Examination Regulations for the

Master's Program "Geophysics" (MSc)

at the University of Münster (WWU)

of 29 May 2020

This is a translation of the original German text and is intended for your information only. Under German law only the official German version of the "Prüfungsordnung für den Masterstudiengang Geophysics an der Westfälischen Wilhelms-Universität Münster vom 29. Mai 2020" is legally binding. It was published in the *Amtliche Bekanntmachungen* (AB Uni; "Official Announcements") on 30 June 2020, pp. 1086 – 1130.

In accordance with § 2 (4) and § 64 (1) of the Higher Education Act of the Federal State of North Rhine-Westphalia (HG NRW) in its version of the Act on the Future of Higher Education (*Hochschulzukunftsgesetz*) of 16 September 2014 (GV. NRW 2014, p. 547), most recently amended on 12 July 2019 (GV. NRW 2014, p. 525), in the corrected version of 24 September 2019 (GV. NRW 2014, p. 593), the University of Münster (WWU) has issued the following regulations:

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§ 1
Scope of the Examination Regulations

The following examination regulations apply to the master's program "Geophysics" at the University of Münster (WWU).

§ 2
Goal of the Program and Aim of the Examination

(1) This master's program builds on the knowledge acquired in a prior undergraduate degree program. In addition to conveying the academic fundamentals of the subject of study, it aims to provide students with the knowledge, skills and methods necessary to meet the demands of the professional world. Students are trained to evaluate complex academic problems in an independent and responsible manner and apply the insights in practical applications.

(2) The master's examination determines whether the students have acquired the necessary knowledge and skills for their prospective professional field, particularly in the areas of research, development and teaching.

§ 3
Master's Degree

After successfully completing the program, the student is awarded the academic degree of "Master of Science" (M.Sc.).

§ 4
Admission to the Program

The admissions requirements for this program are specified in the current version of the "Admissions Regulations for the Master's Program in Geophysics at the University of Münster" ("*Zugangs- und Zulassungsordnung für den Masterstudiengang Geophysics an der Westfälischen Wilhelms-Universität*").

§ 5
Administration of the Program

(1) The Dean of Studies (*Studiendekanin/Studiendekan*) of the Department of Physics is responsible to organise the examinations in the master's program "Geophysics" and the tasks as put forth in these examination regulations. She/he ensures that the stipulations put forth in these regulations are observed. In particular, she/he is responsible for recognizing degree-relevant examinations and required coursework. The Dean of Studies of the Department of Physics is responsible for resolving contested decisions taken during the examination process.

(2) The Dean's Office (*Dekanat*) can assign specific tasks specified in § 5 (1) to members or commissions of the Department of Physics.

(3) The Examinations Office (*Prüfungsamt der Fachbereiche der Mathematisch-Naturwissenschaftlichen Fakultät*) is the responsible office for examination affairs.

§ 6
Admission to the Master's Examination, Alignment Studies from the Bachelor's Phase

(1) Admission to the master's examination occurs via enrolment in the master's program "Geophysics" at the University of Münster, assuming the student remains enrolled at the University. The enrolment has to be rejected if the applicant has irrevocably failed a university examination or state examination in a study program "Geophysics" or another program with substantial closeness.

(2) If the student gains admission on the condition that she/he completes alignment studies (*Angleichungsstudien*) from the bachelor's phase, the student may begin the master's thesis once the alignment studies are completed. The requirements for completion of alignment studies are specified by the "Examination Regulations for the Bachelor's Program 'Geophysics' of the University of Münster" in their current version. Examinations in alignment studies are not considered in the calculation of the overall grade of the master's examination.

§ 7
Standard Duration, Workload and Credits

(1) The standard duration of the program is two academic years. One academic year consists of two semesters.

(2) In order to obtain the master's degree, students must earn a total of 120 credits (CP) (*Leistungspunkte*, *LP*). Academic credit serves as a quantitative measure of a student's overall workload. This includes attending courses as well as time spent on pre- and post-preparation of the course content (i.e. course attendance and self-study time), taking examinations, preparing for examinations, including term papers and the master's thesis, as well as, if applicable, work placements or other types of courses. One credit is equivalent to 30 hours of academic work. The workload for one academic year thus amounts to 1,800 hours. Consequently, the entire master's program has a workload of 3,600 hours. One credit is equivalent to one ECTS (European Credit Transfer System) point.

§ 8
Structure of the Program and the Examination, Module Descriptions

(1) The program is divided into modules. Modules are units of instruction varying in topic, content and duration which lead to partial qualifications, defined in a learning goal related to the respective academic objective. Modules can consist of courses with different teaching and learning formats. Modules usually consist of courses offered in the same semester, or over several semesters. In accordance with the module descriptions, the students may have a choice of courses within a module.

(2) The master's examination is taken in cumulative form over the course of the program. It consists of the degree-relevant examinations of the modules as well as the master's thesis.

(3) A module is successfully completed if all module-related coursework has been completed and all degree-relevant examinations have been passed. Students earn a certain number of credits per module as specified in the respective module descriptions.

(4) Admission to a module can – in accordance with the module descriptions – depend on certain conditions, in particular the successful completion of one (or several) other module(s).

(5) Admission to a course can – in accordance with the module descriptions – depend on whether the student previously attended another course of the same module or completed coursework of the same module.

(6) The module descriptions specify how frequently each module is offered.

§ 9
Types of Courses and Teaching Language

(1) The following types of courses are offered:

- Lectures

- Exercises
- Seminars
- Laboratory and field courses
- Research work under scientific supervision

as stipulated in the module descriptions in the appendix of these examination regulations.

(2) The standard language of instruction is English. If all participants of a course agree, the course can be given in German. Degree-relevant examinations and required coursework can be delivered in English or German.

§ 10
Content of the Program

(1) The degree program comprises the study of the following modules including the master's project with the master's thesis as specified by the module descriptions given in the appendix, which are part of these examination regulations:

First year of studies (first and second semester):	Credits
Module "Dynamics, Evolution and Simulation of Geophysical Systems" (mandatory module)	12.5 CP
Module "Advanced Methods for Investigating the Earth" (mandatory module)	12.5 CP
Module "Advanced Methods in Applied Geophysics" (mandatory module)	13 CP
Module "Elective Studies" (elective mandatory module) For the module "Elective Studies", students choose at the beginning of their first year between the fields "Physics" or "Geosciences": Physics: Material Physics (14-18 CP) or Nonlinear Physics (14-18 CP) Geosciences (14-18 CP) The choice of courses is made by the module representative in consultation with the student. For elective mandatory modules, the regulations in § 16 (3) apply.	14-18 CP
Module "Interdisciplinary Studies" (mandatory module) Upon application the module representative approves entire modules or parts of modules from a subject taught at the University of Münster. This can also be an interdisciplinary module or parts of an interdisciplinary module. In all cases, approval is only given if a meaningful connection to the Geophysics degree program exists or if it serves professional specialization. Together with the module "Elective Studies", at least 22 CP must be obtained.	4-8 CP

Second year of studies (third and fourth semester):	Credits
Professional Specialization and Project Design (mandatory module)	30 CP
Master's Project (includes master's thesis, mandatory module)	30 CP

(2) Students are required to earn a total of 120 credits to complete the master's program, of which the master's thesis accounts for 28 credits

(3) A recommended study plan and the handbook of modules are given in the appendix of these examination regulations.

§ 11
Required Coursework and Degree-relevant Examinations, Registration

(1) The prerequisites for participation in specific courses are outlined in the module descriptions.

(2) In each module at least one degree-relevant examination (*Prüfungsleistung*) has to be passed. In addition, students may have to complete additional coursework (*Studienleistungen*) which is not relevant for the module grade. Such examinations and coursework may include written or oral examinations, written solutions of exercises, presentations of exercise solutions, protocols of laboratory and field experiments and oral presentations. All required coursework and degree-relevant examinations have to be delivered in English or German. The instructor may admit another language.

(3) The module descriptions define the internal structure of the modules. They determine for each course the number of credits obtainable as well as the degree-relevant examinations of the respective module in type, duration and scope. These examinations form part of the master's examination. They can refer to one or more module courses, or to the entire module.

(4) In order to take part in any degree-relevant examination or coursework, students must register in advance. The registration deadlines are announced by the examinations office. Students may withdraw their registration without explanation within these deadlines. Registration and withdrawal are carried out by the students via the electronic examinations administration system of the University of Münster. For modules offered by other departments different rules may apply. Details are given in the module description.

(5) Upon agreement by the Dean of Studies, the types of examinations specified in § 11 (2) can also be executed end evaluated software-based in electronic form or in the form of electronic communication; the form of the examination will be announced by the instructor in suitable form at the beginning of the course. If such an examination has the character of an oral examination, the regulations pertinent to oral examinations hold with the stipulation that the specification in sentence 1 can only be realized subject to the written agreement of the student as well as the participating examiner and assessor; in the other cases the regulations for written examinations hold correspondingly.

§ 12
Master's Thesis

(1) The master's thesis should demonstrate that a student is capable of independently working within a specified period of time on a geophysical problem by using scientific methods and that she/he is able to document the results appropriately. The length of the thesis should not exceed 80 pages. The master's thesis as well as parts of the master's thesis must not have been in the same form part of another examination procedure.

(2) An examiner appointed in accordance with § 14 assigns the topic of the master's thesis and supervises the thesis process. The student has the right to propose both the topic and supervisor of her/his choice. In case the supervisor is not member of the Department of Physics of the University of Münster, the assignment of the topic of the master's thesis has to be approved by the Dean of Studies.

(3) Upon receiving the student's application, the topic of the master's thesis is assigned to the student by the Examinations Office on behalf of the Dean of Studies. Topics can only be assigned on the condition that the student has already earned a total of 60 credits. If the student gained admission on the condition that she/he complete alignment studies in accordance with the admission regulations for the master's program "Geophysics", the topic of the master's thesis may only be assigned upon completion of the alignment studies. The date of the topic assignment must be put on record.

(4) The master's thesis must be completed within six months. The topic, task and scope of the thesis are to be limited in such a manner that it meets the allocated workload of 28 credits. The student is permitted to change her/his topic only once, and only within a week of receiving the topic.

(5) Upon justified request by the candidate the submission deadline of the master's thesis may be extended once by up to four weeks. In case of substantial reasons which considerable impede the work on the master's thesis or prohibit the work for a certain time, the submission date can be extended correspondingly upon request by the student. Substantial reasons for such an extension could include severe illness of the candidate or immutable technical difficulties in the realization of the project. Other substantial reasons can be the care for one's own children up to the age of 12 years, to care or nurse for the spouse, the registered civil partner or a direct relative or first-degree relative by marriage if such care or assistance is necessary. The Dean of Studies is responsible for deciding on and granting extensions (see § 12 (5) sentences 1 and 2). On demand of the Dean of Studies, the candidate must present proof of a "valid reason". Instead of extending the deadline, the Dean of Studies can, with regard to sentence 2, also assign a new topic for the master's thesis if the candidate was unable to work on the thesis for longer than one year. In this case, the assignment of a new topic does not count as a second attempt at the master's thesis in the sense of § 17 (2).

(6) The master's thesis must include a title page, a table of contents and a list of works and sources cited. All parts of the thesis that contain wording or content taken from other sources must be identified as such and cited accordingly. The candidate must attach a written declaration to the thesis which states that she/he has written the thesis herself/himself, has not used sources and means other than those indicated and has identified all direct quotes. Such a declaration must also be made regarding tables, sketches, drawings, graphic illustrations etc. The master's thesis can be written in English or German language.

§ 13
Acceptance and Grading of the Master's Thesis

(1) Candidates are required to submit two copies of the master's thesis (typewritten, bound and paginated) as well as two digital copies in a suitable format for a possible plagiarism check to the Examinations Office by the given deadline. Its submission is only considered on time and complete if both the bound and digital copies are submitted to the Examinations Office before the deadline. With the submission of the thesis the student has to submit a written consent permitting the electronic plagiarism checking and for this purpose the storage of the thesis in a data base as well as its comparison with other texts in order to find matchings. The date of submission must be put on record. If the master's thesis is submitted after the deadline or not in due form, it is graded as a fail (*nicht ausreichend*, 5.0) (see § 22 (1)).

(2) The master's thesis must be read and graded by two examiners. One of the examiners should be the person who assigned the topic. The second examiner is appointed by the Dean of Studies (or by a staff member of the Institute of Geophysics authorized by the Dean of Studies) among the admitted examiners, she/he can be proposed by the candidate. Both grades must conform to § 18 (1) and be justified in written form. The overall grade is then determined as the arithmetic mean (see § 18 (4) sentences 4 and 5), provided the difference between the grades is no greater than 2.0. If the difference is greater than 2.0 or if one examiner grades the thesis as a fail while the other grade is at least a pass, then a third examiner is to be appointed by the Dean of Studies to grade the master's thesis. In this case, the grade is calculated as the arithmetic mean of the three examiners' grades. The grade can only be a pass (4.0) or better, however, if at least two of the examiners grade the thesis with a pass (4.0) or better.

(3) The grading period for the master's thesis may not exceed eight weeks, or 16 weeks if a third examiner is involved.

§ 14
Examiners and Assessors

(1) Examiners are admitted by the Dean's Office among the persons who are entitled to serve as an examiner. This admission can be restricted to specific examinations.

(2) Any individual who regularly holds relevant courses in the subject of the degree-relevant examination or master's thesis is entitled to serve as an examiner in accordance with § 65 (1) (HG NRW). The Dean of Studies of the Department of Physics is responsible for deciding on exceptions to this rule.

(3) Oral examinations are conducted by an examiner in the presence of an assessor. Before determining 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.

(4) The assessors for oral examinations are appointed by the examiner. Only individuals who hold a relevant *Diplom*, master's degree or academic qualification of an equivalent or higher-level degree can serve as an assessor.

(5) Examiners and assessors are independent in their examination activity. For written examinations, correction assistants can devise exercises and carry out preliminary corrections on behalf of the examiner.

(6) Written degree-relevant module examinations are graded by a single examiner. The master's thesis is graded in accordance with § 13.

(7) The examination must be graded by at least two examiners if an oral or written degree-relevant examination is the final attempt according to § 17 (2) before a possible permanent fail of the master's examination. In this case, the grade is calculated as the arithmetic mean of the two individual grades. § 18 (4), sentences 3 and 4 apply accordingly.

(8) Students of the same degree program 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.

§ 15
Recognition of Required Coursework and Degree-relevant Examinations

(1) Required coursework (*Studienleistungen*) and degree-relevant examinations (*Prüfungsleistungen*) from within the same program at other German universities are recognized upon request unless these differ substantially with the prescribed objectives of the program; a determination of equivalence is not conducted. The same applies to required coursework and degree-relevant examinations completed in other degree programs at the University of Münster or other German universities.

(2) Based on the recognition procedures outlined in § 15 (1), the student must upon request be granted placement in the semester determined by the ratio of number of credits recognized to total number of credits obtainable in the program. If the first place after the decimal is smaller than five, the semester number is rounded down. Otherwise it is rounded up.

(3) § 15 (1) and (2) apply accordingly to the recognition of required coursework and degree-relevant examinations completed in state-recognized distance-learning study programs, in distance-learning units developed by the state of North Rhine-Westphalia together with the other German states or the federal government, at state or state-recognized universities of cooperative education (*Berufsakademien*), in degree programs at foreign state or state-recognized universities or in further education study programs (see § 62 HG NRW).

(4) The basis for determining whether essential differences exist is a comparison of the content, workload and requirements of the respective coursework and examinations. The determination of equivalence should not be based on a schematic comparison, but rather on an overall assessment. For the equivalence of required coursework and

degree-relevant examinations from foreign universities, the equivalence agreements of the Standing Conference of the Ministers of Education and Cultural Affairs of the Federal Republic of Germany (KMK) and the German Rectors' Conference (HRK) apply. In case of doubt concerning equivalence, the Central Office for Foreign Education (Zentralstelle für ausländisches Bildungswesen) may be consulted.

(5) If students are allowed to enter the program at a higher semester after passing a placement examination, they receive academic credit in terms of both required coursework and degree-relevant examinations for the knowledge and skills they demonstrated in the placement examination. The Dean of Studies is legally bound by the assessments made in that examination.

(6) Additional skills and qualifications for which documentation is provided can be taken into consideration upon the student's request, provided that the required coursework and degree-relevant examinations which they replace are equivalent in terms of content and level. At most, up to half of the coursework and examinations can be replaced in this way.

(7) If external examinations are recognized as degree-relevant examinations and the grading systems are comparable, the grades may be used to calculate part of the overall grade. In the case of non-comparable grading systems, examinations are marked as passed (*bestanden*). The recognition of examinations is indicated in the degree certificate. If a module grade cannot be calculated due to the recognition of examinations from a non-comparable grading system, then this module is excluded from the calculation of the overall grade.

(8) The student is responsible for providing the documents necessary for deciding on recognition. These must include information on the knowledge and qualifications for which equivalence is to be recognized. If the student requests recognition for coursework from other degree programs, the student must, as a rule, provide the corresponding examination regulations and module descriptions as well as the transcript of records (ToR) or equivalent document.

(9) The Dean of Studies of the Department of Physics is responsible for recognizing academic achievement. Before equivalence can be determined, members of staff representing the subject in question must be consulted.

(10) The student is to be informed about the decision on recognition within four weeks after the application has been made and the required documents have been submitted. Any rejection must be justified.

§ 16
Compensation for Disadvantages

(1) If a student can demonstrate that she/he is partially or entirely unable to complete required coursework or degree-relevant examinations in their intended form due to a disability or chronic illness, the Dean of Studies must – at the student's request – make allowances with respect to the form and duration of the examination and the use of aids or assistants to ensure equal opportunity. The same applies to the requirements for participation in the modules and completion of the corresponding coursework and degree-relevant examinations as put forth in these examination regulations.

(2) At the student's request, the faculty representative for students with disabilities must be consulted with regard to decisions specified in § 16 (1). If consultation with a representative is not possible within the faculty, the WWU Representative for Students with a Disability or Chronic Illness is to be consulted.

(3) Compensation for disadvantages as put forth in § 16 (1) is granted on a case-by-case basis. 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 (*Behindertenausweis*).

(4) Provided that the condition/status of the student's illness or disability will foreseeably remain unchanged, the compensation for disadvantages as put forth in § 16 (1) extends to all required coursework and degree-relevant examinations that have to be completed during the master's program.

(5) If a female student is unable to complete required coursework or degree-relevant examinations in part or whole on account of maternity protection regulations, § 16 (1-3) apply accordingly.

§ 17
Passing of the Master's Examination, Retaking

(1) The master's examination has been passed when the candidate has passed all of the modules in accordance with § 8, § 10, § 11 and the module descriptions as well as the master's thesis with at least a passing grade (4.0; *ausreichend*) (§ 17 (1)). The candidate must have also obtained a total of 120 credits.

(2) Except for the master's thesis, students are granted three attempts at passing any examination within a module. Additional attempts to improve her/his grade in an examination which has already received a passing grade are not allowed. After all permissible attempts to retake a failed module examination are exhausted, the module is considered permanently failed.

(3) If one of the "Elective Studies" modules is permanently failed, the student can at most in one additional of the offered elective mandatory modules try to pass the degree-relevant examinations. Students may also complete more than one of the modules offered within the "Elective Studies" framework. In this case, the best grade enters the final grade.

(4) If the candidate receives a fail for the master's thesis, she/he is granted one more attempt to write the thesis on a newly assigned topic. A third attempt is not allowed. During the second attempt, the topic can only be handed back within the time specified in § 12 (4) sentence 3 if the candidate did not make use of this possibility in her/his first attempt.

(5) The terms for participating in and passing degree-relevant examinations and required coursework in modules offered by other departments/faculties are regulated by their corresponding requirements; details are provided in the module descriptions.

(6) If the candidate has permanently failed a mandatory module (Pflichtmodul) or the master's thesis, or if she/he has permanently failed an elective mandatory module and there is no more possibility to successfully pass another module, then the master's examination is considered permanently failed.

(7) If the candidate has permanently failed the master's examination, she/he may request a university transcript listing all of the completed coursework/examinations and, if applicable, respective grades. In order to receive a transcript, the candidate must present her/his certificate of de-registration (*Exmatrikulationsbescheinigung*) and proof of the completed coursework/examinations. The transcript is signed by the Head of the Department of Physics and authenticated with the faculty seal.

§ 18
Grading of Individual Examinations, Module Grades and Calculation of the Overall Grade

(1) Unless otherwise stated in the module descriptions, all degree-relevant examinations receive a grade. The following grades should be used:

1 = *sehr gut* (excellent) = an excellent achievement
2 = *gut* (good) = a significantly above-average achievement

3 = *befriedigend* (satisfactory) = an average achievement
4 = *ausreichend* (pass) = an adequate achievement, despite shortcomings
5 = *nicht ausreichend* (fail) = an inadequate achievement due to serious shortcomings

Intermediate values may be used to differentiate assessments by raising and lowering the grades by 0.3. The grades 0.7, 4.3, 4.7 and 5.3 are excluded, however. The module descriptions can allow for the grading of non-degree-relevant coursework.

(2) Grades for oral degree-relevant examinations must be communicated to the student and the responsible Examinations Office within a one-week period, the grades for written degree-relevant examinations within a four-week period.

(3) The candidate receives electronic or written notification of grades obtained for degree-relevant examinations and the master's thesis. The time of notification must be put on record. Electronic notification occurs via the electronic examination administration system of the University of Münster. Students who do not pass a degree-relevant examination after the final attempt receive individual written notification which includes information on the legal remedies available to her/him.

(4) For each module requiring at least one graded examination, an overall grade is determined on the basis of the individual degree-relevant examinations assigned to that module. The module descriptions determine the weight of the individual grades for the final module grade. For the calculation of the module grade, all decimal places except for the first are deleted without rounding. This results in the following grades:

less or equal 1.5 = *sehr gut* (excellent)
1.6 – 2.5 = *gut* (good)
2.6 – 3.5 = *befriedigend* (satisfactory)
3.6 – 4.0 = *ausreichend* (pass)
above 4.0 = *nicht ausreichend* (fail)

(5) Based on the grades of the modules and the master's thesis an overall grade is calculated. The module descriptions determine the weight of the module grades for the final overall grade. For the calculation of the overall grade, all decimal places except for the first are deleted without rounding. This results in the following grades:

less or equal 1.5 = *sehr gut* (excellent)
1.6 – 2.5 = *gut* (good)
2.6 – 3.5 = *befriedigend* (satisfactory)
3.6 – 4.0 = *ausreichend* (pass)
above 4.0 = *nicht ausreichend* (fail)

If in all degree-relevant examinations the best grade 1.0 is achieved, the master's examination is awarded the appellation "passed with distinction" (*mit Auszeichnung*).

(6) In addition to the overall grade, as determined according to § 18 (5), a comparative grade based on the ECTS grading scale is also calculated.

§ 19
Master's Certificate and Master's Diploma

(1) When a student has successfully completed the master's program, she/he receives a master's certificate. This certificate contains the following information:

a) grade of the master's thesis
b) title of the master's thesis
c) overall grade for the master's examination

d) number of semesters required to complete the master's program.

(2) The certificate bears the date of the day of the last degree-relevant examination.

(3) In addition to the certificate, the student receives a diploma of the same date, confirming the conferral of the master's degree (see § 3).

(4) Both the certificate and the diploma are issued with an English version of the same.

(5) The master's certificate and the master's diploma are signed by the Head of the Department of Physics and authenticated with the faculty seal.

§ 20
Diploma Supplement with Transcript of Records

(1) In addition to the certificate, the student receives a diploma supplement which includes a transcript of records (ToR). The diploma supplement contains detailed information about the individual study program, the courses and modules attended, the required coursework and degree-relevant examinations completed and their respective grades, along with the individual subject-related profile chosen by the student in the program.

(2) The diploma supplement is issued in accordance with the recommendations of the German Rectors' Conference (HRK).

§ 21
Access to the Examination Files

After completing each degree-relevant examination, students can, upon request, gain access to the examination papers, the examiners' assessments and examination minutes. Students are generally permitted to make copies or other faithful reproductions of the original documents while viewing the examination files. Requests must be filed with the Examinations Office 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 Dean of Studies. The same applies with regard to the master's thesis. § 29 VwVfG NRW remains unaffected.

§ 22
Absence, Withdrawal, Deception and Violation of Regulations

(1) A degree-relevant examination is considered a fail (*nicht ausreichend*, 5.0) if the student, for no valid reason, does not appear at the examination on the designated date, or if she/he withdraws for no valid reason after beginning an examination. The same applies if a written degree-relevant examination or the master's thesis is not completed within the allocated time limit. Examples of valid reasons include an inability to take an examination due to illness, claims to maternity or paternity leave as provided by the Federal Parental Benefit Act (*Bundeselterngeld- und Elternzeitgesetz*), or nursing/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.

(2) If a female student may not meet her academic requirements on account of the Maternity Protection Act (*Mutterschutzgesetz*), the administration of examinations is also not permitted.

(3) The reasons for absence or withdrawal according to § 22 (1) must immediately be submitted and substantiated in writing to the examinations office. In the case of illness, the Dean of Studies may request a medical certificate. If

the reasons given are not accepted, the student is notified in writing. If the student does not receive written notification within a four-week period, then the reasons have been accepted.

(4) If a student withdraws on account of illness, yet there is sufficient reason to believe that the student was capable of taking the examination or that another form of proof would be more appropriate, the Dean of Studies may request a medical certificate from a University-appointed physician (*Vertrauensarzt*) in accordance with § 63 (7) HG. With respect to § 22 (3) sentence 1, sufficient reasons exist e.g. if the student has failed to appear to more than four examinations or has withdrawn more than twice from the same examination due to illness in accordance with § 22 (1). The student is to be immediately notified of this decision and provided with the names of at least three physicians, designated by the University of Münster, from one of whom the student must obtain a medical certificate.

(5) If a student attempts to influence the outcome of a degree-relevant examination or the master's thesis through dishonest means such as the use of unauthorized material or devices, the examination is regarded as not having been completed and is considered a fail (*nicht ausreichend*, 5.0). A student who disrupts an examination may, usually after a warning by the invigilator, be excluded from continuing that particular examination. In this case, the degree-relevant examination is regarded as not having been completed and is considered a fail (5.0). In serious cases, the Head of the Department of Physics may exclude the student from the master's examination entirely, in which case the master's examination is marked as permanently failed. The reason(s) for exclusion must be put on record.

(6) Adverse decisions must be immediately disclosed to the student concerned 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 must be given the opportunity to state her/his case.

§ 23
Invalidity of Individual Examinations

(1) If a student knowingly manipulates the results of a degree-relevant examination or the master's thesis and if this fact comes to light only after the master's certificate has been issued, the Head of the Department of Physics can retroactively correct the result and, if applicable, the grades of the degree-relevant examination(s) or the master's thesis accordingly and declare these examinations in part or whole as failed.

(2) If the requirements for admission to a degree-relevant examination or the master's thesis were not met and the student had no intention of acting dishonestly and if this fact becomes apparent only after she/he passed the degree-relevant examination in question, the successful completion of the examination rectifies the mistake. However, if the student is found to have deliberately gained admission through wrongful means, the Head of the Department is responsible for deciding on the legal consequences, subject to the Administrative Procedures Act for North Rhine-Westphalia (*Verwaltungsverfahrensgesetz für das Land Nordrhein-Westfalen,* VwVfG NRW).

(3) If the requirements for admission to a module were not met and the student had no intention of acting dishonestly and if this fact becomes apparent only after she/he passed the module in question, the successful completion of the module rectifies the mistake. However, if the student is found to have deliberately gained admission through wrongful means, the Head of the Department is responsible for deciding on the legal consequences, subject to the Administrative Procedures Act for North Rhine-Westphalia (*Verwaltungsverfahrensgesetz für das Land Nordrhein-Westfalen*, VwVfG NRW).

(4) If the requirements for enrolment in the program and thus the requirements for admission to the master's examination were not met and the student had no intention of acting dishonestly and if this fact becomes apparent only after the master's certificate has been issued, the successful completion of the program rectifies the mistake. How-

ever, if the student is found to have deliberately gained admission through wrongful means, the Head of the Department is responsible for deciding on the legal consequences, subject to the Administrative Procedures Act for North Rhine-Westphalia (VwVfG NRW).

(5) Before a final decision is made, the student has the right to state her/his case.

(6) The erroneous certificate must be handed back and is replaced with a new certificate if applicable. A decision in accordance with § 23 (1), sentence 2 of (2), (3) and (4) is no longer possible after a period of five years from the issue date of the certificate.

§ 24
Revocation of the Master's Degree

The master's degree may be revoked if it becomes apparent at a later date that the student obtained it through deception or if essential requirements for conferral were erroneously presumed to have been met. § 23 applies accordingly. The Head of the Department is responsible for such decisions.

§ 25
Coming into Force and Publication

These regulations (in their original German version) come into force on the day following their publication in the Official Announcements (*Amtliche Bekanntmachungen*) of the University of Münster. They apply to all students who began their studies in the master's program Geophysics in or after the winter semester of 2020/21.

Issued (in the original German version) upon resolution by the faculty board of the Department of Physics of the University of Münster on 13 May 2020. These regulations (in the original German version) are hereby announced.

Please note that in accordance with § 12 (5) of the Higher Education Act of the State of North Rhine-Westphalia (HG NRW) violations of procedural regulation as put forth by regulatory laws or other legal provisions pertaining to university autonomy may no longer be claimed after one year following this announcement, unless

1. the regulations were not properly announced,
2. the Rectorate previously raised an objection to the resolution passed by the deciding committee,
3. the University was issued a reprimand for the formal or procedural defect, and was informed of the violated legal provision and the fact that resulted in the defect,
4 the legal consequence of exclusion resulting from such reprimand was not included in the public announcement of the regulations.

Münster, 29 May 2020

The Rector

Prof. Dr. Johannes Wessels

Glossary of English-German translations

alignment studies	*Angleichungsstudien*
assessor	*Beisitzerin/Beisitzer*
Central Office for Foreign Education	*Zentralstelle für ausländisches Bildungswesen*
credit (CP)	*Leistungspunkt (LP)*
Dean of Studies	*Studiendekanin/Studiendekan*
degree-relevant examination	*Prüfungsleistung*
disability certificate	*Behindertenausweis*
elective mandatory module (EM)	*Wahlpflichtmodul (P)*
final module examination (FME)	*Modulabschlussprüfung (MAP)*
examinations office	*Prüfungsamt*
examination regulations	*Prüfungsordnung*
examiner	*Prüferin/Prüfer*
faculty/department	*Fachbereich*
faculty board	*Fachbereichsrat*
German Rectors' Conference	*Hochschulrektorenkonferenz*
Head of Department	*Dekanin/Dekan*
mandatory module (M)	*Pflichtmodul (P)*
module cumulative examination (MCE)	*Modulteilprüfung (MTP)*
required coursework	*Studienleistung*
Standing Conference of the Ministers of Education and Cultural Affairs of the Federal Republic of Germany	*Kultusministerkonferenz (KMK)*

Overview, Recommended Study Plan and Module Descriptions

Module No.	Module	CP
1	Dynamics, Evolution and Simulation of Geophysical Systems	12.5
2	Advanced Methods for Investigating the Earth	12.5
3	Advanced Methods in Applied Geophysics	13
4	Elective Studies: Material Physics	14 – 18
5	Elective Studies: Nonlinear Physics	14 – 18
6	Elective Studies: Geosciences	14—18
7	Interdisciplinary Studies	at least 4—8
8	Professional Specialization and Project Design	30
9	Master's Project	30

Recommended Study Organization

FS	Module				
1.	**Dynamics, Evolution and Simulation of Geophysical Systems (12.5 CP)**	**Advanced Methods for Investigating the Earth (12.5 CP)**	**Advanced Methods in Applied Geophysics (13 CP)**	**Elective Studies (14-18 CP)** Nonlinear Physics *- or –* Material Physics *- or -* Geosciences	**Interdisciplinary Studies (at least 4-8 CP)**
2.					
3.	**Professional Specialization and Project Design (30 CP)**				
4.	**Master's Project (30 CP)**				

Taken together, at least 22 CP need to be achieved in the modules "Elective Studies" and "Interdisciplinary Studies".

Degree programme	**Geophysics (Master of Science)**
Module	**Dynamics, Evolution and Simulation of Geophysical Systems**
Module number	1

1	**Basic data**
Programme semester	1,2
Credits (CP)	12.5
Workload (h) in total	375
Module duration	2 Semesters
Module status (M/EM)	M

2	**Profile**
Aim of the module / Integration in the curriculum	
This module is devoted to the dynamics and evolution of geophysical systems. While many branches of classical geophysics are concerned with determining the physical properties of the Earth, the focus of this module is on dynamical processes within the Earth system. In addition to their physical description, the module also deals with numerical modelling techniques, which are taught in the context of geophysical examples. A seminar and a colloquium allow students to gain insight into current research topics.	
Teaching content	
Reiteration of the basic equations of continuum mechanics and fluid dynamics; frequently used approximations of these equations; fluid flow in rotating systems; boundary layers; stably stratified flow; gravity waves; instability and turbulence in geophysical systems; convection; dynamics of the Earth's mantle; numerical algorithms for the simulation of geophysical systems; finite difference, finite volume, finite element and spectral methods; advanced methods for solving linear and non-linear systems of equations	
Learning outcomes	
Students have mastered the basic principles of geophysical fluid dynamics. They are aware of the main dynamical characteristics of flows within the atmosphere, the oceans, the Earth's core and mantle. They are able to formulate the basic partial differential equations needed for the description of these geophysical systems and they have developed a profound understanding of various approaches for solving these equations numerically. The experience gained in writing a simple simulation code enables them to master more complex numerical models, to employ these for their purposes and to refine them as needed. They are aware of selected current research topics. Furthermore, they know how to give a compelling research talk.	

3	**Structure**						
Module components							
No.		Course category	Course form	Course	Status (M/EM)	Workload (h)	
						Attendance time (h) / SWS	Self-study (h)
1	1a	Lecture		Advanced Geophysical Fluid Dynamics	M	30 h / 2 SWS	30h

	1b	Practical		Advanced Geophysical Fluid Dynamics	M	15 h / 1 SWS	45h
2	2a	Lecture		Numerical Simulation of Geophysical Processes	M	30 h / 2 SWS	30h
	2b	Practical		Numerical Simulation of Geophysical Processes	M	30 h / 2 SWS	90h
3		Seminar		Seminar on the Dynamics and Evolution of Geophysical Systems	M	30 h / 2 SWS	30h
4		Seminar	Colloquium	Geophysical Colloquium	M	15h / 1SWS	0h
Choice within module				None			

4	**Examination structure**				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course no. if appl.	Weight in the module grade
1	FME	Oral exam. All requirements for passing the coursework of this module have to be fulfilled before taking the oral exam.	30 -45 min		100%
Weight of the module grade for the final overall grade		The module contributes with a weight of 12.5 / 120 to the final overall grade			
Required coursework					
No.		Type	Duration/ Scope	Connection to course no. if appl.	
1		Successful participation in the practical part for Advanced Geophysical Fluid Dynamics: Exercises are worked on in self-study, checked and discussed in small exercise groups. Successful participation usually requires the correct solution of 50% of the tasks.	Weekly Exercises	1b	
2		Successful participation in the practical part for Numerical Simulation of Geophysical Processes: In pre-defined, weekly steps, students develop their own simulation code for a specific geophysical flow phenomenon. Their work is evaluated weekly and discussed within small groups. In addition, the students work on small theoretical exercises. The successful participation usually requires the complete implementation of the simulation code, complemented by the correct solution of 50% of the theoretical tasks.	Weekly Exercises, containing theoretical and practical tasks	2b	
3		Presentation of a talk in the Seminar on the Dynamics and Evolution of Geophysical Systems.	~ 20 min.	3	

5	**Requirements**
Module-related requirements for participation	Basic knowledge of geophysical continuum mechanics, geophysical fluid dynamics and on modelling approaches for geophysical systems, as for example taught in the BSc Geophysics at WWU.
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	Regular attendance of the Seminar and Colloquium is expected.

6	CP allocation	
Participation (= attendance time)	Course no. 1a	1 CP
	Course no. 1b	0.5 CP
	Course no. 2a	1 CP
	Course no. 2b	1 CP
	Course no. 3	1 CP
	Course no. 4	0.5 CP
Degree-relevant examination(s)	no. 1	2 CP
Required coursework	no. 1	1.5 CP
	no. 2	3 CP
	no. 3	1 CP
Total CP		12.5 CP

7	Module administration
Frequency	every WS
Module representative	Prof. Ulrich Hansen
Responsible faculty	Physics

8	Recognition
Usability in other degree programs	none
Module title German	Dynamik, Evolution und Simulation geophysikalischer Systeme
German translation of the module components from field 3	Course No. 1a: Fortgeschrittene geophysikalische Fluiddynamik (Vorlesung)
	Course No. 1b: Fortgeschrittene geophysikalische Fluiddynamik (Übung)
	Course No. 2a: Numerische Simulation geophysikalischer Prozesse (Vorlesung)
	Course No. 2b: Numerische Simulation geophysikalischer Prozesse (Übung)
	Course No. 3: Seminar zur Dynamik und Evolution geophysikalischer Systeme
	Course No. 4: Geophysikalisches Kolloquium

9	Miscellaneous

Degree programme	**Geophysics (Master of Science)**
Module	**Advanced Methods for Investigating the Earth**
Module number	2

1	**Basic data**
Programme semester	1,2
Credits (CP)	12.5
Workload (h) in total	375
Module duration	2 Semesters
Module status (M/EM)	M

2	**Profile**
Aim of the module / Integration in the curriculum	
Understanding and knowledge of advanced seismology and array seismic methods, reflection seismics and other geophysical methods. Ability to write a wave propagation program. Ability to analyse and interpret seismological and exploration seismic data. Overview of recent research topics.	
Teaching content	
Advanced seismic concepts to investigate Earth, for example Green's functions, ambient seismic noise, monitoring, source inversion methods, array seismic methods and array design, advanced signal processing methods and mislocation vectors. Analysis and interpretation of geophysical data. Modelling of seismic and other geophysical data with different methods. Interpretation using information from petro-physics and other fields. The practical classes enhance the understanding and ability to process and analyse real data. A wave propagation model will be written. The colloquium will allow students to learn about recent advances in geophysics research.	
Learning outcomes	
The students know methods and approaches to investigate Earth's interior, they are able to extract information from complex data sets and compare to numerically generated data sets. The students have experience in error analysis and sources of errors that may arise in the analysis of geophysics data sets. The students have the ability to transfer their knowledge to other non-geophysical data sets. The understand the relevance of the acquired geophysical content for current and recent research projects.	

3	**Structure**					
Module components						
No.	Course category	Course form	Course	Status (M/EM)	Workload (h)	
					Attendance time (h) / SWS	Self-study (h)
1	1a	Lecture	Advanced Seismology	M	30 h / 2 SWS	30 h
	1b	Practical	Advanced Seismology	M	30 h / 2 SWS	90 h
2	2a	Lecture	Analysis and Interpretation of Geophysical Data	M	30 h / 2 SWS	30 h

	2b	Practical	Analysis and Interpretation of Geophysical Data	M	30 h / 2 SWS	90 h
3		Seminar	Geophysical Colloquium	M	15 h / 1SWS	0 h
Choice within module			none			

4	Examination structure				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course no. if appl.	Weight in the module grade
1	FME	Oral exam. All requirements for passing the coursework of this module have to be fulfilled before taking the oral exam.	30-45min		100%
Weight of the module grade for the final overall grade		The module contributes with a weight of 12.5 / 120 to the final overall grade			
Required coursework					
No.		Type	Duration/ Scope	Connection to course no. if appl.	
1		Successful participation in the practical part for advanced seismology: the practical part will deepen the knowledge gained in the Lectures. A successful participation also requires processing the tasks in the practical part as well as writing a report.	weekly tasks and a report of approx. 10 pages.	1b	
2		Successful participation in the practical part of analysis and interpretation. In the practical part techniques and analysis of data sets will be carried out to deepen the knowledge. A successful participation also requires processing the tasks in the practical part as well as writing a report.	report of approx. 30 pages.	2b	

5	Requirements
Module-related requirements for participation	Basic knowledge of Seismology and applied methods as for example taught in the BSc Geophysics at WWU are highly recommended.
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	

6	CP allocation	
Participation (= attendance time)	Course no. 1a	1 CP
	Course no. 1b	1 CP
	Course no. 2a	1 CP
	Course no. 2b	1CP
	Course no. 3	0.5 CP
Degree-relevant examination(s)	no. 1	2 CP
Required coursework	no. 1	3 CP
	no. 2	3 Cp
Total CP		12.5 CP

7	Module administration
Frequency	every WS
Module representative	Prof Dr. C. Thomas
Responsible faculty	Physics

8	Recognition
Usability in other degree programs	none
Module title German	Fortgeschrittene Methoden zur Erkundung des Erdkörpers
German translation of the module components from field 3	Course No. 1a: Fortgeschrittene Seismologie (Vorlesung)
	Course No. 1b: Fortgeschrittene Seismologie (Übung)
	Course No. 2a: Analyse und Interpretation geophysikalischer Daten (Vorlesung)
	Course No. 2b: Analyse und Interpretation geophysikalischer Daten (Übung)
	Course No. 3: Geophysikalisches Kolloquium

9	Miscellaneous

Degree programme	**Geophysics (Master of Science)**
Module	**Advanced Methods in Applied Geophysics**
Module number	3

1	**Basic data**
Programme semester	1,2
Credits (CP)	13
Workload (h) in total	390
Module duration	2 semesters
Module status (M/EM)	M

2	**Profile**

Aim of the module / Integration in the curriculum

Procurement of advanced concepts and skills for the collection, analysis and inversion of geophysical data under special consideration of electromagnetic deep sounding (magnetotellurics).

Teaching content

Methods for solving linear and non-linear inversion problems: deterministic and probabilistic approaches, distance methods, application of vector spaces, regularization of ill-posed problems, robust regression, gradient methods. Theory and practice of the methods of electromagnetic deep sounding and especially magnetotellurics: concepts, time series processing, analysis of transfer functions, inversion, applications in lithospheric research and exploration geophysics, interpretation. Practical application of the learned methods and procedures in an advanced field course.

Learning outcomes

The students know the methods and procedures for the inversion of geophysical data and are familiar with the concepts of electromagnetic deep sounding methods. They are able to independently collect data and to independently apply advanced procedures and methods for data processing and inversion. They are able to implement programs to solve inverse geophysical and non-geophysical problems. Students are able to assess the validity of geophysical models of the subsurface. They know the theoretical concepts, measuring principles and application areas of electromagnetic deep sounding.

3	**Structure**

Module components

No.		Course category	Course form	Course	Status (M/EM)	Workload (h)	
						Attendance time (h) / SWS	Self-study (h)
1	1a	Lecture		Modelling and inversion	M	30 h / 2 SWS	30 h
	1b	Practical		Modelling and inversion	M	15 h / 1 SWS	45 h
2	2a	Lecture		Magnetotellurics	M	30 h / 2 SWS	30 h
	2b	Practical		Magnetotellurics	M	15 h / 1 SWS	45 h

3	Practical course	excursion	Field course	M	60 h	90 h
Elective options within the module			None.			

4	**Examination structure**				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course no. if appl.	Weight in the module grade
1	MCE	Oral examination on the contents of the lectures "Modelling and Inversion" and "Magnetotellurics". All requirements for passing the related coursework (see No. 1 and 2 below) have to be fulfilled before taking the oral exam.	30 – 45 min	1,2	50 %
2	MCE	Detailed report on the measurements carried out in the field course and on data evaluation	Report (approx. 20 p)	3	50 %
Weight of the module grade for the final overall grade		The module contributes with a weight of 13 / 120 to the final overall grade			
Required coursework					
No.		Type	Duration/ Scope	Connection to course no. if appl.	
1		Successful participation in the practical exercises on "Modelling and Inversion": Exercises are worked on in self-study, checked and discussed in small exercise groups. Successful participation usually requires the correct solution of 50% of the tasks.	Weekly Exercises	1b	
2		Successful participation in the practical exercises on "Magnetotellurics": Exercises are worked on in self-study, checked and discussed in small exercise groups. Successful participation usually requires the correct solution of 50% of the tasks.	Weekly Exercises	2b	

5	**Requirements**
Module-related requirements for participation	None
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	Attendance in the field course is required because students carry out geophysical measurements on their own.

6	**CP allocation**	
Participation (= attendance time)	Course no. 1a	1 CP
	Course no. 1b	0.5 CP
	Course no. 2a	1 CP
	Course no. 2b	0,5 CP
	Course no. 3	2 CP
Degree-relevant examination(s)	no. 1	2 CP
	no. 2	3 CP
Required coursework	no. 1	1.5 CP

	no. 1	1.5 CP
Total CP		13 CP

7	**Module administration**
Frequency	every WS
Module representative	Prof. Dr. M. Becken
Responsible faculty	Physics

8	**Recognition**
Usability in other degree programs	none
Module title German	Fortgeschrittene Methoden der angewandten Geophysik
German translation of the module components from field 3	Course No. 1a: Modellierung und Inversion (Vorlesung)
	Course No. 1b: Modellierung und Inversion (Übung)
	Course No. 2a: Magnetotellurik (Vorlesung)
	Course No. 2b: Magnetotellurik (Übung)
	Course No. 3: Feldkurs

9	**Miscellaneous**

Degree program	**Geophysics (Master of Science)**
Modul	**Elective Studies: Materials Physics**
Module number	4

1	**Basic data**
Program semester	1, 2
Credits (CP)	14 – 18
Workload (h) in total	420 – 540
Module duration	2 semesters
Module status (M/EM)	EM

2	**Profile**

Aim of the module / Integration in the curriculum

The evolution of our society has been and is strongly affected by materials with particular properties. Steel, as an example, consisting of a mixture of iron and carbon, has allowed one to construct buildings of several hundred meters height. High purity silicon as the basic ingredient for the fabrication of electronic devices is at the heart of the digital revolution of our society and is currently partially replaced by organic-inorganic composite materials. The macroscopic properties of a material are essentially determined by defects of different dimensionality, defined as deviations from the ideal crystal structure, which constitute the so-called microstructure of a material. In the examples given above, but also beyond and in the vast majority of all materials the specific macroscopic properties of a material, like, e.g. its hardness or electrical conductivity, are directly related to the often complex and different length scale-covering microstructure and therefore refrain from being accessible by a simple consideration.

In the module, the students are introduced to the description of single- and multi-component materials and their microstructure as well as the coupling between microstructure and property. The description of defects of the crystal lattice as well as their properties and their characterization by using modern methods of materials research are discussed to provide the students with a fundamental understanding of the properties of functional materials.

Teaching content

Lecture materials physics: structure and crystal defects, thermodynamics and constitution, diffusion, phase transitions and reaction kinetics, mechanical properties, classes of functional materials

Laboratory course of materials physics: experimental techniques and basic physical properties of materials

Advanced lectures: choice of, e.g., atomic transport, physics of soft matter and biomaterials, semiconductor physics, polymer physics, material mechanics, nanostructured materials, numerical methods of materials physics

Learning outcomes

The students have acquired advanced knowledge in the physical concepts and methods of materials physics. They are able to contribute to pertinent current research activities.

3	**Structure**					
Module components						
No.		Course-category	Course-form	Course	Status (M/EM)	Workload (h)
						Attendance time (h)/SWS / Self studies (h)
1	1a	Lecture		Materials physics I	M	30 h / 2 SWS / 30 h
	1b	Exercise		Exercises to materials physics I	M	15 h / 1 SWS / 45 h
2	2a	Lecture		Materials physics II	M	30 h / 2 SWS / 30 h
	2b	Exercise		Exercises to materials physics II	M	15 h / 1 SWS / 45 h
3		Laboratory course		Laboratory course on materials physics	M	45 h / 3 SWS / 105 h
4				At least one advanced lecture, possibly with exercise, or a seminar in the field of materials physics or experimental or theoretical solid-state physics or Implementation of a short research project in a materials physics research group (“mini research”) or Implementation of a project in the context of an internship in industry under scientific supervision of a university teacher of the module	M	depending on the course / depending on the course
Elective options within the module				The courses no.1 – 3 are mandatory. Courses related to no. 4 can be chosen upon agreement with a module representative.		

4	**Examination structure**				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course No., if appl.	Weight in the module grade
1	FME	Oral final examination on the subjections of the module.	30 – 45 min		100%
Weight of the module grade for the final overall grade		The module grade contributes with the weight 17/120 to the final overall grade.			
Required coursework					

No.	Type	Duration/ Scope	Connection to course No., if appl.	
1	Successful participation in the “Exercises to materials physics I”. Exercise sheets are worked on in self-studies. They are checked, presented and discussed in small exercise groups by the students. The solutions of the exercises are graded. The successful participation usually requires the correct solution of 50 % of the exercises.	Exercise sheets on a weekly or biweekly basis	1b	
2	Successful participation in the “Exercises to materials physics I”. Exercise sheets are worked on in self-studies. They are checked, presented and discussed in small exercise groups by the students. The solutions of the exercises are graded. The successful participation usually requires the correct solution of 50 % of the exercises.	Exercise sheets on a weekly or biweekly basis	2b	
3	Successful, testified implementation and assessment of all required experiments.	10 experimental protocols	3	
4	If applicable, depending on the choice of the courses: Solution of exercises, presentation of a talk or delivery of a final report on the project.		4	

5	**Requirements**
Module-related requirements for participation	None
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	In the laboratory courses physical attendance is necessary because the competence to perform physics experiments can be acquired only by actually dealing with the provided laboratory equipment. In case of absence for a substantial reason alternative dates are offered. If under course. Nr 4 a seminar is chosen, a regular participation in the seminar is explicitly recommended because the ability to actively participate in the scientific discussion following the talks is an essential learning target.

6	**CP allocation**	
Participation (= attendance time)	Course No. 1a	1 CP
	Course No. 1b	0,5 CP
	Course No. 2a	1 CP
	Course No. 2b	0,5 CP
	Course No. 3	1,5 CP
	Course No. 4	0 – 5 CP
Degree-relevant examination(s)	No. 1	2 CP
Required coursework	No. 1	1,5 CP
	No. 2	1,5 CP
	No. 3	3,5 CP

	No. 4	0 – 5 CP
Total CP		14 – 18 CP

7	**Module administration**
Frequency	Every semester
Module representative	Prof. Dr. G. Wilde
Responsible department	Department of Physics

8	**Recognition**
Usability in other degree programs	M.Sc. Physics
Module title German	Physikalische Vertiefung: Materialphysik
German translation of the module components from field 3	Course No. 1a: Materialphysik I
	Course No. 1b: Übungen zu Materialphysik I
	Course No. 2a: Materialphysik II
	Course No. 2b: Übungen zu Materialphysik II
	Course No. 3: Praktikum der Materialphysik
	Course No. 4: Mindestens eine vertiefende Vorlesung, ggf. mit Übung, oder ein Seminar aus dem Bereich der Material- oder der experimentellen oder theoretischen Festkörperphysik, oder Durchführung eines kurzen Forschungsprojekts in einer materialphysikalischen Arbeitsgruppe (Miniforschung), oder Durchführung eines Projekts im Rahmen eines Praktikums in der Industrie unter wissenschaftlicher Begleitung durch eine Hochschullehrerin/einen Hochschullehrer des Wahlpflichtmoduls

9	**Miscellaneous**

Degree program	**Geophysics (Master of Science)**
Modul	**Elective Studies: Nonlinear Physics**
Module number	5

1	**Basic data**
Program semester	1, 2
Credits (CP)	14 – 18
Workload (h) in total	420 – 540
Module duration	2 semesters
Module status (M/EM)	EM

2	**Profile**

Aim of the module / Integration in the curriculum

Nonlinear effects show up in everyday life and in nature. Particularly fascinating examples are patterns on animal fur, turbulent weather phenomena, spatio-temporal structures in the behavior of sand or optical patterns. But also, collective phenomena in biology and social sciences like the formation of swarms, neural network structures or group dynamics can be studied by using methods of nonlinear physics. In many physical, chemical, biological or also social systems which, due to energy or information flow, are kept far from thermal equilibrium, nonlinear effects lead to the formation of spatio-temporal patterns.

The goal of the module is to introduce important phenomena and the terminology of nonlinear physics in a general form and to address in depth selected topics. For this purpose, it involves both theoretical and experimental approaches. Students get a comprehensive understanding of nonlinear physics, ranging from the classification of stationary, oscillating and chaotic behavior in systems with few degrees of freedom via the spontaneous formation of structures in spatially extended systems up to nonlinear wave phenomena and turbulence, and apply it to examples in hydrodynamics, nanophysics, biophysics and optics. The module furthermore provides the opportunity to participate in the activities of the interdisciplinary Center for Nonlinear Science. Thus, in addition to many examples in the field of physics also complex systems in biology, chemistry, medicine or social sciences are addressed.

Teaching content

The module contains theoretical and experimental topics. The focus of the studies can be more on the theoretical or the experimental side. In each combination of courses, the fundamental concepts of nonlinear physics like signatures of nonlinear and complex systems, emergence, self-organization, bifurcations, attractors or pattern formation will be addressed and specific examples of nonlinear systems will be treated. Thereby, typical nonlinear model equations and their generic properties as well as exemplary experimental systems and their applications will be discussed.

Learning outcomes

The students have developed an understanding of the fundamental concepts of nonlinear physics and are able to understand on this basis the role of nonlinearities in various physical, chemical or biological systems. They

have learned relevant methods for the theoretical and/or experimental analysis of nonlinear systems and developed skills to apply those to specific theoretical or experimental physical problems.

The students can familiarize themselves with an advanced topic in the field of nonlinear physics, prepare a talk addressed to a specific audience, present the talk and defend it in the subsequent discussion. They have the ability to contribute adequately to the scientific discussions on the subjects of the seminar talks.

3	**Structure**					
Module components						
No.	Course-category	Course-form	Course	Status (M/EM)	Workload (h)	
					Attendance time (h)/SWS	Self studies (h)
1 1a	Lecture		Two basic or advanced lectures in the field of nonlinear physics	M	60 h / 4 SWS	30 – 60 h
1b	Exercise		Exercises to a lecture from No. 1a	M	15 h / 1 SWS	45 h
2	Seminar		Seminar on nonlinear physics	M	30 h / 2 SWS	30 h
3	Laboratory course		Laboratory Course: Nonlinear Physics	M	45 h / 3 SWS	90 h
4			Additional lecture, possibly with exercises, or seminar in the field of Nonlinear Physics or Research project on a nonlinear physical problem ("mini-research") or implementation of a project within the framework of the interdisciplinary course "Nonlinear Modeling in Science" or internship in business or an external university or research institution under the scientific supervision of a university teacher of the module.	M	depending on the course	depending on the course
Elective options within the module			Taking into account the subject area and the above-mentioned structural conditions, a free choice of courses offered by the Department of Physics is possible. The individual realization of the module has to be agreed on with the module representative prior to the participation in courses.			

4	**Examination structure**				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course no., if appl.	Weight in the module grade

1	FME	Oral final examination on the subjects of the module.	30 – 45 min		100%
Weight of the module grade for the final overall grade		The module grade contributes with the weight 17/120 to the final overall grade.			
Required coursework					
No.	Type		Duration/ Scope	Connection to course no., if appl.	
1	Successful participation in an exercise. Exercise sheets are worked on in self-studies. They are checked, presented and discussed in small exercise groups by the students. The solutions of the exercises are graded. The successful participation usually requires the correct solution of 50 % of the exercises.		Exercise sheets on a weekly or biweekly basis	1b	
2	Presentation of a talk.		30 – 45 min	2	
3	Successful, testified implementation and assessment of all required experiments.		Experimental protocols	3	
4	If applicable, depending on the choice of the courses: Solution of exercises, presentation of a talk or successful, testified implementation and assessment of experimental and/or theoretical tasks.			4	

5	**Requirements**
Module-related requirements for participation	None
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	In the laboratory courses physical attendance is necessary because the competence to perform physics experiments can be acquired only by actually dealing with the provided laboratory equipment. In case of absence for a substantial reason alternative dates are offered. A regular participation in the seminar is explicitly recommended because the ability to actively participate in the scientific discussion following the talks is an essential learning target.

6	**CP allocation**	
Participation (= attendance time)	Course No. 1a	2 CP
	Course No. 1b	0,5 CP
	Course No. 2	1 CP
	Course No. 3	1,5 CP
	Course No. 4	0 – 5,5 CP
Degree-relevant examination(s)	No. 1	2 CP
Required coursework	No. 1	1,5 CP
	No. 2	1 CP
	No. 3	3 CP

	No. 4	0 – 5,5 CP
Total CP		14 – 18 CP

7	**Module administration**
Frequency	Every semester
Module representative	Prof. Dr. C. Denz, Prof. Dr. S. Linz
Responsible department	Department of Physics

8	**Recognition**
Usability in other degree programs	M.Sc.Physics
Module title German	Physikalische Vertiefung: Nichtlineare Physik
German translation of the module components from field 3	Course No. 1a: Zwei Vorlesungen auf grundlegendem oder vertieftem Niveau aus dem Bereich der nichtlinearen Physik
	Course No. 1b: Übungen zu einer Vorlesung aus Nr. 1a
	Course No. 2: Seminar zur Nichtlinearen Physik
	Course No. 3: Praktikum zur Nichtlinearen Physik
	Course No. 4: Weitere Vorlesung, ggf. mit Übungen, oder Seminar aus dem Gebiet der Nichtlinearen Physik, oder Forschungsprojekt zu einem nichtlinear-physikalischen Problem („Mini-Forschung“), oder Durchführung eines Projekts im Rahmen des interdisziplinären Praktikums „Nichtlineare Modellierung in den Naturwissenschaften“, oder Durchführung eines Praktikums in der Wirtschaft oder einer auswärtigen Universität oder Forschungseinrichtung unter wissenschaftlicher Begleitung durch eine Hochschullehrerin/einen Hochschullehrer des Wahlpflichtmoduls.

9	**Miscellaneous**

Degree programme	**Geophysics (Master of Science)**
Module	**Elective Studies - Geociences**
Module number	6

1	**Basic data**
Programme semester	1,2
Credits (CP)	14-18
Workload (h) in total	420-540
Module duration	2 semesters
Module status (M/EM)	EM

2	**Profile**
Aim of the module / Integration in the curriculum	
The module provides in-depth knowledge from the field of geosciences. It enables students to set a focus in the field of geosciences. **This module is taught in German.**	
Teaching content	
The contents depend on the student's election of courses.	
Learning outcomes	
The learning outcomes depend on the student's election of courses.	

3	**Structure**					
Module components						
No.	Course category	Course form	Course	Status (M/EM)	Workload (h)	
					Attendance time (h) / SWS	Self-study (h)
1			Selected after consultation with the module representative	M	dependent on the student's election of courses.	dependent on the student's election of courses.
Elective options within the module			The students elect courses from the field of geosciences, which are in a meaningful context to the geophysics course program. The election of courses should be made from the modules of the Bachelor's program in geosciences as listed below,			

	and set clear thematic priorities. As a rule, all courses should be elected from the respective selected specialization modules in order to achieve a clear focus. The election of courses must be agreed upon in advance with the respective module representative responsible and be approved by her/him. The level of selected courses should match the level of the geophysics Master courses.

4	**Examination structure**				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course no. if appl.	Weight in the module grade
		The demanded degree-relevant examination(s) depend on the student's choice of courses and are determined when the module is approved by the module supervisor. As a rule, they are based on the degree-relevant examination(s) demanded in the Bachelor's program in Earth Sciences for the selected courses. At least two degree-relevant examinations must be completed successfully.			Examination grades are included in the module grade with the weight of the credit points assigned to them and the associated course CPs.
Weight of the module grade for the final overall grade		The module contributes with a weight of 17 / 120 to the final overall grade			
Required coursework					
No.		Type	Duration/ Scope	Connection to course no. if appl.	
		The required coursework is determined when the module is approved by the module supervisor. They are based on the CPs required in the Bachelor's program in geosciences for the selected courses.	dependent on courses chosen by the student		

5	**Requirements**
Module-related requirements for participation	Knowledge from the field of geosciences, as taught in the bachelor's degree course in geophysics at the University of Münster.
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	As attendance rules, the requirements for the selected courses of the Bachelor's program in geosciences at the WWU Münster apply.

6	**CP allocation**	
Participation (= attendance time)		

Degree-relevant examination(s)		
Required coursework		
Total CP		

7	**Module administration**
Frequency	every semester
Module representative	Dr. P. Göbel
Responsible faculty	Geosciences

8	**Recognition**
Usability in other degree programmes	none.

9	**Miscellaneous**
	The examination regulations for the actual BSc Geosciences program apply to the registration and deregistration modalities as well as to the participation in and passing of the coursework and examinations of this module.

Degree programme	**Geophysics (Master of Science)**
Module	**Interdisciplinary studies**
Module number	7

1	**Basic data**
Programme semester	1,2
Credits (CP)	At least 4-8
Workload (h) in total	120h – 240h
Module duration	2 Semesters
Module status (M/EM)	M

2	**Profile**
Aim of the module / Integration in the curriculum	
This module allows students to freely choose among courses offered at WWU. This allows them to gain additional qualifications beyond those imparted by the compulsory curriculum.	
Teaching content	
The chosen courses should complement the compulsory curriculum in a sensible fashion and contribute to vocational qualification. Their level must be adequate for Master's students. To guarantee these requirements the chosen courses must be approved in advance by the module representative. In addition, students must get written permission to take part in the chosen courses and exams from the respective course organizers. Appropriate forms are provided by the examination office.	
Learning outcomes	
Depends on the courses chosen.	

3	**Structure**					
Module components						
No.	Course category	Course form	Course	Status (M/EM)	Workload (h)	
					Attendance time (h) / SWS	Self-study (h)
1	depends on the choice of courses		After consultation with the module representative.	M	depends on the choice of courses	depends on the choice of courses
Elective options within the module			This module allows students to freely choose among courses offered at WWU. The chosen courses should complement the compulsory curriculum in a sensible fashion and contribute to vocational qualification. Their level must be adequate for Master's students. To guarantee these requirements the chosen courses must be approved in advance by the module representative. In addition, students must get			

	written permission to take part in the chosen courses and exams from the respective course organizers. Together with the module "Elective studies", at least 22 CP have to be gained.

4	Examination structure				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course no. if appl.	Weight in the module grade
		After consultation with the module representative, students have to pass at least one FME or MCE. The grade for this module is given by the grade of the FME or by the best grade obtained in MCEs.	Fixed in consultation with the module representative.		100%
Weight of the module grade for the final overall grade		The module grade contributes with a weight of 5/120 to the final grade.			
Required coursework					
No.		Type	Duration/ Scope	Connection to course no. if appl.	
		Determined in consultation with the module representative.			

5	Requirements
Module-related requirements for participation	none
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	Depends on the courses chosen.

6	CP allocation		
Participation (= attendance time)		Course no. 1	depends on the courses chosen
		[...]	
Degree-relevant examination(s)		no. 1	depends on the courses chosen
		[...]	
Required coursework		no. 1	depends on the course chosen
		[...]	
Total CP			4-8 CP

7	Module administration
Frequency	every semester
Module representative	Prof. Dr. U. Hansen / Prof. Dr. C. Thomas
Responsible faculty	Physics

8	Recognition
Usability in other degree programmes	none

9	Miscellaneous

	This module structure serves as a template for an individually arranged interdisciplinary module. The individual choice of courses must be approved beforehand by the module representative.

Degree program	**Geophysics (Master of Science)**
Modul	**Professional Specialization and Project Design**
Module number	8

1	**Basic data**
Program semester	3
Credits (CP)	30
Workload (h) in total	900
Module duration	1 semester
Module status (M/EM)	M

2	**Profile**
Aim of the module / Integration in the curriculum	
Based on research-oriented special courses and the individual familiarization with the subject, the module imparts the scientific basis for the independent work on the master's thesis. The student becomes familiar with the independent acquisition of relevant information, data and literature. Special technical and numerical or mathematic skills forming the basis for the master's thesis are acquired. The cooperation with technical staff of the workshops and the institutes is trained.	
Teaching content	
Introduction to scientific work, elaboration of the detailed contents of the chosen scientific area, familiarization with the current research literature in the field of the planned master's thesis.	
Learning outcomes	
Depending on the requirements of the chosen subject area, the student is familiar with relevant complex experimental facilities and geophysical equipment, is able to select necessary components and to procure them commercially, knows how to structure extensive calculations in such a way that the results are reliable or to implement numerical algorithms on different computer architectures. For this module the student is already integrated in a scientific research group. By means of this integration she/he has become acquainted with efficient group work and the optimal use of informal knowledge in the close environment.	

3	**Structure**					
Module components						
No.	Course category	Course form	Course	Status (M/EM)	Workload (h)	
					Attendance time (h)/SWS	Self studies (h)
1			Professional specialization and project design	M	0	900

Elective options within the module	Upon arrangement with the module representative the participation in laboratory courses, in research seminars including the presentation of a talk or in further courses may be required.

4	**Examination structure**				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course No., if appl.	Weight in the module grade
1	FME	Final presentation in the form of a talk or a poster on the subject of the planned master's thesis with discussion in the respective research group	30 – 45 min		100%
Weight of the module grade for the final overall grade		The module grade contributes with the weight 6/120 to the final overall grade.			
Required coursework					
No.		Type	Duration/ Scope	Connection to course No., if appl.	

5	**Requirements**
Module-related requirements for participation	At least 30 CP from the master's program has to be achieved.
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	The preparation of the project usually requires participation in the activities of the research group of the supervisor. In the laboratory courses physical attendance is necessary because the competence to perform physics experiments can be acquired only by actually dealing with the provided laboratory equipment. In case of absence for a substantial reason alternative dates are offered. Depending on the research group the physical attendance in other courses may be required.

6	**CP allocation**	
Participation (= attendance time)	Course No. 1	0 CP
Degree-relevant examination(s)	No. 1	30 CP
Required coursework		
Total CP		30 CP

7	**Module administration**
Frequency	Every semester
Module representative	The supervisor of the master's thesis
Responsible department	Department of Physics

8	**Recognition**
Usability in other degree programs	
Module title German	Fachliche Spezialisierung und Projektplanung
German translation of the module components from field 3	Course No. 1: Fachliche Spezialisierung und Projektplanung

9	**Miscellaneous**

Degree program	**Geophysics (Master of Science)**
Modul	**Master's Project**
Module number	*9*

1	**Basic data**
Program semester	4
Credits (CP)	30
Workload (h) in total	900
Module duration	1 semester
Module status (M/EM)	M

2	**Profile**
Aim of the module / Integration in the curriculum	
The master's project serves for the scientific formation. In this project the student demonstrates that she/he is able to elaborate independently on a well-defined scientific problem within a research area by using scientific methods, to present the results in scientific diction in written form in the master's thesis and in oral form in the final presentation.	
Teaching content	
Upon agreement with the module representative. In the research area chosen for the master's project the student elaborates under the guidance of a scientific supervisor a topical scientific problem.	
Learning outcomes	
In addition to the scientific contents the student has become familiar with relevant key qualifications for the work as a scientist: communication skills (also in the English language), literature research, evaluation of published data and their interpretation, accuracy in experimental work, testing strategies for newly developed programs, the will and power of endurance, writing of scientific papers, if applicable presentation of the results and exchange with other scientists at conferences, if applicable communication with suppliers and workshops.	

3	**Structure**					
Module components						
No.	Course-category	Course-form	Course	Status (M/EM)	Workload (h)	
					Attendance time (h)/SWS	Self studies (h)
1			Master's project	M	0	900
Elective options within the module			None			

4	Examination structure				
Degree-relevant examination(s)					
No.	FME/ MCE	Type	Duration/ Scope	Connection to course No., if appl.	Weight inthe module grade
1	FME	Master's thesis The master's thesis is evaluated and graded by the examiners. The evaluations are handed in at the Examinations Office by the examiners after the presentation of the talk.	In general at most 80 pages	1	100%
Weight of the module grade for the final overall grade		The module grade contributes with the weight 54/120 to the final overall grade.			
Required coursework					
No.		Type	Duration/ Scope	Connection to Course No., if appl.	
1		Talk on the subject of the master's thesis with subsequent discussion under the participation of first and second examiner.	30 – 45 min	1	

5	Requirements
Module-related requirements for participation	At least 60 CP from the master's program have to be achieved. If the admission to the master's program had been granted under the condition of alignment studies, the successful completion has to be proven before starting with the master's thesis.
Awarding credits	Academic credit is awarded upon completion of the entire module, i.e. when students have proven that they have achieved the learning outcomes in their entirety as provided by the module.
Rules on course attendance	The experimental and theoretical works of the project require the active participation in the research group of the supervisor corresponding to a full-time occupation.

6	CP allocation	
Participation (= attendance time)	Course No. 1	0 CP
Degree-relevant examination(s)	No. 1	28 CP
Required coursework	No. 1	2 CP
Total CP		30 CP

7	Module administration
Frequency	Every semester
Module representative	The supervisor of the master's thesis
Responsible department	Department of Physics

8	Recognition
Usability in other degree programs	
Module title German	Masterprojekt
German translation of the module components from field 3	Course No. 1: Masterarbeit

9	Miscellaneous