Joint examination regulations for the Bachelor's degree programme "Mathematical Modelling, Simulation and Optimisation" and the Master's programme "Mathematical Modelling, Simulation and Optimisation" at the University of Koblenz-Landau

From 29 October 2015* as amended on 8 July 2020,*****

Pursuant to Section 7 (2) No. 2 and Section 86 (2) No. 3 of the Higher Education Act of 21 July 2003 (GVBl. p. 167), BS 223-41, last amended by Article 2 of the Act of 24 July 2014 (GVBl. p. 125), the Council of faculty 3: Mathematics / Natural Sciences on 29 October 2015 and the Council of faculty 4: Computer Sciences on 14 October 2015 2015 the following examination regulations for the Bachelor's programme "Mathematical Modelling" and the Master's programme "Mathematical Modelling of Complex Systems". These regulations were approved by the president of the University of Koblenz-Landau on 29 October 2015. They are hereby announced.

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*** Students who began studying for a Bachelor's degree in Mathematical Modelling or a Master's degree in Mathematical Modelling of Complex Systems before the amendment came into force on 1 October 2020 will complete their studies in accordance with the previous regulations.

§ 1
Scope, aim of the programme, purpose of the Bachelor's and Master's examinations, academic degree

(1) These regulations govern the examination in the Bachelor's programme in Mathematical Modelling, Simulation and Optimisation (Bachelor's examination) and in the Master's programme "Mathematical Modelling, Simulation and Optimisation" in faculty 3: Mathematics / Natural Sciences and faculty 4: Computer Sciences at the University of Koblenz-Landau.

(2) The Bachelor's programme in Mathematical Modelling, Simulation and Optimisation is an undergraduate scientific study programme leading to a first professionally qualifying degree. Its aim is to teach key competencies in the STEM field (modelling, experimentation, simulation) and their scientific foundations in mathematics, physics and computer sciences, and to enable graduates to independently apply mathematical methods and computer sciences tools to problem solving.

(3) The Bachelor's examination consists of

1. the module exams taken during the course of study as specified in the appendix,
2. the Bachelor's thesis and
3. the final oral examination.

(4) The Bachelor's examination is intended to determine whether the candidate

1. has acquired the fundamental specialist knowledge necessary for the transition to professional practice and
2. meets the requirements to continue their studies in the Master's programme "Mathematical Modelling, Simulation and Optimisation" or in another Master's programme.

(5) After successfully completing their studies and passing the Bachelor's examination, the faculties of Mathematics / Natural Sciences and Computer Sciences award the academic degree "Bachelor of Science" (B.Sc.). This university degree may be added to the name of the graduate.

(6) The Master's study programme in Mathematical Modelling, Simulation and Optimisation is a research-oriented scientific study programme that generally builds on the subject-specific and interdisciplinary knowledge, skills and methods acquired in the Bachelor's study programme in Mathematical Modelling, Simulation and Optimisation and is designed to prepare students for further scientific qualification. Its aim is to enable graduates to mathematically model complex systems in research and practice on a physical basis and to simulate them using Computer Sciences methods, and to enable graduates to work in this field using scientific methods.

(7) The Master's examination consists of

1. the module exams taken during the course of study as per the appendix,
2. the Master's thesis, and
3. the final oral examination.

(8) The Master's examination is intended to determine whether the candidate

1. possesses the in-depth scientific knowledge and methodological competencies necessary for the transition to professional practice and

2. has the ability to work independently on complex academic issues and to initiate, absorb and implement developments in the subject, discipline.

(9) After successfully completing their studies and passing the Master's examination, the faculties 3: Mathematics / Natural Sciences and 4: Computer Sciences award the academic degree "Master of Science" (M.Sc.). This university degree may be added to the name of the graduate.

§ 2
Admission requirements

(1) Admission to the Bachelor's study programme in Mathematical Modelling, Simulation and Optimisation is granted to those who have a university entrance qualification in accordance with § 65 (1) and (2) of the Higher Education Act and have not yet lost their examination entitlement for this programme.

(2) Admission to the Master's programme in Mathematical Modelling, Simulation and Optimisation is granted to those who have successfully completed the Bachelor's programme in accordance with the examination regulations for the Bachelor's programme in Mathematical Modelling, Simulation and Optimisation at the University of Koblenz-Landau or who have a degree recognised by the examination board in accordance with § 5 in a programme in the fields of mathematics, physics and computer sciences.
If the examination board determines that the necessary prior knowledge is lacking, it may require the applicant to make up for missing credits of up to 30 credit points within two terms. The decision on the applicant's suitability for the Master's programme, not their knowledge of all the content of the Bachelor's programme
"Mathematical Modelling, Simulation and Optimisation". Registration for the Master's thesis is only possible after the requirements have been met.
Only those who have achieved a final grade of at least 2.5 in their undergraduate programme will be admitted; exceptions will be decided by the examination board upon application. Exceptions may be made if the Bachelor's thesis has been graded with at least 1.5 or if the applicant has at least one year of professional experience in the field of mathematical modelling of complex systems.
Immatriculation in the Master's programme in Mathematical Modelling, Simulation and Optimisation is also possible if the Bachelor's degree certificate is not yet available, provided that all examinations have been completed before the start of the Master's programme and the examination is expected to be completed with a grade of 2.5. If the admission requirements are not met by the end of the first term, enrolment will be cancelled.

(3) The admission requirement for the Bachelor's programme is knowledge of German and English corresponding to at least level B2 of the Common European Framework of Reference for Languages. The admission requirement for the Master's programme is knowledge of English corresponding to at least level B2 of the Common European Framework of Reference for Languages. Proof of this is provided either by a school or university degree in the chosen languages or by corresponding certificates.

§ 3
examination board

(1) The councils of the faculties 3: Mathematics / Natural Sciences

and 4: Computer Sciences establish an examination board. The chair of the examination board is responsible for appointing examiners, unless the examination board decides otherwise. If the chair of the examination board does not appoint any examiners, those who have independently conducted module exams in accordance with
§ 48 (1) sentence 1 or § 56 (1) sentence 4 HochSchG. Sentence 2 applies accordingly to the appointment of examiners who supervise and assess Bachelor's or Master's theses.

(2) The examination board shall consist of four university teachers and one member each from the group of academic staff, the group of non-academic staff and the group of students. The chair and deputy chair must be university teachers. In the event of a tie, the chair shall have the casting vote. Section 25 (5) of the Higher Education Act shall apply to votes on examination performance. The term of office of the student member is one year, and that of the other members is three years.

(3) The chairperson and at least two other members of the examination board are members of Department 3: Mathematics / Natural Sciences. The deputy chairperson and at least one other member are members of Department 4: Computer Sciences. Each of the three subjects mathematics, physics and computer sciences shall be represented on the examination board by one member from the group of university teachers.

(4) The councils of Faculties 3: Mathematics / Natural Sciences and 4: Computer Sciences may, at the recommendation of the examination board, assign module coordinators to perform individual tasks, in particular the organisation of module exams and the issuance of module examination certificates.

(5) Unless otherwise specified, the examination board is responsible for all decisions to be made on the basis of these regulations. It ensures that the provisions of the examination regulations are complied with and that the names of the examiners and the dates of the examinations are communicated to the students in good time. The examination board shall report regularly to the faculties involved in the study programme on the development of examination and study times, including the actual processing times for the Bachelor's thesis, make suggestions for reforming the curriculum and the examination regulations, and disclose the distribution of module grades and overall grades. The report shall be published in an appropriate manner by the faculties. The examination board makes suggestions for reforming the curriculum and the examination regulations.

(6) The examination board may delegate tasks to the chairperson. The chairperson is authorised to make decisions and take measures on behalf of the examination board in matters that cannot be postponed; the examination board must be informed of this immediately.

(7) The members of the Examination Board have the right to attend the examinations. This right does not extend to the deliberation and announcement of grades.

(8) The examination board has a quorum if the chair or deputy chair and the majority of the members are present and the university lecturers have the majority of votes. The meetings of the examination board are not open to the general public. A representative of the Examination Office may participate in the meetings of the examination board in an advisory capacity.

in an advisory capacity. The members of the examination board are subject to official secrecy. Unless they are civil servants, they shall be bound to secrecy by the chairperson.

(9) Decisions of the examination board that are detrimental to the candidate must be communicated to the candidate in writing without delay and justified. The candidate must be given the opportunity to be heard beforehand. Notices must be accompanied by information on the right of appeal.

§ 4
Examiners and assessors

(1) The module exams are conducted by examiners.

(2) Examiners are university lecturers representing the respective subject area. In justified cases, retired professors, honorary professors, postdoctoral lecturers, junior professors in accordance with Section 61 (2a) of the Higher Education Act (HochSchG), scientific and artistic staff with tasks in accordance with
Section 56 (1) sentence 2 of the Higher Education Act, teachers for special tasks and contract-teachers may be appointed as examiners by the examination board; they must be or have been teaching at a university in the subject area to which the examination relates. Furthermore, in special cases, persons with professional experience may be appointed as examiners if they have proven relevant professional experience in the subject area to which the examination relates.

(3) The examiner shall appoint an assessor for each oral exam. The assessor must have at least a qualification equivalent to the respective degree. They shall take minutes during oral exams and may be assigned to pre-correct written examinations.

(4) Section 3 (8) sentences 4 and 5 shall apply mutatis mutandis to examiners and assessors.

§ 5
Recognition of achievements

(1) Credits earned at a university are generally recognised. This does not apply if there are significant differences in the acquired competences. If credits are not recognised, the reasons must be communicated to the student. Equivalence agreements approved by the Standing Conference of the Ministers of Education and Cultural Affairs (KMK) and the German Rectors' Conference (HRK) as well as agreements within the framework of university cooperation agreements must be taken into account when recognising credits. If no equivalence agreements exist, the Central Office for Foreign Education may be consulted in cases of doubt regarding equivalence.

(2) If a student intends to study abroad with subsequent recognition of academic achievements and examinations taken abroad, he or she should discuss the recognition of academic achievements and examinations with the chair of the examination board before beginning their studies abroad.

(3) Outside the higher education sector acquired equivalent knowledge and

qualifications acquired outside xml-ph-0000@deepl.internal the xml-ph-0001@deepl.internal higher education sector xml-ph-0002@deepl.internal acquired xml-ph-0003@deepl.internal equivalent xml-ph-0004@deepl.internal knowledge xml-ph-0005@deepl.internal and

(4) If credits are recognised, the grades – insofar as the grading systems are comparable – are to be transferred and included in the calculation of the overall grade. The recognised coursework and examination credits are awarded the credit points (LP) specified for this purpose in these regulations. In the case of incomparable grading systems, the certificate shall include the note "passed". The certificate shall indicate that the credits have been recognised.

(5) The student must submit to the examination board the documents required for recognition, showing the assessment, credit points (CP) and periods of all examinations taken by the student in another study programme or at other universities. The documents must show which module exams were failed or repeated. The documents must be issued by the university at which the examinations were taken. The recognition of credits in related study programmes is carried out ex officio, in other study programmes upon application.

§ 6
Standard period of study, modularised course structure, deadlines

(1) The standard period of study for the Bachelor's programme, including the time required to complete the Bachelor's thesis and the final oral examination, is three years (six terms).

(2) The standard period of study for the Master's programme, including the time required to complete the Master's thesis and the final oral examination, is two years (four terms).

(3) The courses in the study programme are offered in modules. "Module" refers to self-contained teaching units that are coordinated in terms of subject matter and time.

(4) When determining the periods of study that are relevant for compliance with the deadlines specified in these examination regulations, extensions and interruptions of periods of study are not taken into account if they were caused by:

1. participation in committees of a university, a student body or a student services organisation as provided for by law or statutes,
2. illness, disability or other reasons beyond the student's control,
3. pregnancy or raising a child; in these cases, at least the statutory maternity leave periods and the periods under the Federal Parental Allowance and Parental Leave Act must be made available;
4. supervision of a relative in need of care, or
5. a proper and relevant period of study abroad of up to two terms. The student is responsible for providing evidence.

§ 7
Scope of studies, structure of the programme

(1) The total number of semester loads, credit hours (SWS) required for the successful degree of the Bachelor's programme is at least 108 SWS in the compulsory and compulsory elective areas (see appendix). Of these,

1. 105 SWS / 159 LP are allocated to the compulsory area,
2. at least 3 SWS / 6 LP are allocated to the compulsory elective area.

(2) The total number of semester load, credit hours (SWS) required for the successful degree of the Master's programme is at least 52 SWS in the compulsory and compulsory elective areas (see appendix). Of these

1. 26 SWS / 51 LP for compulsory subjects
2. at least 26 SWS / 39 LP in the compulsory elective area. These must be selected from the groups "Advanced Mathematics", "Physics in Applications" and "Computer-based Methods", provided that their content has not already been covered in the Bachelor's programme
   "Mathematical Modelling, Simulation and Optimisation".

(3) The courses in the Bachelor's programme are generally held in German, while those in the Master's programme are held in German or English. The compulsory area of the Master's programme is held in English, while courses in German are also offered in the compulsory elective area.

§ 8
Credit point system

(1) Each module is assigned the number of credit points specified in the appendix, which corresponds to the approximate amount of time that students generally need to spend attending all compulsory courses in the module, preparing for and following up on the course material, preparing for exams and taking the exams. The same applies to the Bachelor's and Master's theses. Credit points are awarded after successful completion of the module exam, the Bachelor's thesis, the Master's thesis or the final oral degree. The total workload for the course material of one term averages 30 credit points. The criteria for the allocation of credit points correspond to the European Credit Transfer System (ECTS).

(2) To successfully complete the degree programme, 180 credit points (CP) must be earned. Of these 180 credit points,

- the compulsory modules	144 CP,
- the compulsory elective modules	6 CP,
- the practical module	15 CP,
- the bachelor's thesis	12 CP, and
- the final oral examination	3 CP.

(3) To successfully complete the Master's degree, a total of 120 credit points must be earned, of which

- the compulsory modules	36 CP,
- the compulsory elective modules	39 CP,

- the project seminar	15 CP,
- the Master's thesis	27 CP, and
- the oral final examination	3 CP.

§ 9
Module exams, coursework, examination-relevant coursework

(1) The modules to be completed in accordance with the appendix conclude with a module exam. This does not apply to module 03XX1501. In exceptional cases, module exams may be taken as partial module exams (see appendix). The examinations shall be assessed in accordance with the provisions of § 16.

(2) Regular attendance at all courses in a module is a prerequisite for the award of credit points, provided that the courses are seminars, practicals or exercises. Regular attendance can still be certified if the student has missed up to two individual courses, but no more than four course hours per term. Exceptions may only be admitted in justified individual cases. For the remaining courses, the lecturer shall announce at the beginning of the course whether attendance will be monitored. If attendance is monitored, proof of regular attendance in accordance with sentence 1 may be waived in justified individual cases. A corresponding application must be submitted to the person responsible for the course in good time before the start of the first course of the module. The decision on this is made in individual cases or in principle by the examination board in agreement with the responsible subject representatives. Attendance at lectures is not compulsory. Credit points can only be awarded in conjunction with a final module exam.

(2a) Credit points for individual courses will only be certified upon written request, which must be accompanied by the necessary supporting documents, and only for transfer purposes. If, in justified individual cases, individual proof of coursework is required, a certificate of study will be issued by the course instructor. The certificate of attendance shall contain at least the name of the participating student, the exact name of the course and module, the term in which the course was held, the number of credit points and, in the case of a graded coursework, also the assessment of the coursework in accordance with § 16 (1) and the manner in which the coursework was accomplished. The certificate must be signed by the course instructor.

(3) If the appendix so provides, further coursework may be required as a prerequisite for admission to a module exam or the awarding of credit points. Coursework through successful participation in a course is deemed to have been achieved if the performance assessment results in a grade of at least satisfactory or a grade classified as "pass". Such performance assessments may comprise several parts and consist primarily of written exams, oral exams, portfolios (laboratory journal and, if applicable, other documents, e.g. articles, plots, papers), minutes, colloquia, subdivisions, practical exercises and term papers. The type and duration of the performance assessment shall be announced at the latest at the beginning of the course.

(4) Module exams are taken during the course of study. A module exam consists of an examination that covers the subject areas of all courses in a module. Module exams take place in written form (§ 10) or in oral form

form (§ 11). Combinations of examination forms within a module are permitted. If provided for in the appendix, a coursework assignment that is equivalent to an examination in terms of requirements and procedure is generally to be taken into account when determining the grade for the module exam (relevant for the examination coursework). §§ 10 and 11 apply accordingly to examination-relevant coursework.

(5) The oral and written module exams are intended to enable the candidate to demonstrate that they recognise the interrelationships within the subject area and are able to classify specific questions within these interrelationships. Furthermore, it should be determined whether the candidate has knowledge of the examination area that corresponds to the level of their studies.

For modules 03MA1106, 03MA1107, 03MA1112, 03MA1113, 03PH1101, 03PH1102, 03PH1104, 03PH1105, 03PH1106, 03PH1108 and 03PH1109, the provisions of the examination regulations for the related to teaching Bachelor's programme at the University of Koblenz-Landau dated 6 July 2009 (State Gazette for Rhineland-Palatinate No. 28, p. 1327) in the currently valid version (Newsletter of the University of Koblenz-Landau).

For module 03PH2110, the provisions of the examination regulations for the examination in the Master's degree programmes for teaching at primary schools, teaching at secondary schools plus, teaching at special needs schools and teaching at grammar schools at the University of Koblenz-Landau dated 19 October 2010 (State Gazette for Rhineland-Palatinate No. 45, p. 1800) in the currently valid version (University of Koblenz-Landau newsletter).

For module 03MA1201, the provisions of the examination regulations for the double-subject Bachelor's programme at the University of Koblenz-Landau dated 29 January 2013 (State Gazette for Rhineland-Palatinate No. 45, p. 1800) apply in their currently valid version.

module 03XX1401 is subject to the provisions of the Joint Examination Regulations for the Bachelor's programme in Applied Natural Sciences and the Master's programme in Chemistry and Physics of Functional Materials at the University of Koblenz-Landau dated 29 October 2015 Newsletter 5/2015 of the University of Koblenz-Landau, p. 53), as amended.

For module exams in modules offered by faculty 4: Computer Sciences (04IN1101, 04IN1102, 04IN1103, 04IN1020 and in the compulsory elective area "Computer-based Methods"), the provisions of the Joint Examination Regulations for Bachelor's and Master's degree programmes in the faculty of Computer Sciences at the University of Koblenz-Landau dated 9 July 2019 (University of Koblenz-Landau Newsletter 3/2019, p. 145, as amended.

(6) Module exams are held at the end of the lecture period of the term in which the corresponding courses were held and at the beginning of the lecture period of the following term. Candidates must register for one of the two examinations at least two weeks before the first examination date. If registration or participation in the examination is missed, the module exam is considered failed on the first attempt.

(7) In the case of study and examination achievements of students with disabilities, their special needs must be taken into account in order to ensure equal opportunities. If the candidate can credibly demonstrate that he or she is unable to take the examination in whole or in part in the prescribed form due to a long-term or permanent physical disability, the chair of the examination board shall allow him or her to take the examination within an extended period of time or to take equivalent examinations in another form.

A medical certificate may be required for this purpose. The same applies to coursework.

(8) A module exam that has not been graded as "sufficient" may be repeated twice. If the second repeat is also not graded with at least a "sufficient" (4.0), the module exam is considered definitively failed; the entire Bachelor's or Master's programme can no longer be successfully completed. The first retake and, if necessary, the second retake must take place within one year of the first failed module exam.

§ 10
Written module exams

(1) Written module exams consist of exams, term papers or portfolios. The time allowed for an exam is usually between 45 and 90 minutes (see appendix). The time allowed for term papers can be determined by the respective lecturer depending on the scope of the work and taking into account any other term papers to be completed within the same period. It usually takes two weeks, or four weeks in exceptional cases. For written examinations, students must submit a written declaration that they have written the paper independently and have not used any sources or aids other than those specified. The submission of a term paper in digital form (presentation) is permitted with the consent of the examiner.

(2) Written examinations are assessed by one examiner in each examination area. The second repeat of a written examination is conducted and assessed by two examiners. In the case of assessment by two examiners, the grade is calculated from the arithmetic mean of both assessments. Section 13 (13) applies accordingly. The assessment procedure should not exceed four weeks.

(3) A written examination in the form of a portfolio is understood to mean the independent writing, selection and compilation of a limited number of written documents on the topics of a study module and products produced in the corresponding courses. A portfolio consists of an introduction, a collection of documents and a reflection. The documents are taken from the entire period of study in the corresponding module. According to the detailed regulations in the appendix, two weeks are available for selecting the compilation and writing the introduction and reflection. Upon submission, the student must provide a statement that he or she has created the portfolio independently and has not used any sources or aids other than those specified. The submission of the portfolio in digital form (presentation) is permitted with the consent of the examiner.

(4) Written examinations in laboratory exercises consist of evaluations covering the preparation and performance of individual or multiple tests, experiments or practical activities in the individual practical courses; the grade for the module exam is calculated from the arithmetic mean of the grades for the individual examination components.

§ 11
Oral module exams

(1) Oral module exams are conducted by two examiners (collegial examination) or by one examiner in the presence of a knowledgeable assessor.

(2) Oral module exams are conducted as individual exams or as group exams with two students each, or as independently prepared seminar presentations followed by discussion. Individual and group examinations last 15 to 30 minutes per candidate, seminar presentations followed by discussion last 30 to 60 minutes. Section 10 (2) sentences 2 and 3 apply accordingly.

(3) If the examination questions require the use of graphical or mathematical representations, these shall form part of the oral exam. Before determining the grade, the examiner shall consult with the other examiners or assessors involved in the examination. The result shall be communicated to the candidate immediately after the oral exam. If the candidate fails, the reasons shall be disclosed to the candidate.

(3a) An oral portfolio examination consists of a presentation and discussion of a selection of materials (e.g. documents, graphics, lecture notes) from the period of study in the relevant module, which the candidate has independently selected and structured for the examination topic. The presentation must be prepared using the portfolio within 90 minutes of the examination question being announced and then presented in a 30-minute oral exam.

(4) A transcript must be made of the course of each oral exam. The transcript must include the names of the examiners, the person taking the minutes and the candidate, the start and end of the oral exam, the main subjects of the oral exam, the examination performance and the grades awarded. The transcript may not be written in electronic form.

(5) Upon request, students from the participating faculties may attend oral exams as observers, provided that none of the candidates objects to this when registering for the examination. The examiner shall decide on such requests, which must be submitted to the examination board three weeks before the examination, depending on the number of places available. Candidates sitting the same examination date are excluded from attending as observers. If the proper conduct of the examination is jeopardised, students may also be excluded during the examination.

(6) At the request of a candidate, the central gender equality officer or the gender equality officer of faculty 3 or 4 may attend the oral exams.

§ 12
Practical module / project seminar

(1) During the Bachelor's programme, a practical module must be completed, which can be carried out internally or with external institutions in all areas of mathematics, physics and Computer Sciences. The practical module is intended to prepare students for their Bachelor's thesis and provide insights into tasks and opportunities after completing the Bachelor's programme.

Students work on a disciplinary topic within a specified time under supervision. Students are expected to have the ability to achieve scientific results under professional guidance, to evaluate them critically and to classify them according to the current state of knowledge.

(2) Students are under the supervision of a supervisor (§ 4 (2)) during the practical module. The module exam takes the form of a seminar presentation followed by a discussion. The seminar presentation is based on a documentation of the practical module in German or English.

(3) The practical module should not be completed before the end of the fifth semester. The completion of the practical module at an external institution requires approval from the examination board.

(4) The time required for the practical module, equivalent to the credit points, is twelve weeks. For internships carried out outside the university, confirmation of the duration and completion of the internship must be submitted to the supervisor by the external institution. At the request of the student, the examination board may, in agreement with the supervisor, extend the processing time by a maximum of one month. The standard period of study must be observed. The topic, task and scope of the practical module must be limited by the supervisor in such a way that the deadline for completion can be met.

(5) The Master's programme includes an application-oriented, interdisciplinary project seminar that forms a link between theoretical principles, modelling concepts and simulations. Students work in small groups to solve real, application-oriented problems, which may involve issues from Computer Sciences, mathematics and physics, and apply the methods and techniques taught so far to solve the respective problem. Students are expected to be able to achieve, validate and interpret scientific results, taking into account current research findings, as well as to present these results and discuss them in the seminar group.

(6) Students are under the supervision of an examiner (§ 4 (2)) during the project seminar. The module exam takes the form of a seminar presentation followed by a discussion in English. The seminar presentation is based on a written documentation of the project seminar in English.

(7) The project seminar should be started in the second term. The examination board must approve the practical module being carried out at an external institution.

(8) The time required for the project part of the project seminar, equivalent to the credit points, is twelve weeks. For internships carried out outside the university, confirmation of the duration and completion of the project must be submitted to the supervisor by the external institution. At the request of the student, the examination board may, in agreement with the supervisor, extend the processing time by a maximum of one month. The standard period of study must be observed. The topic, task and scope of the project seminar must be limited by the supervisor in such a way that the deadline for completion can be met.

§ 13

Bachelor's and Master's theses

(1) The Bachelor's and Master's theses are written examinations. The Bachelor's thesis is an examination paper that is intended to demonstrate that the candidate is largely capable of independently modelling complex systems using sound mathematical methods, achieving scientific results, identifying and solving problems that arise in the process, critically evaluating them and classifying them according to the current state of knowledge. The Master's thesis is an examination paper that is intended to demonstrate that the candidate is capable of independently achieving scientific findings through the mathematical modelling of complex systems, recognising and solving problems that arise in the process, critically evaluating them and classifying them according to the current state of knowledge. The topics of the bachelor's and master's theses can come from any field in which complex systems occur and can be interdisciplinary in nature. Twelve credit points are awarded for the bachelor's thesis and 27 credit points for the master's thesis.

(2) The candidate is supervised by a supervisor (§ 4 (2)) during the preparation of the final thesis. The supervisor is obliged to guide the candidate in the preparation of the final thesis and to regularly inform themselves about the progress of the work. With the approval of the examination board, the final thesis may also be written outside the departments 3: Mathematics/Natural Sciences and 4: Computer Sciences and supervised by a person from the external institution who is authorised to conduct examinations.

(3) The final thesis is usually assessed by two persons, each of whom provides a written report. One report is prepared by the supervisor. The second examiner is appointed by the chair of the examination board. One of the examiners must be a university lecturer in Department 3: Mathematics/Natural Sciences or Department 4: Computer Sciences.

(4) To be admitted to the Bachelor's thesis, students must

1. have earned at least 120 LP and
2. has agreed on a preliminary topic for a Bachelor's thesis with a supervisor.

(5) To be admitted to the Master's thesis, you must

1. have earned at least 60 LP and
2. has agreed on a preliminary topic for a Master's thesis with a supervisor.

(6) The application for admission to the final thesis must be submitted in writing to the examination board. The application must be accompanied by

1. proof of the credit points earned in accordance with paragraph 4 no. 1 or paragraph 5 no. 1 and
2. the proposal for the topic the final thesis with approval of the proposed supervisor.

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(7) The examination board decides on admission to the final thesis. Admission to the final thesis will be refused if the candidate does not meet the admission requirements or if the documents referred to in paragraph 5 are incomplete. If the candidate is not admitted to the final thesis, he or she shall be notified of this decision in writing, stating the reasons. The notification shall be accompanied by information on the right of appeal. If the

candidate is admitted, the examination board shall determine the start date of the final thesis and record this in the files.

(8) The Bachelor's thesis may be written in German or English. The Master's thesis must be written in English.

(9) Registration for the Bachelor's thesis usually takes place after the degree of the fifth semester, but no later than six weeks after completion of all the requirements listed in the appendix, otherwise the Bachelor's thesis is considered failed for the first time. Registration for the Master's thesis usually takes place after the degree of the third semester, but no later than six weeks after completion of all the requirements listed in the appendix, otherwise the Master's thesis is considered failed for the first time. In the notification of the initial failure of the final thesis, the chair of the examination board shall request the candidate to submit the documents specified in paragraph 5 within four weeks. If the deadline is missed, the final thesis is considered to have been definitively failed, unless only the document specified in paragraph 5 no. 2 is missing. In this case, the chair of the examination board determines the topic and the start date of the final thesis in consultation with the candidate.

(10) The workload for the Bachelor's thesis comprises 12 credit points (360 working hours), and that for the Master's thesis 27 credit points (810 working hours). The period from the assignment of the topic to the candidate to the submission of the thesis is twelve weeks for the Bachelor's thesis and twenty-four weeks for the Master's thesis. At the request of the candidate, the examination board may, in consultation with the supervisor, extend the processing time by a maximum of one month. Compliance with the standard period of study must be ensured. The topic, task and scope of the final thesis must be limited by the supervisor in such a way that the deadline for completing the final thesis can be met. The topic can only be returned once and only within the first two weeks of the processing period. A new topic must be agreed upon immediately, at the latest within four weeks. Paragraphs 4, 5, 6 and 9 apply accordingly.

(11) The candidate shall submit the final thesis to the examination board in triplicate and in electronic form by the deadline and shall confirm in writing upon submission that he or she has written the thesis independently and has not used any sources or aids other than those specified. If the bachelor's thesis is written in English in accordance with paragraph 8, a German summary must be included. If the thesis is written in German in accordance with paragraph 8, an English summary must be included. The date of submission must be recorded. If the final thesis is not submitted by the deadline, it will be graded as "unsatisfactory".

(12) The examination board forwards the final thesis to the supervisor as the first assessor and to the second assessor as the second assessor in accordance with paragraph 3.

(13) If the assessments of the two reviews differ by up to one full grade (≤ 1.0), the overall grade is calculated as the arithmetic mean of the two individual assessments. If the grades in the two reports differ by more than one full grade (> 1.0), the chair of the examination board shall appoint a third examiner. The chair of the examination board shall determine the final overall grade on the basis of the three reports. The assessment procedure shall not exceed six weeks.

(14) The final thesis is failed if the overall grade is "unsatisfactory". The failed final thesis may be repeated once. The examination board shall ensure that the candidate receives a new topic for a final thesis within six weeks of the grade being announced. A return of the topic in accordance with paragraph 10, sentence 5, is only permissible if the candidate did not make use of this option when first writing their final thesis. A second repeat of the final thesis is not permitted.

§ 14
Oral final examination

(1) The oral final examination shall take place within four weeks of the submission of the Bachelor's or Master's thesis. The date of the oral final examination shall be determined by the chair of the examination board and communicated to the candidate at least two weeks in advance. Three credit points shall be awarded for the oral final examination.

(2) The oral final examination takes the form of a seminar presentation followed by a discussion and is conducted by the examiners of the final thesis. The seminar presentation is based on the final thesis. In the Bachelor's programme, the examination language is usually German; in exceptional cases, the examination may be conducted in English. The examination board decides on exceptions. In the Master's programme, the examination is conducted in English.

(3) Following the examination, the examiners determine the grade for the final oral examination. They are required to agree on a joint grade. If no agreement can be reached, the first examiner's vote shall be decisive.

(4) The final oral examination is failed if the examination performance is graded lower than "sufficient" (4.0). The result of the examination must be announced to the candidate immediately after the oral exam. If the candidate fails, the reasons must be disclosed to them. A failed final oral examination may be repeated once within six months of the failure. The right to take the examination expires if the repeat period is missed.

§ 15
Passing and failing the Bachelor's and Master's examinations, Repeating examination performances

(1) The Bachelor's examination is passed if the module exams, the Bachelor's thesis and the final oral exam have each been passed with a grade of at least "sufficient" (4.0) and the 180 credit points required for the Bachelor's programme in accordance with § 8 (2) have been demonstrated. The Master's examination is passed if the module exams, the Master's thesis and the final oral exam have each been passed with a grade of at least
"sufficient" (4.0) and the 120 LP required for the Master's programme in accordance with § 8 (3) and a total of 300 LP from the completed Bachelor's and Master's programmes have been demonstrated.

(2) Failed examinations and relevant for the examination coursework in a comparable Bachelor's or Master's programme at another higher education institution in

Germany or abroad shall be counted as failed attempts towards the permissible number of repeat examinations. Failed examinations and relevant for the examination coursework in modules or examination areas of another study programme at a university in Germany or abroad that essentially correspond to those in the Bachelor's degree programme "Mathematical Modelling, Simulation and Optimisation" or the Master's degree programme "Mathematical Modelling, Simulation and Optimisation" at a university in Germany or abroad, provided that equivalent or lower requirements are stipulated for passing them.

(3) An examination passed cannot be repeated.

(4) If an examination cannot be taken or repeated, the Bachelor's or Master's examination is definitively failed and it is no longer possible to continue studying in the Bachelor's or Master's programme.

(5) If the Bachelor's or Master's examination has not been passed or is considered failed, the examination board shall issue the candidate with a written notification to this effect. The notification shall include information on the right of appeal.

§ 16
Assessment of examination performance, education of final grades and overall grade

(1) The following grades shall be used for the assessment of examination performance and relevant coursework:

1.0; 1.3	very good	=	an outstanding performance;
1.7; 2.0; 2.3	good	=	a performance that significantly exceeds average requirements;
2.7; 3.0; 3.3	satisfactory	=	a performance that meets average requirements corresponds to requirements;
3.7; 4.0	sufficient	=	a performance that, despite its shortcomings, still meets the requirements;
5.0	not satisfactory	=	a performance that no longer meets the no longer meets the requirements.

(2) A module exam is passed if the coursework assigned to the module in accordance with the appendix have been completed and the final module exam has been graded at least "sufficient" (4.0). This does not apply to module 03XX1501. If a module exam consists of several examination components, each examination component must be passed. In this case, the grade for the module exam is calculated from the arithmetic mean of the grades for the individual examination components, unless different regulations are agreed upon when the type and duration of the examination are announced in accordance with § 9 (4) sentence 5. If a module exam consists of one examination component, its grade is also the grade achieved for the module exam. If the examination regulations in accordance with § 9 (4) sentence 7, one or, in special cases, several relevant for the examination coursework are stipulated for a module, the grades for the individual relevant for the examination coursework are multiplied by the credit points assigned to them in order to determine the grade for the module exam. The grade for the module exam performance or the grade formed from the arithmetic mean of the grades of several examination performances is multiplied by the credit points of the entire module. The values determined in this way are added together and divided by the total number of credit points included in the above calculation. The grade for the module exam is:

For an average

of up to 1.5 inclusive	=	very
good, above 1.6 up to and including 2.5	=	good,
above 2.6 up to and including 3.5	=	satisfactory,
above 3.6 up to and including 4.0	=	adequate,
above 4.0	=	not satisfactory.

During the education of module grades, only the first decimal place after the comma is taken into account; all other decimal places are deleted without rounding.

(3) The overall grade for the final thesis and the oral final examination is calculated as the arithmetic mean of the partial grades, with the grade for the final thesis weighted twice. The overall grade for the Bachelor's thesis and the oral final examination is included in the overall grade for the Bachelor's examination in a ratio of 22:180. The overall grade for the Master's thesis and the final oral examination is included in the overall grade for the Master's examination in a ratio of 30:180.

(4) To determine the overall grade for the Bachelor's examination, the grades for the module exams in accordance with the appendix and the overall grade for the final thesis and the final oral examination are multiplied by the respective credit points, added together and divided by the total number of credit points included.
To determine the overall grade for the Master's examination, the grades for the module exams in accordance with § 9 (1) in conjunction with § 7 are multiplied by the respective credit points, added to the overall grade for the final thesis and the final oral examination in accordance with paragraph 3, and divided by the total number of credit points included.
The overall grade calculated in this way is:

For an average

of up to 1.5 inclusive	=	very good,
above 1.6 up to and including 2.5	=	good,
above 2.6 up to and including 3.5	=	satisfactory,
above 3.6 up to and including 4.0	=	adequate,
above 4.0	=	not satisfactory.

In the education of overall grades, only the first decimal place after the comma is taken into account; all further decimal places are deleted without rounding. In the case of outstanding performance (overall grade 1.0 to 1.2), the overall assessment "Passed with distinction" is awarded.

§ 17
Certificate, diploma, diploma supplement

(1) Once the Bachelor's or Master's examination has been passed, the candidate will receive a certificate immediately, or at the latest after four weeks, containing the grades for the final thesis, the oral final examination, the individual grades for the module exams and the overall grade. The certificate will also include the topic of the final thesis and the duration of study required to complete the Bachelor's or Master's examination. At the candidate's request, additional courses attended and their final grades will be included in the certificate.

(2) The certificate shall bear the date on which the last examination was taken. It shall be signed by the chair of the examination board and bear the seal of the state.

(3) At the same time as the certificate, the candidate is given a document certifying the award of the degree of "Bachelor of Science (B.Sc.)" or "Master of Science (M.Sc.)". The certificate bears the date of the degree certificate. It is signed by the dean of Faculty 3: Mathematics / Natural Sciences and Faculty 4: Computer Sciences, as well as the chair of the examination board, and bears the seal of the state. At the candidate's request, the German designation may also be added to the academic degree.

(4) In addition, graduates receive a Diploma Supplement (DS) in accordance with the Diploma Supplement Model of the European Union / Council of Europe / UNESCO. The text agreed upon by the Standing Conference of the Ministers of Education and Cultural Affairs and the German Rectors' Conference in its currently valid version is to be used as a description of the national educational system (DS Section 8). The currently valid version can be found at: http://www.hrk.de (keyword: "Diploma Supplement"). The Diploma Supplement contains, in particular, information about the higher education institution, the type of degree, the study programme, the admission requirements, the study requirements and the course of study, as well as information about the German study system. In addition, the ECTS grading table is presented, showing the percentage of students per local grade within the comparison group of the degree programme. It must be signed by the chair of the examination board.

(5) The certificate and diploma are in German, while the Diploma Supplement is in German and English. An English translation is attached to the candidate's diploma.

(6) Students who leave the university without a degree or who continue their studies at the university in another study programme will receive a summary certificate of their academic and examination achievements upon request and upon presentation of the relevant evidence. The request must be submitted in writing to the chair of the examination board, enclosing the necessary documents.

§ 18
Absence, withdrawal, deception, breach of regulations

(1) A candidate may withdraw from an examination without giving reasons if he or she notifies the examination board of his or her withdrawal in person or in writing at least two weeks before the date of the examination. In the case of written notification, the date of the postmark shall be decisive. Withdrawal in accordance with sentence 1 is not possible if, in the event of withdrawal, the deadlines set out in these examination regulations cannot be met.

(2) If the candidate has not withdrawn from an examination date in due time, fails to appear without good reason, or withdraws after the start of the examination without good reason, the respective examination performance will be graded as "unsatisfactory" (5.0).

(3) The reasons given for withdrawal or absence must be reported to the examination board in writing without delay and must be substantiated. If the examination board accepts the reasons, the absence or withdrawal will be treated as a timely withdrawal in accordance with paragraph 1. In this case, any examination results already available shall be taken into account. If the absence or withdrawal is due to illness of the candidate for the first time, the inability to take the examination must be proven by a medical certificate. From the second

sick note, a certificate from a public health officer or a qualified certificate from the attending physician must be submitted. The latter must contain information on the duration of the illness, the dates of medical treatment, the nature and extent of the illness, stating the facts as determined by the physician on the basis of his or her own observations (findings), and the effect of the illness on the examination. The candidate must submit the medical certificate to the examination board without delay. The illness of the candidate is equivalent to the illness of a child for whom he or she is primarily responsible. If the reasons are accepted, a new date will be arranged.

(4) If the candidate interrupts an oral exam without the consent of the examiner and without valid reasons, the exam will be graded as "unsatisfactory" (5.0).

(5) If the candidate attempts to influence the result of their examination performance by deception or the use of unauthorised aids, the examination performance in question shall be graded as "unsatisfactory" (5.0).

(6) If the candidate disrupts the proper conduct of the examination, he or she may be excluded from the examination by the respective examiner; in this case, the examination performance in question shall be graded as "unsatisfactory" (5.0). In serious cases, the examination board may initiate proceedings in accordance with Section 69 (6) of the Higher Education Act.

(7) Adverse decisions must be communicated to the candidate in writing without delay and justified; information on legal remedies must be included. Before a decision is made in accordance with paragraph 6, sentence 2, the candidate concerned must be given the opportunity to be heard.

§ 19
Invalidity of the Bachelor's and Master's examinations

(1) If the candidate has cheated in an examination and this fact only becomes known after the certificate has been issued, the examination board may retrospectively adjust the grades for those examination performances in which the candidate cheated and declare the examination wholly or partially failed. The examiners shall be heard beforehand.

(2) If the requirements for admission to an examination were not met without the candidate intending to cheat, and this fact only becomes known after the certificate has been issued, this deficiency shall be remedied by passing the examination. If the candidate has deliberately obtained admission under false pretences, the examination board shall decide in accordance with the State Administrative Procedure Act.

(3) The candidate shall be given the opportunity to comment before a decision is made.

(4) The incorrect examination certificate and the Diploma Supplement shall be withdrawn and, if necessary, reissued. Furthermore, the certificate shall be withdrawn in accordance with Section 17 (3) if the Bachelor's or Master's examination has been declared "failed" on the grounds of deception. A decision in accordance with paragraphs 1 and 2 shall be excluded after a period of five years from the date of the examination certificate.

§ 20
Inspection of examination files

(1) Upon request, candidates shall be granted access to their examination files, their final thesis, the related reports and the examination records. Access shall also be granted if the Bachelor's examination has not yet been completed.

(2) The request must be submitted to the chair of the examination board within one year of written notification of the examination result. The chair of the examination board shall determine the place and time of inspection.

(3) Documents relating to academic and examination achievements (with the exception of the final thesis) are kept for two years after completion of the last examination (date of the certificate) and can be handed over to graduates after this period. If the documents relating to academic and examination achievements are not collected from the relevant Examination Office within six months of the expiry of the two-year period, the documents will be destroyed. The provisions on the archiving of certificates, documents and diploma supplements remain unaffected by this.

§ 21
Entry into force

These regulations shall enter into force on the day after their publication in the University of Koblenz-Landau newsletter.

Koblenz, 29 October 2015

The Dean of Faculty 3: Mathematics / Natural Sciences Prof. Dr. Stefan Wehner

Mainz, 20 October 2015

The dean of faculty 4: Computer Sciences
Prof. Dr. Ralf Lämmel

Appendix

Bachelor of Science (B.Sc.) Mathematical Modelling, Simulation and Optimisation

Compulsory modules (174 LP – including bachelor's thesis and oral final examination)

	Courses	Designation	Compulsory / Compulsory elective	Credits	SWS	Study performance	Examination-relevant study performance
	module 01 Disciplinary prerequisites 03MA1201 *individual course requirements: None*						5 credit points Compulsory module
1.1	Elementary mathematics from a higher perspective (V)	3611011	Comp	3	2		
1.2	Tutorials in elementary mathematics from a higher perspective (Ü)	3611012	Compulsory	2	2	X	
	Module exam for 3611011 and 3611012		Written		exam		90 min
	module 02 Fundamentals of Mathematics A: Linear Algebra 1 / Analysis 1 03MA1112 *individual course requirements: Competences from 3611011 and 3611012*						10 credit points Compulsory module
2.	Linear Algebra 1 / Analysis 1 (V)	3611121	Comp	7	5		
2.2	Tutorials in Linear Algebra 1 / Analysis 1 (Ü)	3611122	Compulsory	3	2	X	
	Module exam Mathematics M2a - Koblenz		Written		exam		90 min
	module 03 Experimental Physics 1: Mechanics, Thermodynamics 03PH1101 *individual course requirements: None*						12 credit points Compulsory module
3.1	Mathematics for Physicists 1 (V)	3511011	Comp	2	2		
3.2	Mathematics for Physicists 1 (Ü)	3511012	Compulsory	3	2		
3.3	Experimental Physics 1 (V)	3511013	Compulsory	4	4		
3.4	Experimental Physics 1 (P)	3511014	Compulsory	3	2		
	Module exam Physics M1 - Koblenz		Written		exam		90 min
	module 04 Introduction to scientific software 03XX1501 module *Module 03XX1501 (Introduction to Scientific Software) is completed without a module exam in accordance with § 9 (1). The credits for the module are included in the overall grade for the Bachelor's examination in accordance with § 16 (3).*						7 credit points Compulsory
4.1	Mathematical Simulation Software (Ü)	3615015	Comp	2	2		
4.2	LaTeX (Ü)	3615016	Compulsory	2	1		
4.3	Introduction to an object-oriented programming language (Ü)	3615017	Compulsory	3	2		

	module 05 Fundamentals of Mathematics B: Linear Algebra 2 / Analysis 2 9 credit points **03MA1113** Compulsory module *Compulsory module for RS plus, Gym* *individual course requirements: Competences from 3611011 and 3611012* *Competences from module 03MA1112*						
5.	Linear Algebra 2 / Analysis 2 (V)	3611131	Compulsory	6	4		
5.2	Tutorials in Linear Algebra 2 / Analysis 2 (Ü)	3611132	Compulsory	3	2		
	Module exam Mathematics M3a - Koblenz		Written		exam		90 min
	module 06 Experimental Physics 2: Electrodynamics, Optics 12 credit points **03PH1102** Compulsory module *Individual course requirements for 3511021: Competences from 3511011 and 3511012* *Individual course requirements for 3511022: Competences from 3511011 and 3511012* *Individual course requirements for 3511023: competences from module 03PH1101* *Individual course requirements for 3511024: competences from module 03PH1101*						
6.1	Mathematics for Physicists 2 (V)	3511021	Compulsory	2	2		
6.2	Mathematics for Physicists 2 (Ü)	3511022	Compulsory	3	2		
6.3	Experimental Physics 2 (V)	3511023	Compulsory	4	4		
6.4	Experimental Physics 2 (Tutorial)	3511024	Compulsory	3	2		
	Module exam Physics M2 - Koblenz		Written		exam		90 min
	module 07 Experimental Physics 3: Atomic and Quantum Physics 9 credit points **03PH1106** Compulsory module *Individual course requirements for 3511061: Competences from modules 3511011 and 3511012* *Individual course requirements for 3511062: Competences from modules 03PH1101 and 03PH1102* *Individual course requirements for participation 3511063: competences from modules 03PH1101 and 03PH1102*						
7.1	Mathematics for Physicists 3 (V)	3511061	Compulsory	3	2		
7.2	Experimental Physics 3 (V)	3511062	Compulsory	4	3		
7.3	Experimental Physics 3 (P)	3511063	Compulsory	2	1		
	Module exam Physics M6 - Koblenz		Written		exam		90 min
	module 08 Programming and Modelling 6 credit points **04IN1101** Compulsory module						
8.1	Programming and Modelling (V)	04IN1101-1	Compulsory	3	2		
8.2	Programming and Modelling (Ü)	04IN110101	Compulsory	3	2		
	Module exam Programming and Modelling		Written		exam		90 min

	module 09 **Internship in Programming and Modelling** 3 credit points **04IN1102** Compulsory module						
9.1	Internship Programming and Modelling (P)	04IN1102	Comp	3	2		
	Module exam Programming and Modelling internship Modelling		Written		exam		60 min
	module 10 **Mathematics as a potential solution A: Modelling and practical applications** 10 credit points **03MA1106** **Mathematics** Compulsory module *individual course requirements:* *Competences from 3611011 and 3611012* *Competences from module 03MA1112* *Competences from module 03MA1113*						
10.1	Numerical Methods and Modelling (V)	361106	Compulsory	5	4		
10.2	Tutorials in Numerics and Modelling (Ü)	3611062	Compulsory	3	2		
10.3	Use of computers in numerical analysis (LÜ)	3611063	Compulsory	2	1	X	
	Module exam Mathematics as a potential solution A: Modelling and practical mathematics		Written		exam		90 min
	module 11 **Basic experimental practical course 1: Mechanics, thermodynamics** 5 credit points **03PH1104** Compulsory module *individual course requirements:* *Passed module exam in module 03PH1101*						
11.1	Basic Experimental Practicum 1 (LÜ)	3511041	Compulsory	5	3	X	
	Module exam in physics M4 – Koblenz		Written		portfolio		1 week
	module 12 **Introduction to optimisation** 9 credit points **03MA1504** Compulsory module *One optional compulsory subject must be chosen from: 3615042 and 3615043, depending on availability.* *Prerequisite for participation:* *Competences from modules 03MA1201, 03MA1112, 03MA1113, 03MA1106*						
12.1	Introduction to Optimisation (V)	3615041	Compulsory	6	4		
12.2	Introduction to Optimisation (Ü)	3615042	Elective	3	2		
12.3	Introduction to Optimisation (S)	3615043	Elective	3	2		
	module exam Introduction to Optimisation		Written		exam		90 min
	module 13 **Mathematics as a Solution Potential B: Introduction to Stochastics** 8 credit points **03MA1107** Compulsory module *individual course requirements:* *Competences from 3611011 and 3611012* *Competences from 3611121 and 3611122* *Competences from 3611131 and 3611132*						
13.1	Stochastics (V)	361107	Compulsory	5	4		
13.2	Stochastics (Ü)	3611072	Compulsory	3	2		
	Module exam Mathematics M7a - Koblenz		Written		exam		90 min

	module 14 Theoretical Physics 1: Theoretical Mechanics, Electrodynamics 7 credit points **03PH1109** Compulsory module *individual course requirements:* *Competences from modules 03PH1101, 03PH1102 and 03PH1106*						
14.1	Theoretical Physics 1 (V)	3511091	Compulsory	4	3		
14.2	Theoretical Physics 1 (seminar)	3511092	Compulsory	3	1		
	Module exam in physics M9 – Koblenz		Written		exam		90 min
	module 15 Basic Experimental Practical 2: Electrodynamics, Optics 5 credit points **03PH1105** Compulsory module *individual course requirements:* *Competences 3511011 and 3511012* *Competences from 3511021 and 3511024 Competences* *from module 03PH1104 Pass* *module exam in module 03PH1102*						
15.1	Basic Experimental Practicum 2 (LÜ)	3511051	Compulsory	5	3	X	
	Module exam Physics M5 - Koblenz		Written		portfolio		1 week
	module 16 Algorithms and Data Structures 9 credit points **04IN1103** Compulsory module *individual course requirements:* *Basic knowledge of object-oriented programming and modelling with Java.*						
16.1	Algorithms and Data Structures (V)	04IN110301	Compulsory	6	4		
16.2	Algorithms and Data Structures (Ü)	04IN110302	Compulsory	3	2		
	Module exam Algorithms and Data Structures		Written		exam		90 min
	module 17 Modelling, Simulation and Optimisation 9 credit points **03MA1505** Compulsory module *One optional compulsory subject must be chosen, depending on availability.* *individual course requirements:* *Competences from modules 03MA1201, 03MA1102, 03MA1103, 03MA1106, 03MA1504*						
17.1	Modelling, Simulation and Optimisation (V)	3615051	Compulsory	6	4		
17.2	Modelling, Simulation and Optimisation (Ü)	3615052	Elective	3	2		
17.3	Modelling, simulation and optimisation (S)	3615053	Elective	3	2		
	Module exam Modelling, simulation and optimisation		Written		exam		90 min
	module 18 Fundamentals of Communication 9 credit points **03XX1401** Compulsory module *individual course requirements:* *English at level B2* *Individual course requirements for 3514017:* *competences from 3514016*						
18.1	KSB Communication Techniques (S)	100315	Compulsory	3	2	X	
18.2	Scientific English 1 (Ü)	3514016	Compulsory	3	2	X	

18.3	Scientific English 2 (Ü)	3514017	Compulsory	3	2		
	Module exam Fundamentals of Communication		Written		term paper in the form of a presentation in English		20 min.
	module 19 Practical module MSO **03XX1503** module *individual course requirements:* *Competences from modules 03MA1106, 03MA1107, 03MA1112, 03MA1113, 03MA1201, 03MA1503, 03PH1101, 03PH1102, 03PH1104, 03PH1105, 03PH1106, 03PH1109, 04XX1401 and 04XX1501*						15 credit points Compulsory
19.1	Disciplinary Proseminar (PS)	3611045	Compulsory	3	2		
19.2	Practical module (Pro)	3915031	Compulsory	11	0	X	
19.3	Accompanying seminar for the practical module (S)	3915032	Compulsory	1	2		
	Practical module exam MSO		Oral		Seminar presentation in accordance with §12 Examination Regulations		30 min.

Elective

One of the following modules must be selected.

	Courses	Designation	Compulsory / Elective	Credits	SWS	Study performance	Examination-relevant study performance
	module 20 Elementary algebra and number theory **03MA1503**						6 credit points Elective module
20.1	Elementary Algebra and Number Theory (V)	3611041	Compulsory	4	2		
20.2	Tutorials in Elementary Algebra and Number Theory (Ü)	3611042	Compulsory	2	1		
	Module exam Elementary Algebra and Number Theory		Written		exam		90 min
	module 21 Theoretical Physics 2: Quantum Theory, Statistical Physics and Thermodynamics **03PH2110** elective module *individual course requirements:* *Competences from modules 03PH1101 (3511011 - 3511014), 03PH1102 (3511021 - 3511024), 03PH1106 (3511061 - 3511063) and 03PH1109 (3511091 and 3511092)*						6 credit points Compulsory
21.1	Theoretical Physics 2 (V)	3521101	Compulsory	4	3		
21.2	Theoretical Physics 2 (seminar)	3521102	Compulsory	2	1		
	Module exam Physics M10 - Koblenz		Written		exam		90 min

	module 22 Fundamentals of Databases **04IN1020** *individual course requirements:* *Knowledge of algorithms and data structures.*						6 credit points Elective module
22.1	Fundamentals of Databases (V)	04IN102001	Compulsory	3	2		
22.2	Fundamentals of Databases (Ü)	04IN102002	Compulsory	3	2		
	module exam Fundamentals of Databases		Written		exam		90 min

final thesis

	MAT-23 Bachelor's thesis **04IN1020** module *individual course requirements:* *Competences from modules 03MA1106, 03MA1201, 03MA1504, 03MA1505, 03PH1101, 03PH1102, 03PH1104, 03PH1105, 03PH1106, 03PH1109, 04IN1101, 04IN1102.* *Individual course requirements for 03XX1590:* *In accordance with §13 (4), students who* *1. have earned at least 120 LP and* *2. have agreed on a preliminary topic for a Bachelor's thesis with a supervisor.* *Individual course requirements for 03XX1599:* *Competences from 03XX1590*						15 credit points Compulsory
	Bachelor's thesis (Sc)	03XX1590	Compulsory	12	0		
	Oral final examination (colloquium) (M)	03XX1599	Compulsory	3	0		
	Bachelor's thesis		Written		Bachelor's thesis 12 weeks in accordance with § 13 examination regulations.		
	Oral final examination (colloquium)		Oral		Oral final examination in accordance with § 14 of the examination regulations.		30 min

Master of Science (M.Sc.) Mathematical Modelling, Simulation and Optimisation

Compulsory modules

Compulsory modules (81 LP – including Master's thesis and oral final examination)

	Courses	Designation	Compulsory / Elective	Credits	SWS	Study performance	Examination-relevant study performance
	module 01 03MA2501 **Applied Differential Equations** module *One optional compulsory subject must be chosen, depending on availability.* *(One of the following compulsory courses must be chosen, depending on availability.)* *individual course requirements: None*					9 credit points Compulsory	
1.1	Applied Differential Equations (V)	3625011	Compulsory	6	4		
1.2	Applied Differential Equations (Ü)	3625012	Elective	3	2	X	
1.3	Applied Differential Equations (S)	3625013	Elective	3	2	X	
	Module exam Applied Differential Equations		Written or Oral		written exam or Oral examination		90/30 Min.
	module 02 03MA2502 **Optimisation** module *One optional compulsory subject must be chosen, depending on availability.* *(One of the following compulsory courses must be chosen, depending on availability.)* *individual course requirements: None*					9 credit points Compulsory	
2.1	Optimisation (V)	3625021	Compulsory	6	4		
2.2	Optimisation (Ü)	3625022	Elective	3	2	X	
2.3	Optimisation (S)	3625023	Elective	3	2	X	
	Module exam Optimisation		Written or oral		written exam or Oral examination		90/30 Min.
	module 03 03MA2503 **Numerics for Partial Differential Equations** module *One of the optional compulsory subjects has to be chosen, depending on provision.* *(One of the following compulsory courses has to be chosen, depending on provision.)* *individual course requirements: Passed module exam 03MA2501*					9 credit points Compulsory	
3.1	Numerics for Partial Differential Equations (V)	3625031	Compulsory	6	4		
3.2	Numerics for Partial Differential Equations (Ü)	3625032	Elective	3	2		
3.3	Numerics for Partial Differential Equations (S)	3625033	Elective	3	2		
	Module exam Numerics for Partial Differential Equations		Written or Oral		written exam or Oral examination		90/30 Min.

	module 04 Optimisation 2 **03MA2504** module *One of the optional compulsory subjects has to be chosen, depending on provision.* *(One of the following compulsory courses has to be chosen, depending on provision.)* *individual course requirements: Passed module exam 03MA2502*				9 credit points Compulsory		
4.1	Optimisation 2 (V)	3625041	Obligation	6	4		
4.2	Optimisation 2 (Ü)	3625042	Elective	3	2	X	
4.3	Optimisation 2 (S)	3625043	Elective	3	2	X	
	Module exam Optimisation 2		Written or oral		written exam or Oral examination		90/30 Min.
	module 05 Project seminar **03XX2501** module *Two of the following compulsory elective courses must be chosen together. Either the two courses 3525015 and 3525016 or the two courses 3625015 and 3625016, depending on availability.* *(Optional compulsory courses: Two of the following compulsory courses have to be chosen. Either the two courses 3525015 and 3525016 or the two courses 3625015 and 3625016, depending on availability.)*				15 credit points Compulsory		
5.1	Project (Pro)	3525015	Elective	12	0	X	
5.2	seminar (S)	3525016	Elective	3	2		
5.3	Project (Pro)	3625015	Elective	12	0	X	
5.4	seminar (S)	3625016	Elective	3	2		
	Module exam Project seminar		Oral		Seminar presentation in accordance with §12 of the examination regulations.		30 min.

Elective area:

Modules worth at least 39 LP must be completed from the following areas (Advanced Mathematics; Physics in Applications; Computer-based Methods), provided that their content has not already been covered in the Bachelor's programme "Mathematical Modelling".

Advanced Mathematics

	Courses	Designation	Compulsory / Compulsory elective	Credits	SWS	Study performance	Examination-relevant study performance
	module 06 Special topics in mathematics **03MA2508** *One of the optional compulsory subjects has to be chosen, depending on provision.* *(One of the following compulsory courses has to be chosen, depending on provision.)*				9 credit points Elective module		
6.1	Special Topics in Mathematics (V)	3625081	Compulsory	6	4		
6.2	Special Topics in Mathematics (Ü)	3625082	Elective	3	2		
6.3	Special topics in mathematics (S)	3625083	Elective	3	2		
	Module exam Special topics of Mathematics		Written or Oral		written exam or Oral examination		90/30 Min.

	module 07 Special topics of Applied Mathematics **03MA2509** *One of the optional compulsory subjects has to be chosen, depending on provision.* *(One of the following compulsory courses has to be chosen, depending on provision.)*						9 credit points Elective module
7.1	Applied Mathematics (V)	3625091	Compulsory	6	4		
7.2	Applied Mathematics (Ü)	3625092	Elective	3	2		
7.3	Applied Mathematics (S)	3625093	Elective	3	2		
	module exam Special topics of Applied Mathematics		Written or Oral		written exam or Oral examination		90/30 Min.
	module 08 Specialisation in Mathematics **03MA2510** *One optional compulsory subject must be chosen, depending on availability.* *(One of the following compulsory courses has to be chosen, depending on provision.)*						9 credit points Elective module
8.1	Specialisation in Mathematics (V)	3625101	Compulsory	6	4		
8.2	Specialisation in Mathematics (Ü)	3625102	Elective	3	2		
8.3	Specialisation in Mathematics (S)	3625103	compulsory elective	3	2		
	Module exam Specialisation in Mathematics		Written or Oral		written exam or Oral examination		90/30 Min.

Physics in Applications

	Courses	Designation	Compulsory / Compulsory elective	Credits	SWS	Study performance	Examination-relevant study performance
	module 09 Theoretical Physics 2: Quantum Theory, Statistical Physics and Thermodynamics **03PH2110** elective module *individual course requirements:* *Competences from modules 03PH1101 (3511011 - 3511014), 03PH1102 (3511021 - 3511024), 03PH1106 (3511061 - 3511063) and 03PH1109 (3511091 and 3511092)*						6 credit points Compulsory
9.1	Theoretical Physics 2 (V)	3521101	Compulsory	4	3		
9.2	Theoretical Physics 2 (seminar)	3521102	Compulsory	2	1		
	Module exam Physics M10 - Koblenz		Written		exam		90 min
	module 10 Current Issues in Physics **03PH2402** elective module *Elective options:* *a) Two optional compulsory subjects worth 6 CP must be selected, depending on availability. Individual course requirements:* *None*						6 credit points Compulsory
10.	Optional compulsory subject in physics with topics changing each semester (V)	3521163	Elective	3	2		

10	Elective lectures with term-changing topics (V)	3521165	Elective	3	2		
	Module exam Current issues in physics		Written or Oral		written exam or Oral examination		90/30 Min.
	module 11 Solid State Physics **03PH2501** *individual course requirements: None*						6 credit points Elective module
11	Solid State Physics (V)	3525011	Compulsory	4	3		
11.2	Solid State Physics (Ü)	3525012	Obligation	2	1		
	Module exam Solid State Physics		Written		exam		90 min
	module 12 Surface Science **03PH2503** *individual course requirements: None*						6 credit points Elective module
12	Vacuum Technology (V)	3525031	Compulsory	3	2		
12.2	Fundamentals of Surface Science (V)	3525032	Compulsory	3	2		
	module exam Surface Science		Written		exam		90 min
	module 13 Applied Theoretical Physics **03PH2504** *individual course requirements: None*						6 credit points Elective module
13	Applied Theoretical Physics 1 (V)	3525041	Compulsory	3	2		
13.2	Applied Theoretical Physics 2 (V)	3525042	Compulsory	3	2		
	Module exam Applied Theoretical Physics		Written		exam		90 min
	module 14 Polymer Science **03PH2505** *individual course requirements: None*						6 credit points Elective module
14	Polymer Physics (V)	3525051	Compulsory	3	2		
14.2	Characterisation methods in polymer science (V)	3525052	Compulsory	3	2		
	module exam Polymer Science		Written		exam		90 min

Computer-based methods

All modules from the compulsory areas of the Master's programmes "Web & Data Science" and "Computer Visualistics" can be selected. In addition, modules from the compulsory elective area of the Master's programme "Computer Visualistics" can be selected from the subcategories: "Compulsory Elective Computer Visualistics", "Elective Computer Sciences", "Elective Computer Visualistics or Computer Sciences", "Elective Theoretical Computer Sciences and Mathematics", but without the mathematics component (modules with the code 03MA) and without the research projects (04CV2101 and 04IN2101) of Department 4. The study of the modules is governed by the provisions of the Joint Examination Regulations for Bachelor's and Master's degree programmes in the faculty of Computer Sciences at the University of Koblenz-Landau dated 9 July 2019 (Newsletter 03/2019 of the University of Koblenz-Landau, p. 145) in the currently valid version.

final thesis

	MAT-MBV **Master's thesis** 30 credit points Compulsory module *Individual course requirements for the Master's thesis if they 03XX2590:* *In accordance with § 13 (5), students are granted admission to* *1. have earned at least 60 credit points and* *2. has agreed on a preliminary topic for a Master's thesis with a supervisor.* *Individual course requirements for 03XX2599:* *Competences from module 03XX2590*						
	Master's thesis (A)	03XX2590	Compulsory	27	0		
	Final oral exam (A)	03XX2599	Compulsory	3	0		
	Master's thesis		Written		Master's thesis 24 weeks Moderate § 13 Examination regulations.		
	Final oral exam		Oral		Oral final 30-60 Min. in accordance with § 14 examination regulations.		