkbox"/> jedes SS | Dauer: <input type="checkbox"/> 1 Sem. <input checked="" type="checkbox"/> 2 Sem. | Fachsem.: 4--5 | LP: 18 | Workload (h): 540 | | |
| | | | | | | | |
| 3 | Modulstruktur: | | | | | | |
| | Nr. | Typ | Lehrveranstaltung | Status | LP | Präsenz (h + SWS) | Selbststudium (h) |
| | 1. | V | Vorlesung Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| | 2. | Ü | Übungen zu Partielle Differentialgleichungen I | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 |
| | 3. | V | Weiterführende Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 5 | 60 (4 SWS) | 90 |
| 4. | Ü | Übungen zur weiterführenden Vorlesung | <input checked="" type="checkbox"/> P <input type="checkbox"/> WP | 4 | 30 (2 SWS) | 90 | |
| | | | | | | | |
| 4 | Lehrinhalte: | | | | | | |
| | Lehrinhalte für Partielle Differentialgleichungen I: Grundtypen von partiellen Differentialgleichungen. Trennung der Variablen. Charakteristiken. Laplacegleichung und Lösung des Dirichletproblems. Mittelwerteigenschaften harmonischer Funktionen. Maximumprinzipien. Sobolevräume, Distributionen. Variationsmethoden. Regularitätsfragen. Schwache Lösungen. Randwertprobleme für Evolutionsgleichungen (insbes. Wärmeleitungs- und Wellengleichung). Existenz- und Eindeutigkeitsfragen. | | | | | | |
| | Mögliche weiterführende Vorlesungen: | | | | | | |
| | Lehrinhalte für Partielle Differentialgleichungen II: Die Vorlesung setzt die Themen der Partiiellen Differentialgleichungen I in natürlicher Weise fort. Nichtlineare PDGL, Systeme von PDGL, Monotoniemethoden, Fixpunktmethoden, Gradientenflüsse, Vergleichsprinzipien, Methoden der schwachen Konvergenz und deren Anwendungen. Qualitatives Verhalten mathematischer Modelle in den Natur- und Lebenswissenschaften, z.B. Existenz von Wellenlösungen. | | | | | | |
| Lehrinhalte für Variationsrechnung: Einführung in Modellfragestellungen wie z.B. minimale Rotationsflächen, das Dirichlet-Funktional. Hauptsatz der Variationsrechnung. Euler-Lagrange-Gleichungen. Hamiltonische Formulierung. Zweite Variation. Funktionalanalytische Grundlagen. Schwache Unterhalbstetigkeit. Relaxationstheorie. Regularität von Minimierern. Anwendung auf mathematische und naturwissenschaftliche Fragestellungen. | | | | | | | |
| Lehrinhalte Dynamische Systeme: Lineare und nichtlineare Beispiele aus der Mathematik und den Naturwissenschaften Satz von Picard-Lindelöf. Lineare Differentialgleichungen, Matrixexponential, Variation der Konstanten. Stabilität von Gleichgewichten, Ljapunow-Funktionen und Erhaltungsgrößen qualitatives Verhalten autonomer Differentialgleichungen in 1D und 2D. Invariante Mannigfaltigkeit, homokline und heterokline Orbits, Bifurkationen. | | | | | | | |

| | | | |
|----|---|---|-----------------------------------|
| | Lehrinhalte für Konvexe Analysis: Grundlagen der konvexen Analysis in unendlichdimensionalen Räumen und ihre Anwendung. Konvexe Mengen, Trennungssätze, konvexe Funktionen, konjugierte Funktionen, das Subdifferential, Differenzierbarkeit in Banach-Räumen, konvexe Dualität. Anwendungen z.B. auf optimale Steuerung und Energieabschätzungen für mathematische und naturwissenschaftliche Fragestellungen. | | |
| 5 | Erworbene Kompetenzen: Die Studierenden sollen mit partiellen Differentialgleichungen und darauf aufbauenden analytischen Methoden vertraut gemacht werden, und sie sollen befähigt werden, die erlernten Methoden beim Lösen von Übungsaufgaben einzusetzen. Ferner erhalten Sie die nötigen fachlichen Grundlagen, um im Rahmen eines anschließenden Seminar/Bachelorarbeit die hier behandelten Methoden mathematisch korrekt anzuwenden und weitergehende Literatur selbstständig zu erarbeiten. | | |
| 6 | Beschreibung von Wahlmöglichkeiten innerhalb des Moduls: Im zweiten Teil des Moduls können die Studierenden zwischen den Veranstaltungen Partielle Differentialgleichungen II, Variationsrechnung, Dynamische Systeme oder Komplexe Analysis wählen. Nicht alle diese Veranstaltungen werden jedes Jahr angeboten, jedoch zumindest eine davon. Alternativ kann stattdessen auch eine andere, auf der Vorlesung Partielle Differentialgleichungen I aufbauende analytische Veranstaltung gewählt werden, sofern diese von der/dem Modulbeauftragten hierfür zugelassen ist. | | |
| 7 | Leistungsüberprüfung: [] Modulabschlussprüfung (MAP) [x] Modulprüfung (MP) [] Modulteilprüfungen (MTP) | | |
| 8 | Prüfungsleistung/en: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | Gewichtung für die Modulnote in % |
| | 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung über Partielle Differentialgleichungen I | 2-3 Stunden/ 20-30 min | 100 % |
| | Die Art der Prüfungsleistung wird zu Beginn der Veranstaltung von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | | |
| 9 | Studienleistungen: Anzahl und Art; Anbindung an Lehrveranstaltung | Dauer bzw. Umfang | |
| | Bearbeiten von Übungsaufgaben in einem vom Dozenten vorgegebenen Umfang sowie eine 2- bis 3-stündige Klausur oder 20- bis 30-minütige mündliche Prüfung zu der unter den Punkten 3. und 4. gewählten Vorlesung und Übungen des Moduls Die Art der Studienleistung (Klausur oder mündliche Prüfung) wird zu Beginn der Veranstaltungen zu 3. und 4. von der Dozentin/dem Dozenten in geeigneter Weise bekannt gegeben. | In der Regel müssen 40—50% der gestellten Übungsaufgaben richtig bearbeitet werden. | |
| 10 | Voraussetzungen für die Vergabe von Leistungspunkten: Die Leistungspunkte für das Modul werden angerechnet, wenn das Modul insgesamt erfolgreich abgeschlossen wurde, d.h. alle Prüfungsleistungen und Studienleistungen bestanden wurden. | | |
| 11 | Gewichtung der Modulnote für die Bildung der Gesamtnote: 10 % | | |
| 12 | Modulbezogene Teilnahmevoraussetzungen: keine (aber siehe auch 16) | | |

| | | |
|----|--|---|
| 13 | Anwesenheit: Zur Präsentation der Übungsaufgaben in den Übungen können die Dozenten die Studierenden zur Teilnahme an den Übungen verpflichten. | |
| 14 | Verwendbarkeit in anderen Studiengängen: Die erworbenen Leistungspunkte können im Zweifachbachelor-Studiengang angerechnet werden. Die Inhalte sind außerdem für Studierende im Masterstudiengang der Physik geeignet. | |
| 15 | Modulbeauftragte/r: -Angela Stevens und Benedikt Wirth | Zuständiger Fachbereich: Fachbereich 10 |
| 16 | Sonstiges: Studierende sollten die Grundlagenmodule Analysis und LA sowie das Grundlagenerweiterungsmodul „Angewandte Mathematik“ bestanden haben. Kenntnis der Analysis III wird dringend empfohlen. Dieses Modul darf nicht mit dem Vertiefungsmodul „Kurzes Vertiefungsmodul Partielle Differentialgleichungen“ kombiniert werden. Dieses Modul darf nicht mit den Vertiefungsmodulen „Partielle Differentialgleichungen und Mathematische Modellierung“ oder „Partielle Differentialgleichungen und Höhere Numerik“ kombiniert werden. Das Bestehen des Moduls eröffnet die Möglichkeit, eine Bachelorarbeit in einem Bereich der Angewandten Mathematik zu schreiben. Die in diesem Modul erworbenen Kenntnisse ermöglichen die Teilnahme an den Spezialisierungsmodulen „Angewandte Mathematik“ oder „Wissenschaftliches Rechnen“ des Masterstudiengangs Mathematik. | |

Artikel II

- (1) Diese Änderungsordnung tritt am Tage nach ihrer Veröffentlichung in den Amtlichen Bekanntmachungen der Westfälischen Wilhelms-Universität (AB Uni) in Kraft.
- (2) Diese Änderungsordnung gilt für alle Studierenden, die ab dem Sommersemester 2019 in den Bachelorstudiengang Mathematik eingeschrieben werden. Diese Änderungsordnung gilt ebenso für alle Studierenden, die vor dem Sommersemester 2019 in den Bachelorstudiengang Mathematik eingeschrieben wurden und nach der Prüfungsordnung für den Bachelorstudiengang Mathematik vom 10. Juni 2014 sowie gegebenenfalls nach der Ersten Änderungsordnung vom 5. September 2016 studieren; in Bezug auf die geänderten Modulbeschreibungen jedoch nur, wenn und soweit sie die durch diese Änderungsordnung geänderten Module vor dem Inkrafttreten dieser Änderungsordnung gemäß Absatz 1 noch nicht begonnen haben.

Ausgefertigt aufgrund des Beschlusses des Fachbereichsrates des Fachbereichs Mathematik und Informatik der Westfälischen Wilhelms-Universität vom 9. Januar 2019. Die vorstehende Ordnung wird hiermit verkündet.

Münster, den 28. Januar 2019

Der Rektor

Prof. Dr. Johannes W e s s e l s

**Ordnung für die Zugangsprüfung für in der beruflichen Bildung Qualifizierte
zu den vom Fachbereich Mathematik und Informatik der
Westfälischen Wilhelms-Universität Münster
angebotenen Studiengängen
vom 28. Januar 2019**

Aufgrund des § 2 Abs. 4 des Gesetzes über die Hochschulen des Landes Nordrhein-Westfalen (Hochschulgesetz - HG) in der Fassung des Hochschulzugangsgesetzes vom 16. September 2014 (GV. NRW 2014, S. 547) sowie aufgrund des § 6 Abs. 5 der Verordnung über den Hochschulzugang für in der beruflichen Bildung Qualifizierte (Berufsbildungshochschulzugangsverordnung – BBHZVO) vom 7. Oktober 2016 (GV. NRW 2016, S. 837), zuletzt geändert durch die Verordnung zur Änderung der Berufsbildungshochschulzugangsverordnung vom 1. März 2017 (GV. NRW 2017, S. 316), hat die Westfälische Wilhelms-Universität Münster die folgende Ordnung erlassen:

Inhaltsverzeichnis

- § 1 Zweck der Zugangsprüfung**
- § 2 Zugangsprüfungsvoraussetzungen**
- § 3 Bewerbung, Bewerbungsfrist**
- § 4 Beratungsgespräch**
- § 5 Zuständigkeit**
- § 6 Prüferinnen/Prüfer**
- § 7 Prüfungsleistungen**
- § 8 Nachteilsausgleich für Studierende mit Behinderung oder chronischer Erkrankung**
- § 9 Bewertung der Prüfungsleistungen, Bildung der Noten und Bestehen der Zugangsprüfung**
- § 10 Zeugnis**
- § 11 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß**
- § 12 Ungültigkeit der Zugangsprüfung**
- § 13 Einsicht in die Prüfungsakten**
- § 14 Inkrafttreten**

§ 1

Zweck der Zugangsprüfung

Durch die Zugangsprüfung wird festgestellt, ob die Bewerberin/der Bewerber im Sinne der Berufsbildungshochschulzugangsverordnung die fachlichen und methodischen Voraussetzungen für das Studium in den vom Fachbereich Mathematik und Informatik angebotenen Studiengängen erfüllt.

§ 2

Zugangsprüfungsvoraussetzungen

(1) An der Zugangsprüfung kann teilnehmen, wer die Voraussetzungen der Verordnung über den Hochschulzugang für in der beruflichen Bildung Qualifizierte (Berufsbildungshochschulzugangsverordnung) erfüllt.

(2) Das Vorliegen der Voraussetzungen nach Absatz 1 ist von der Bewerberin/dem Bewerber durch die Vorlage entsprechender Unterlagen und Zeugnisse im Fachbereich Mathematik und Informatik nachzuweisen.

§ 3

Bewerbung, Bewerbungsfrist

(1) Die Bewerbung ist unter Angabe des Studiengangs schriftlich an die Dekanin/den Dekan des Fachbereichs Mathematik und Informatik zu richten. Die Nachweise gemäß § 2 Absatz 2 sind beizufügen.

(2) Die Bewerbungsfrist für die Teilnahme an der Zugangsprüfung endet für das Wintersemester am 1. April und für das Sommersemester am 1. Oktober. In begründeten Fällen kann die Dekanin/der Dekan die Bewerbungsfrist verlängern.

§ 4

Beratungsgespräch

Die Bewerberin/Der Bewerber nimmt in der Regel vor der Zulassung zur Zugangsprüfung an einem Beratungsgespräch mit der Studiendekanin/dem Studiendekan oder einer/einem von dieser/diesem beauftragten Fachvertreter/in teil. Hierdurch soll ermittelt werden, ob erforderliches fachliches oder methodisches Vorwissen fehlt. Das Beratungsgespräch soll auch über Möglichkeiten des Ausgleichs des fehlenden Vorwissens im Sinne einer Studienerfolgsprognose informieren.

§ 5

Zuständigkeit

Für die Organisation der Zugangsprüfung und die durch diese Prüfungsordnung zugewiesenen Aufgaben ist die Dekanin/der Dekan des Fachbereichs Mathematik und Informatik zuständig.

§ 6

Prüferinnen/Prüfer, Beisitzerinnen/Beisitzer

(1) Die Dekanin/der Dekan bestellt für die Prüfungsleistungen die Prüferinnen/Prüfer.

(2) Prüferin/Prüfer kann jede gemäß § 65 Absatz 1 HG prüfungsberechtigte Person sein, die, soweit nicht zwingende Gründe eine Abweichung erfordern, in dem Fach, auf das sich die Prüfungsleistung

bezieht, regelmäßig einschlägige Lehrveranstaltungen abhält. Über Ausnahmen entscheidet die Dekanin/der Dekan.

§ 7

Prüfungsleistungen

(1) Die Zugangsprüfung besteht aus einer 30-minütigen mündlichen Prüfung oder einer zweistündigen schriftlichen Prüfung oder einer Kombination von beidem. Bei Zulassung zur Prüfung wird der Bewerber über die Form der Zugangsprüfung schriftlich informiert.

(2) Die Zugangsprüfung stellt die Studierfähigkeit in fachlicher und methodischer Hinsicht fest. Gegenstand der Zugangsprüfung ist das Fach Mathematik auf dem Niveau der Prüfung der Allgemeinen Hochschulreife.

(3) Neben dem fachbezogenen Wissen kann in den einzelnen Prüfungen auch allgemeines Wissen abgeprüft werden.

§ 8

Nachteilsausgleich für Studierende mit Behinderung oder chronischer Erkrankung

(1) Macht eine Bewerberin/ein Bewerber glaubhaft, dass sie bzw. er wegen einer chronischen Krankheit oder einer Behinderung nicht in der Lage ist, die Prüfungsleistungen ganz oder teilweise in der vorgesehenen Form oder innerhalb der in dieser Ordnung genannten Prüfungsfristen abzulegen, muss die Dekanin/der Dekan die Bearbeitungszeit für Prüfungsleistungen bzw. die Fristen für das Ablegen von Prüfungen verlängern oder gleichwertige Prüfungsleistungen in einer bedarfsgerechten Form gestatten.

(2) Bei Entscheidungen nach Absatz 1 ist auf Wunsch der Bewerberin/des Bewerbers die/der Diversity-Beauftragte des Fachbereichs zu beteiligen. Sollte keine Konsultierung der/des Diversity-Beauftragten möglich sein, so ist die/der Behindertenbeauftragte der Universität anzusprechen.

(3) Zur Glaubhaftmachung einer chronischen Krankheit oder Behinderung kann die Vorlage geeigneter Nachweise verlangt werden. Hierzu zählen insbesondere ärztliche Atteste oder, falls vorhanden, Behindertenausweise.

§ 9

Bewertung der Prüfungsleistungen, Bildung der Noten und Bestehen der Zugangsprüfung

(1) Die Note für die Prüfungsleistung wird von den jeweiligen Prüferinnen/Prüfern (als Prüfungsausschuss i.S.d. Berufsbildungshochschulzugangsverordnung) festgesetzt. Für die Bewertung der Prüfungsleistung sind folgende Noten zu verwenden:

- 1 = sehr gut = eine hervorragende Leistung,
- 2 = gut = eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
- 3 = befriedigend = eine Leistung, die durchschnittlichen Anforderungen entspricht,
- 4 = ausreichend = eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
- 5 = nicht ausreichend = eine Leistung, die wegen erheblicher Mängel den Anforderungen nicht mehr genügt.

Durch Erniedrigen oder Erhöhen der einzelnen Noten um 0,3 können für die Bewertung der Prüfungsleistungen Zwischenwerte gebildet werden; die Noten 0,7, 4,3, 4,7 und 5,3 sind dabei ausgeschlossen.

(2) Schriftliche und mündliche Prüfungen werden von zwei Prüfungsberechtigten bewertet. Im Falle divergierender Bewertungen wird das arithmetische Mittel genommen. Über mündliche Prüfungen ist ein Protokoll zu fertigen, das die wesentlichen Gegenstände der Prüfung und die festgesetzte Note wiedergibt. Es ist von beiden Prüferinnen/Prüfern zu unterschreiben.

(3) Eine Prüfungsleistung ist bestanden, wenn die Note mindestens „ausreichend“ (4,0) ist.

(4) Die Zugangsprüfung ist bestanden, wenn sämtliche Prüfungsleistungen bestanden sind. Die Gesamtnote der Zugangsprüfung errechnet sich aus dem Durchschnitt der Noten der einzelnen Prüfungsleistungen. Die Gesamtnote einer bestandenen Zugangsprüfung lautet:

Bei einem Durchschnitt bis 1,5 = sehr gut

Bei einem Durchschnitt zwischen 1,5 und 2,5 = gut

Bei einem Durchschnitt zwischen 2,5 und 3,5 = befriedigend

Bei einem Durchschnitt zwischen 3,5 und 4,0 einschließlich = ausreichend.

(5) Bei der Bildung der Gesamtnote wird die erste Dezimalzahl hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.

§ 10 Zeugnis

(1) Über die bestandene Zugangsprüfung wird ein Zeugnis ausgestellt, das den Studiengang und die Gesamtnote enthält.

(2) Das Zeugnis trägt das Datum des Tages, an dem die letzte Prüfungsleistung erbracht worden ist.

(3) Das Zeugnis wird von der Dekanin/dem Dekan unterzeichnet.

(4) Ist die Zugangsprüfung nicht bestanden, so erteilt die Dekanin/der Dekan hierüber einen mit einer Rechtsbehelfsbelehrung versehenen Bescheid.

§ 11**Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß**

(1) Eine Prüfungsleistung gilt als mit „nicht ausreichend“ (5,0) bewertet, wenn die Bewerberin/der Bewerber zu einem Prüfungstermin ohne triftige Gründe nicht erscheint oder wenn sie/er nach Beginn der Prüfung ohne triftige Gründe von der Prüfung zurücktritt. Dasselbe gilt, wenn eine schriftliche Prüfungsleistung nicht innerhalb der vorab angegebenen Bearbeitungszeit erbracht wird.

(2) Versucht die Bewerberin/der Bewerber, das Ergebnis ihrer/seiner Prüfungsleistung durch Täuschung oder durch Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Prüfungsleistung als mit „nicht ausreichend“ (5,0) bewertet; die Feststellung wird von der jeweiligen Prüferin/dem jeweiligen Prüfer getroffen und aktenkundig gemacht. Eine Bewerberin/Ein Bewerber, die/der den ordnungsgemäßen Ablauf der Prüfung stört, kann von der jeweiligen Prüferin/dem jeweiligen Prüfer von der Fortsetzung der Prüfungsleistung ausgeschlossen werden; in diesem Fall gilt die betreffende Prüfungsleistung als mit „nicht ausreichend“ (5,0) bewertet. Die Gründe für den Ausschluss sind aktenkundig zu machen.

(3) Belastende Entscheidungen sind der Bewerberin/dem Bewerber unverzüglich schriftlich mitzuteilen, zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen.

§ 12**Ungültigkeit der Zugangsprüfung**

(1) Hat die Bewerberin/der Bewerber bei der Prüfung getäuscht und wird diese Tatsache erst nach der Aushändigung des Zeugnisses bekannt, kann die Dekanin/der Dekan nachträglich diejenigen Prüfungsleistungen, bei deren Erbringung die Bewerberin/der Bewerber getäuscht hat, für nicht bestanden erklären. In diesem Fall ist die gesamte Zugangsprüfung für nicht bestanden zu erklären.

(2) Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass die Bewerberin/der Bewerber hierüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. Hat die Bewerberin/der Bewerber die Zulassung vorsätzlich zu Unrecht erwirkt, entscheidet die Dekanin/der Dekan unter Beachtung des Verwaltungsverfahrensgesetzes für das Land Nordrhein-Westfalen über die Rechtsfolgen.

(3) Der Bewerberin/Dem Bewerber ist vor der Entscheidung Gelegenheit zur Äußerung zu geben. Die Entscheidung ist mit einer Rechtsbehelfsbelehrung zu versehen.

(4) Das zu Unrecht ausgestellte Zeugnis wird eingezogen. Eine Entscheidung nach Abs. 1 und Abs. 2 Satz 2 ist nach einer Frist von fünf Jahren nach dem Datum des zu Unrecht ausgestellten Zeugnisses ausgeschlossen.

§ 13**Einsicht in die Prüfungsakten**

Innerhalb von drei Monaten nach Zustellung des Zeugnisses oder nach Bekanntgabe des Bescheids über das Nichtbestehen der Prüfung wird der Bewerberin/dem Bewerber auf Antrag in angemessener Frist Einsicht in ihre/seine Prüfungsakten gewährt. § 29 des Verwaltungsverfahrensgesetzes für das Land Nordrhein-Westfalen bleibt unberührt.

§ 14 Inkrafttreten

(1) Die vorliegende Ordnung tritt am Tag nach ihrer Veröffentlichung in den Amtlichen Bekanntmachungen der Westfälischen Wilhelms-Universität (AB Uni) in Kraft.

(2) Mit Inkrafttreten dieser Ordnung tritt die Ordnung für die Zugangsprüfung zu den vom Fachbereich Mathematik und Informatik angebotenen Studiengängen vom 10. Juni 2014 (AB Uni 25/2014, S. 1631) außer Kraft.

Ausgefertigt aufgrund des Beschlusses des Fachbereichsrats des Fachbereichs Mathematik und Informatik der Westfälischen Wilhelms-Universität Münster vom 9. Januar 2019. Die vorstehende Ordnung wird hiermit verkündet.

Münster, den 28. Januar 2019

Der Rektor

Prof. Dr. Johannes W e s s e l s
