

General Programme Regulations

Article 1 - Subject and scope of the General Programme Regulations

The General Programme Regulations set out the requirements according to which students of the Joint Master Programme in Applied Geophysics (Programme) may acquire their Master degrees in Applied Geophysics.

Article 2 - Programme partners

The Programme is the shared responsibility of the following three universities:

1. The Faculty of Civil Engineering and Geosciences at Delft University of Technology (**TUD**),
2. The Department of Earth and Planetary Sciences at ETH Zurich (**ETH**), and
3. The Faculty of Geo-resources and Material Engineering at RWTH Aachen University (**RWTH**), thereafter referred to as the partner universities.

Article 3 - Organization of the Programme

The students of the Programme study together at each university and move between universities as a group.

- a. The students start their 120-credit-points Programme at **TUD** in the autumn.
- b. After their first semester, they move to **ETH** where they spend the spring semester, and
- c. Finally, they move on to **RWTH** for their third semester.

The number of credits per university is specified in Paragraph 3.

Depending on their Master thesis project, they will spend their last semester at one of the three partner universities or outside organisations such as industry, government agencies or other universities. The Programme ends with a diploma ceremony at TUD where the students receive one joint-degree diploma certificate, making it in fact an international joint degree programme.

Article 4 - Joint Examination Board (JEB)

See the Rules and Regulations of the Joint Examination Board.

Article 5 - Credit examinations

1. Credit examinations are in the responsibility of each partner university and thus handled according to local rules and regulations. The course schedule of each partner university specifies the type and modalities of credit examinations.
2. The results of the credit examinations are to be declared to the students, the respective administration units, and in particular the coordinating office at TUD within the timeframe stipulated by each partner university.
3. The Director of Studies may require students who have interrupted or delayed their studies to retake any credit examination they passed during their previous enrolment in the Programme if the content of the course in question has considerably changed since then. Such re-entries will be evaluated on a case-by-case basis.

Article 6 - Obtaining credit points

A student will receive the allocated number of credit points for each course provided the student has obtained a minimum grade of E (see 4.4 – Grading system) in the respective examination or has been granted an exemption.

Paragraph 1 - Study Programme & Programme Composition

Article 7 - Study load

Each student must obtain a minimum of **120 credit points** within 4 years to be awarded their Master degrees. It is recommended that students acquire their 120 credit points from the list of recommended courses.

Article 8 - Intended learning outcomes

The student is able to...

1. Explain, discuss, and use fundamental scientific knowledge about wavefield, diffusive-field and potential-field methods of applied geophysics.
2. Design and conduct scientifically sound geophysical experiments, process the collected data, and analyse and interpret the processed results.
3. Develop and use mathematical models to simulate, process, and invert geophysical data and solve related subsurface characterisation and monitoring problems.
4. Perform a literature study, identify a knowledge gap in a topic in applied geophysics, formulate a research question, and build on existing knowledge in relevant fields that are required to solve the stakeholders' problems.
5. Improve methodologies for applied geophysics that drive technological innovations to improve the responsible and sustainable use of the Earth's subsurface.
6. Observe, characterise, and explain Earth system processes related to application areas of applied geophysics.
7. Challenge existing knowledge, show a constructive critical attitude, propose novel and creative solutions, and exercise independent judgement.
8. Use written and oral communication skills to effectively exchange information and ideas with scientists and engineers, the public, and other stakeholders in the field of applied geophysics.
9. Initiate, design, plan, and monitor a project to meet the requirements set by the stakeholder
10. Work effectively in teams of diverse expertise, talents, skills, characters, and cultures.
11. Acquire new knowledge and skills to continue operating effectively.
12. Uphold and evaluate ethical standards for scientific integrity and evaluate societal and economic trade- offs and relevant ethical issues when developing technological innovations.

Article 9 - Programme overview

1. Each student must obtain a minimum of **24 EC** from each partner university, **but 120 ECs in total from the three partner universities**;
2. Each student must pass three core modules at TUD, pass the three obligatory blocks at ETH, and 3 out of 7 core Blocks at RWTH;
3. Each student must obtain 30 credit points for the Master thesis project including an obligatory colloquium at the end of the project. The MSc thesis can be written at one of the three partner universities.

The programme consists of the following components:

Semester 1 (Sep.-Jan.)			EC	Semester 2 (Feb.-Jul)			EC
TU Delft	Nominal study load		30	ETH Zürich	Nominal study load		30
	Minimum study load		24		Minimum study load		24
	Mandatory modules		18		Mandatory modules		19
Semester 3 (Oct.-Feb.)			EC	Semester 4 (Mar.-Aug.)			EC
RWTH Aachen	Nominal study load		30	All partners	Nominal study load		30
	Minimum study load		24		Minimum study load		24
	Mandatory modules		18		Master thesis		30

Article 10 - Programme Requirements

- Each student must obtain a minimum of **120 credit** points¹ within 4 years to be awarded their Master degrees. It is recommended that students acquire their 120 credit points from the list of recommended courses. However, each student must:
 - obtain a minimum of **24 credit** points from each partner universities courses;
 - pass the three core modules at **TUD**, pass the three compulsory modules in combination with additional courses at **ETH** and 3 out of 7 core Blocks at **RWTH**;
 - obtain **30 credit** points for the Master thesis project including an obligatory colloquium at the end of the project. A student can compensate the difference between the nominal amount of **30 credit** points and the minimum of **24 credit** points in one partner university with the corresponding number of extra credits at another partner university.
- Students need to have obtained at least **40 credit** points from TUD and ETH after one academic year before 1 October of the calendar year in which they study at ETH. Students who do not obtain the necessary **40 credits**, will be expelled from the programme.

Article 11 - Programme composition

- First year TU Delft:** A minimum of **24 credits** should be passed from TU Delft subjects, including the following three compulsory courses:

Course code		Course title	EC
Semester 1	JMAG110-26	Field Geophysics and Signal Analysis with exercises	6
	JMAG111	Advanced Reflection Seismology and Seismic Imaging	6
	JMAG100	Electromagnetic Exploration Methods	6

Additional courses at TU Delft:

Course code		Course title	EC
JMAG121		Geophysics Special Subjects	6
JMAG120		Seismic Acquisition to Data Information Content	6

¹ The Programme follows a credit system which is aligned with the European Credit Transfer System (ECTS). Credit points describe the average time expenditure required to achieve a learning goal. The curriculum is designed such that students may obtain an average of 30 credit points per semester.

3. **First year Zürich:** A minimum of **24 credits** should be passed from ETH Zürich subjects, including the three compulsory blocks:

	Course code	Block	Course title	EC
Semester 2		Module 1	Mathematical Methods	6
		Module 2	Modelling and Imaging of Waves	6
		Module 3	Geophysical Field Work & Processing: Methods & Preparation	3
	651-4106-03L	Module 3	Geophysical Field Work & Processing: Field Course	4

Additional courses at Zürich:

Course code	Course title	EC
651-4087-01L	Case Studies in Exploration and Environmental Geophysics	3
651-4096-00L	Inverse Theory I: Basics	3
651-4096-02L	Inverse Theory II: Applications	3
651-4109-00L	Geothermal Energy	5
651-4013-00L	Potential Field Theory	3
651-4240-00L	Geofluids	5
651-4284-00L	AI-Assisted Coding and Collaborative Project Development	3
651-4918-00L	Machine Learning for Earth and Planetary Sciences I	2

4. **Second year Aachen:** a minimum of **24 credits** should be passed from RWTH Aachen subjects, whereby at least three of the following seven blocks must be passed.

	Course code	Block	Course title	EC
Semester 3	5.331.637.01	Block 1	Rockphysics	3
	5.331.637.02	Block 1	Rockphysics Laboratory	3
	5.314.570	Block 2	Geophysical Logging and Log Interpretation	3
	5.350.132	Block 2	Fieldwork: Geophysical Logging and Log Interpretation	3
	5.412.003	Block 3	Modeling and Inversion for multi-method Geophysics	6
	5.318.482	Block 4	Hydrogeophysics	3
	5.329.469	Block 4	Engineering geophysics	3
	5.342.487	Block 5	Computational Continuum Mechanics	6
	5.412.000	Block 6	Research Module in Applied Geophysics	6
	53.26004	Block 7	Scientific Machine Learning	6

Additional courses at Aachen:

(If a student chooses another block as an additional course, they must pass all the courses in the block)

Course code	Block	Course title	EC
5.100.010	Block 8	Final Disposal and Projects	3
5.100.017	Block 8	Geological & Engineering Basics of Final Disposal	3
1.253.420		Machine Learning	6
4.100.220		Finite Elements in Fluids	6
5.330.255		Seismic Interpretation and Well Integration	3
5.331.439		Data analysis in Geoscience	3
5.332.383		Underground Excavation	6
8.118.471		Economics of Technological Diffusion	6
5.312.002		Principles of Plate Tectonics	3
5.424.346		Energy Resources Management	3
5.345.471		Portfolio Management and Prospect Evaluation	3
5.349.932		Neotectonics and Earthquake Geology	3
5.334.000		Advanced Applied Seismology	3
5.325.865		GIS specialization	3

1. Second year Delft/Zürich/Aachen: Master thesis 30 credits

Course code		Course title	EC
Semester 4	JMAG230	Master Thesis Project	30

Article 12 - Electives

1. A list of recommended courses will be provided to the students at the beginning of each semester at TUD, ETH and RWTH.
2. At TUD, the list of recommended courses can be extended with any course of the Master Applied Earth Sciences.
3. At ETH, the list of recommended courses can be extended with any course of their Earth Science programme.
4. At RWTH, the provided list of courses includes possible elective and voluntary courses that can be followed.
5. For courses outside these lists, a permission from the JEB is required.
6. Students may not choose as free electives²:
 - Language courses
 - Courses offered by the Graduate School;
 - Skill courses and MOOCs.
 Company internships, language courses, skills subjects and MOOCs are not allowed within the examination Programme, they can only be part of the extracurricular section of the diploma supplement.

Article 13 - Composing and registering the Individual Study Plan (ISP)

1. At the beginning of each academic year, the courses of the Programme, including details of compulsory credits, and type and weight of exam, will be provided by each partner university. Students register for their courses through the respective system of each partner university.
2. Students must submit an [Individual Study Plan \(ISP\)](#) in My Study Planning. The ISP provides an overview of the full MSc programme the student intends to follow, including all courses or modules and electives.
3. The ISP, and any subsequent changes to it, has to be approved by the programme coordinator.
4. Approved ISPs are registered in Osiris and are used to monitor the student's progress and to check whether the student has fulfilled all components necessary to graduate.

Paragraph 2 - Master thesis

Article 14 - Master thesis preparation

1. A student may only begin the Master thesis project once the research project has been approved by the Joint Examination Board, the student has reached **83 EC** by the end of the first exam period at RWTH.
2. Should there be cogent grounds for a student not meeting the requirements, a student may submit an individual request for an exception to the Joint Examination Board and the JEB may allow the Master thesis project to begin.
3. As thesis preparation, students are strongly advised to complete the following research module.

Module code	Module title	EC
5.412.000	Research Module in Applied geophysics	6

² This means that the courses are not allowed within the examination programme but only as extracurricular.

Article 15 - Master thesis project

Since the Master thesis is common to the three partner universities, the rules laid down in the Rules and Regulations of the Joint Examination Board (JEB) and are common to the three universities. In addition, the following rules apply:

1. **Choice of master thesis theme:** The JEB publishes a list and description of research themes for Master thesis projects. Representatives from each of the three partner universities and, if applicable, from industry give short presentations on the potential research projects at a thesis presentation day and are available to discuss these with the students. Some research projects may involve extensive periods of closely supervised research in industry, government or other universities.
After the presentations, each student submits to the JEB a ranked list of three research themes, each one supervised by a different partner university, that student may be interested in pursuing in student's thesis project. Subject to availability, every reasonable effort is made to provide the student with a research theme that matches student's preferences and suites student's knowledge, skills and experience.
2. **Supervision and form of the Master thesis projects:** The student must report to the supervisor(s) at least once every two weeks during the course of the Master thesis project.
At the 6- and 12-week marks, the student presents verbal reports on the status of the research. At the 15-week mark, the students and supervisors decide on the content and form of the written Master thesis. If there are sufficient original results, then an article may be prepared for publication in a scientific journal. Such an article, appropriately bound in the form of a thesis, is acceptable as the Master thesis. The maximum page number of the thesis is 70 excluding (digital) appendices.
The resulting Master thesis should be subjected to one round of corrections by the principal supervisor or the student's delegate before being formally submitted and examined.
3. **Completion of the Master thesis report, public presentation and defense:** The completed Master thesis report must be made available to an ad hoc thesis committee (see below, under 7) directly after the submission, whose date is specified in the academic calendar, which is at least 1 week before the defence. After the completion of the Master thesis report the students have to present their results in a 20-minute public presentation with 5 minutes for questions from the public. After the presentation the ad hoc thesis committee will examine the candidate on the thesis work in a closed sitting (defence) of at least 15 minutes.
4. **Composition of the Master-thesis assessment committee:** Each Master thesis is assessed by an ad hoc thesis committee which consists at least of:
 - Two members, one of whom is the principal supervisor and one from a partner university.
 - Each of these members must be a full professor, associate professor, assistant professor or senior lecturer at one of the partner universities.
 - Each of these members must be qualified to assess courses/theses at her/his own university.
 The principal supervisor is responsible for forming the ad hoc thesis committee. The ad hoc thesis committee might be extended to additional members (e.g., the external supervisors from external master thesis projects) without voting right.
5. **Grading the Master thesis:** The ad hoc committee assesses the thesis, the public presentation and the defence, and the final decision on the grade is made by the committee members with voting rights. These committee members have to be involved in assessing the thesis, the public presentation and the thesis defence.
The JEB establishes and publishes a list of evaluation criteria, with which all theses are assessed.
The ad hoc thesis committee makes recommendations concerning the grades (in the local grading system) to be given to the thesis including colloquium and defence. The final decision concerning the grades is the responsibility of the two committee members with voting right.

The principal supervisor shall declare the results to the student after the colloquium presentation and the thesis defence. The student will also inform the respective administration units and in particular the coordinating office at TUD.

Repetition of a failed Master Thesis: A failed Master thesis may be repeated once. A repetition of a failed Master thesis must be on a different topic and may be conducted with the same or a new supervisor. To repeat a failed Master thesis, the student has to submit a proposal to the JEB which then assigns a principal supervisor for the Master thesis project. The student must start the repeated Master thesis within three semesters after the failed first attempt. For the duration, supervision, form, completion, presentation and grading of the Master thesis the same rules apply as for the failed Master thesis (Art. 10.4 – 10.7). If the repetition of the Master thesis fails or if the time limit to start the repeated Master thesis is exceeded, the student is expelled from the Programme. However, the student has the possibility to choose another track within the Applied Earth Sciences Master programme at TUD.

Article 16 - Award of degree

See the Rules and Regulations of the Joint Examination Board.

Article 17 - Documents and title

See the Rules and Regulations of the Joint Examination Board.

Article 18 - With honours

See the Rules and Regulations of the Joint Examination Board.

Paragraph 3 - Admission requirements

Article 19 - Admission requirements

1. Admission to the Programme may be granted to:
 - a. Applicants with a Bachelor degree in appropriate subject areas (e. g. earth sciences, environmental sciences, physics, engineering) issued by one of the partner universities;
 - b. applicants with a Bachelor degree of at least 180 ECTS CPs or an equivalent university qualification in appropriate subject areas (e.g., earth sciences, environmental sciences, physics, engineering) which gives evidence of the required qualification for the Programme from other top universities worldwide.
2. In order to be sufficiently qualified for the Programme applicants must have a solid background in the fundamentals of mathematics and physics as well as basic knowledge of geology and geophysics.

Article 20 - Admission and selection procedure

1. Candidates for the Programme apply through the TUD admission system.
2. A pre-selection of applications is made by designated personnel of the TUD Admissions Office.
3. Applications passing the pre-selection procedure are then evaluated by the Admission Committee.
4. Admission is granted by the Dean of the Faculty of Civil Engineering and Geosciences of TUD to students who have been selected for the Programme by the Admission Committee.
5. Admission to the Programme may be conditional, such that some applicants may have to fulfil specific conditions (e.g., pass certain examinations at their home universities) before final admission.
6. Students who accept their admission offer will automatically be admitted to and enrolled at all partner universities for the entire duration of the Programme.

Article 21 - Language requirements

1. The language of tuition is English. All teaching, exercise and practical material will be provided in English.
2. All students are required to provide a proof of English language proficiency. The detailed requirements are published by TUD at the beginning of each admission period.
3. Only students with a Bachelor from either TUD, ETH or RWTH, nationals from the U.S., U.K., Ireland, Australia, New Zealand and Canada as well as students with a Bachelor degree from one of these countries are exempt from the proof of English language proficiency requirement.
4. TUD specifies the requirements in consultation with the Executive and the Administrative Committees.

Article 22 - Bridging Programme for students with a Dutch HBO bachelor's degree

1. This bridging programme is designed especially for the Dutch students from Dutch Higher Vocational Institutes.
2. The courses in this bridging programme will be taught only in Dutch.
3. Students who want to be admitted to the Master's degree course on the basis of a relevant Dutch Higher Vocational Institute Bachelor degree have to complete the following bridging programme first.

Course code	Course title	EC
Compulsory courses		
IFEEMCS012100	Calculus for Engineering, part 1	3
IFEEMCS012200	Calculus for Engineering, part 2	3
IFEEMCS012300	Calculus for Engineering, part 3	3
ECTB1240	Linear Algebra	4
ECTB1220A	Geodata Fundamentals: Sensing and Statistics	5
ECTB1220B	Geodata Fundamentals: Applied Statistics with Python	3
WI1909TH	Differential Equations	3
CTB2400	Numerical Mathematics	3
ECTB1131B	Thermodynamics	4
ECTB1131A	Mechanics	4
ECTB2150	Fluid Dynamics	5
ECTB1110A	Exploring the Grand Challenges: Data and Python	4

Paragraph 4 - Practical information/ Education, practical exercises and examinations

At the TU Delft:

The following articles apply only at the TU Delft.

At ETH Zürich:

The rules and regulations at ETH Zürich apply. See the regulations of ETH Zürich.

At RWTH Aachen:

The rules and regulations at RWTH Aachen apply. See the regulations of RWTH Aachen.

Article 23 - Registering for courses

1. At the beginning of each academic year, the courses of the Programme, including details of compulsory credits, and type and weight of exam, will be provided by each partner university.
2. Students register for their courses through the respective system of each partner university.

Article 24 - Credit examinations

1. Credit examinations are in the responsibility of each partner university and thus handled according to local rules and regulations. The course schedule of each partner university specifies the type and modalities of credit examination.
2. The results of the credit examinations are to be declared to the students, the respective administration units and in particular the coordinating office at TUD within a reasonable timeframe.
3. The JEB may require students who have interrupted or delayed their studies to retake any credit examination they passed during their previous enrolment in the Programme if the content of the course in question has considerably changed since then. Such re-entries will be evaluated on a case-by-case basis.

Article 25 - Practical exercises and/or exercises

1. The course or module teaching takes the form of lectures, practical exercises and/or exercises.
2. Practical's and/or exercises must be completed before students participate in the examination, unless indicated otherwise in the study guide.
3. Unless otherwise specified in the corresponding course description in the study guide, the following rules apply with respect to improving an unsatisfactory result for a practical or project:
 - a. If the result of a practical or project is unsatisfactory, i.e. if the practical exercise is assessed with a grade of **5.5** or lower (rounded to halves), the grade may be improved during the next teaching period (i.e. the teaching period following the one in which the course is taught), through one of the following options, depending on the grade obtained:
 - Grade 5.0 or higher: The student may submit an addendum to the original submission. The maximum grade that can be obtained in this way is a 6.0.
 - Grade lower than 5.0: The student must redo the practical or project in full, i.e. based on a new case or a new set of input parameters.

Article 26 - Grading system

1. **National grading scales and conversion to absolute A-F grades.** Each partner university uses its local grading scale. On the degree certificate the grades of all courses are converted to absolute A-F scale according to the following table:

F grading scale	Description	TU Delft	RWTH Aachen	ETH Zürich
A	Excellent	9.3 to 10	1.0 to < 1.5	> 5.5 to 6.0
B	Very good	8.3 to < 9.3	1.5 to < 2.1	> 5.0 to 5.5
C	Good	7.3 to < 8.3	2.1 to < 2.8	> 4.5 to 5.0
D	Satisfactory	6.3 to < 7.3	2.8 to < 3.5	> 4.0 to 4.5
E	Sufficient	6.0 to < 6.3	3.5 to 4.0	4.0
F OR FX	Fail	< 6.0	> 4.0	< 4.0
X	Exemption			
> larger than, < less than				

ECTS and local grades will be listed on the diploma supplement.

2. **Obtaining credit points.** A student will receive the allocated number of credit points for each course provided the student has obtained a minimum grade of E in the respective examination or has been granted an exemption.
3. **Final average grade.** TUD is responsible for providing the final average grade. For calculating this average, the marks of the courses from each university are converted to the TUD grading scale that has the finest scale and uses the scale 1 to 10, rounded off to one decimal. For these conversions, the following table is used:

6.00	10.0		1.00	10.0
5.75	9.5		1.30	9.6
5.50	9.0		1.70	9.1
5.25	8.5		2.00	8.7
5.00	8.0		2.30	8.3
4.75	7.5		2.70	7.7
4.50	7.0		3.00	7.3
4.25	6.5		3.30	6.9
4.00	6.0		3.70	6.4
			4.00	6.0

4. **The Weighted average.** Then the weighted average, with the ECTS credits of the courses as weights, is determined. Finally, the TUD-scale average is converted to the average in the absolute A-F grading scale using the table under article 26.1.

Article 27 - Graduation ceremony

A joint graduation ceremony will be held annually at TU Delft.

Article 28 - Leaving without completion of the programme

Students who have successfully passed one or more credit examinations, but who leave the Programme without eligibility for a degree certificate, may receive a declaration of such from the JEB provided that they submit such a request.

Article 29 - Appeals

Appeals with regard to the admission fall under the appeal regulations of TUD. All other appeals, including appeals regarding the master thesis project, fall under the appeal regulations of the institution where the incident occurred.

Paragraph 5 - Deviations from the study programme

Article 30 - Deviations from the programme

The Joint Examination Board (JEB) may allow students to deviate from the rules of the programme, including the transitional rules, if the achievement of the intended learning outcomes of the programme are safeguarded.

Paragraph 6 - Final provision

Article 31 - When the rules do not provide

Insofar as this annex does not provide for specific circumstances, the Joint Examination Board (JEB) will make a decision that is in line with this annex to every extent possible.

Article 32 - Final provision

The General Programme Regulations come into effect at the beginning of the autumn semester 2024. They apply to students who enter the degree programme.