

# TEACHING AND EXAMINATION REGULATIONS (TER)

IN ACCORDANCE WITH ARTICLE 7.13 OF THE [DUTCH]  
HIGHER EDUCATION AND RESEARCH ACT [WHW]

## ANNEX

**MASTER DEGREE PROGRAMME**  
APPLIED EARTH SCIENCES

2021  
2022

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# Paragraph 1

## General

### Article 1 Applicability of the regulations<sup>1</sup>

1. These regulations including the programme specific annexes, apply to the teaching and the examinations of:
  - » the Master degree programme in Civil Engineering (CE)
  - » the Master degree programme in Applied Earth Sciences (AES)
  - » the Interfaculty 4TU Master degree programme Construction Management and Engineering (CME)
  - » the Interfaculty Master degree programme Transport, Infrastructure and Logistics (TIL)

hereinafter referred to as 'the programme' or 'programmes'.

These regulations also apply to the bridging programmes of the aforementioned programme(s).

2. For CE and AES, the programme is provided under the responsibility of the faculty of Civil Engineering and Geosciences at Delft University of Technology, hereinafter referred to as the 'faculty'.  
For TIL, the programme is provided under the responsibility of the faculty Civil Engineering and Geosciences, the faculty Mechanical, Maritime and Materials Engineering and the faculty Technology, Policy and Management of Delft University of Technology.  
For CME, the programme is provided under the responsibility of the faculty Civil Engineering and Geosciences, Architecture & the Built Environment and Technology, Policy & Management.

### Article 2 Concepts / definitions

A list of relevant websites can be found in the appendix to this article.

1. The following concepts apply in this Regulation:

- |                                     |  |
|-------------------------------------|--|
| a. academic year:                   | the period from 1 September till 31 August of the following calendar year;   |
| b. Act:                             | the Higher Education and Scientific Research Act (in Dutch, the <a href="#">WHW</a> ), Dutch Bulletin of Acts, Orders and Decrees, number 593 and as amended since;  |
| c. annex (former: IR);              | the appendix which forms part of these Teaching and Examination regulations;   |
| d. Board of Examiners:              | the programme's Board of Examiners, which has been installed in accordance with Article 7.12 of the Act;   |
| e. bridging programme:              | a deficiency rectifying programme aimed at moving up to a Master degree programme, while enrolled in a Bachelor degree programme, but without obtaining a Bachelor degree, as stipulated in Article 7.30e or Article 7.57i of the Act; |
| f. cohort:                          | the group of students who have registered for a degree programme for the first time in a given academic year;  |
| g. course (or: 'subject');          | a teaching unit within the programme as intended in Article 7.3, sections 2 and 3 of the Act; a course can consist of a number of components;  |
| h. credit:                          | a European Credit (EC) awarded in line with the European Credit Transfer System (ECTS); one credit denotes a study load of 28 hours;   |
| i. (component) partial examination: | an assessment of the knowledge, insight and skills of a student in relation to a component within a course, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the Board of Examiners;  |
| j. dean:                            | Dean of the faculties mentioned in Article 1, Section 2 or Dean that represents the Deans of the faculties mentioned in Article 1, Section 2;  |
| k. degree:                          | an academic title conferred by universities and colleges as an indication of the completion of a course of study, or as an honorary recognition of achievement;  |
| l. degree audit:                    | the evaluation, in which, in accordance with Article 7.10 of the Act, the Board of Examiners determines whether all examinations in the courses of the degree programme have been successfully completed;                              |

<sup>1</sup> This Teaching and Examination Regulation (TER) is established per academic year and is valid as of the first day of the relevant academic year. This TER replaces all previous versions of the TER. The Study Guide is an integral part of the TER and its annex.

m. disability:	all conditions which are (at least for the specified period) chronic or lasting in nature and which form a structural limitation for the student in receiving education and/or sitting examinations or taking part in practicals;
n. education registration system:	the current education registration system is Osiris;
o. examination:	an assessment of the knowledge, insight and skills of a student in relation to a course, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the Board of Examiners;
p. examiner:	the individual who, in line with Article 7.12, Subsection 3 of the Act, has been appointed by the Board of Examiners to set the examinations;
q. institute:	Delft University of Technology;
r. interim examination:	the assessment of the examinee's knowledge, insight and skills and the results of the assessment as referred to in Section 7.10, first subsection of the WHW;
s. learning management platform:	the current learning management platform is Brightspace;
t. practical exercise:	course or component of a course aimed at the acquisition of particular skills. The following can be understood as practical exercises: <ul style="list-style-type: none"> <li>• writing a thesis,</li> <li>• conducting a project or experimental design,</li> <li>• carrying out a project or a design/research assignment,</li> <li>• completing an internship,</li> <li>• participating in fieldwork or an excursion,</li> <li>• conducting tests and experiments, or</li> <li>• participating in other educational activities that are considered essential and that are aimed at acquiring particular skills;</li> </ul>
u. programme:	the Master degree courses as stipulated in Article 7.3a Paragraph 1, Subsection b of the Act
v. programme duration:	the duration starting from the enrolment of the student up and to including the last examination;
w. student:	a person enrolled at Delft University of Technology in order to receive education and take the examinations and the degree audit in the degree programme ( <a href="http://www.studiegids.tudelft.nl">www.studiegids.tudelft.nl</a> );
x. study guide:	a digital guide to the programme containing specific information pertaining to the various courses;
y. teaching period:	half a semester;
z. track	major, as stipulated in Article 7.13, Paragraph 2, Subsection b of the Act;
aa. virtual learning environment:	the electronic system designed for the exchanging of teaching information (here: Brightspace);
bb. working day:	Monday to Friday with the exception of recognised national public holidays and the collective closure days.

2. The other concepts in these regulations are used in the sense in which they appear in the Act.
3. In these regulations, the term 'examination' also refers to 'interim examination', with the exception of Article 19, Section 1, first two complete sentences.
4. A written or oral examination may also be taken digitally and/or online. In these regulations the term examination is also taken to mean a digital and/or online examination, unless stated otherwise in these regulations.

# Paragraph 2

## Admission and prior education

### Article 3a Admission to the Master's degree programme {Addendum}

1. Individuals holding one of the following degrees have access to the education of the Master degree programme in Civil Engineering (under a) or Applied Earth Sciences (under b) or Construction Management Engineering (under c) or Transport, Infrastructure and Planning (under d) on the condition that all of the stated requirements have been met.

#### a. Civil Engineering

- » Bachelor degree Civil Engineering from Delft University of Technology or Bachelor degree Civil Engineering from University of Twente.

#### b. Applied Earth Sciences

- » Bachelor degree "Technische Aardwetenschappen" or "Applied Earth Sciences" from Delft University of Technology.

#### c. Construction Management and Engineering

- » Bachelor degree Architecture, Urbanism and Building Sciences (Bouwkunde) from Delft University of Technology or from Eindhoven University of Technology,
- » Bachelor degree Civil Engineering (Civiele Techniek) from Delft University of Technology or University of Twente,
- » Bachelor degree Systems Engineering, Policy Analysis and Management (Technische Bestuurskunde) from Delft University of Technology,
- » Bachelor degree Industrial Engineering & Management from University of Twente,
- » Bachelor degree Industrial Engineering from Eindhoven University of Technology,
- » Bachelor degree in Sustainable Innovation from Eindhoven University of Technology.

#### d. Transport, Infrastructure and Logistics

A university Bachelor degree at Delft University of Technology or equivalent in:

- » A university Bachelor degree at Delft University of Technology or equivalent in:
- » 'Civiele Techniek' (also at University of Twente) 'Electrical Engineering' (also at Eindhoven University of Technology and University of Twente),
- » 'Luchtvaart- en Ruimtevaarttechniek',
- » 'Maritieme Techniek',
- » 'Technische Bestuurskunde',
- » 'Technische Informatica' (also at Eindhoven University of Technology and University of Twente),
- » 'Technische Natuurkunde' (also at Eindhoven University of Technology, University of Twente and University of Groningen),
- » 'Technische Wiskunde' (also at Eindhoven University of Technology, University of Twente and University of Groningen),
- » 'Werktuigbouwkunde' (also at Eindhoven University of Technology and University of Twente).

or a university Bachelor degree in:

- » 'Econometrie en Operationele Research' at Erasmus University Rotterdam, University of Amsterdam, VU University Amsterdam, University of Groningen, University of Tilburg or Maastricht University,
- » 'Technische Bedrijfskunde' at Eindhoven University of Technology, University of Twente or University of Groningen.

Depending on the Bachelor degree, certain synchronisation courses are mandatory according to the annex of the distinctive programme.

2. Students who do not possess the degree mentioned in section 1 are required to obtain proof of admission to the programme from the Dean, who will seek the advice of the admission committee on this matter.

**a. Other university Bachelor degree (not including those listed in section 1)**

The following applies to this category: successful completion of the stated bridging programme for admission to the Master degree programme:

**Civil Engineering and Applied Earth Sciences:**

- » University Bachelor degree
- » Bridging programme to be followed: to be specified upon application.

**Construction Management and Engineering:**

- » University Bachelor degree: students who do not possess any of the degrees mentioned in section 1 may be eligible for, and should therefore seek advice on a Bridging minor or a custom bridging program as stipulated in the Annex for the MSc CME.

**Transport, Infrastructure and Logistics:**

A university Bachelor degree at Delft University of Technology or equivalent in:

- » 'Bouwkunde' (also at Eindhoven University of Technology)
- » 'Industrieel Ontwerpen' (also at University of Twente)
- » or a university Bachelor degree in:
  - » 'Landschapsarchitectuur en Ruimtelijke Planning' at Wageningen University,
  - » 'Technische Planologie' at University of Groningen,
  - » 'Sociale Geografie en Planologie' at University of Amsterdam, Utrecht University or University of Groningen
- » gives admission to the Master's degree programme, in which a convergence programme has to be completed. This convergence programme will be part of the Master's degree programme in Transport, Infrastructure and Logistics and consists of convergence courses stated in the annex to the TER.

**b. Higher professional education degree**

The following applies to this category:

Successful completion of the stated bridging programme for admission to the Master degree programme and, if applicable, the language requirement.

- » higher professional education degree

**Civil Engineering and Applied Earth Sciences:**

Bridging programme to be followed: Transitional programme for students with a Dutch higher vocational institute Bachelor degree ("HBO") as stipulated in the annex.

**Construction Management Engineering:**

Bridging programme to be followed: Transitional programme for students with a Dutch higher vocational institute Bachelor degree ("HBO") as stipulated in the annex.

**Transport, Infrastructure and Logistics:**

A relevant higher professional education degree gives admission to the programme only after successful completion of the bridging programme stated in the annex to this TER and, if applicable, the language requirement.

**c. Foreign degree**

This category is subject to the general selection requirements of Delft University of Technology with regard to prior foreign education, based on a Cumulative Grade Point Average of at least 75% of the maximum number of points that could be earned, included in the table of countries (see website) and meeting the requirements for satisfactory linguistic mastery of English, as stated in the appendix to art. 3.

3. For admission in accordance with section 2, the following additional condition apply:  
Access to the education of the Master degree programme in Civil Engineering, Applied Earth Sciences, Construction Management Engineering or Transport, Infrastructure and Logistics is open to individuals who have demonstrated to the admissions committee that they possess knowledge, insight and skills at the level of the Bachelor degree mentioned in sections 1 and 2.
4. Civil Engineering and Applied Earth Sciences:  
In order to meet the stipulations outlined in subsection 2 and 4b, knowledge for the programme may be lacking in various subjects as long as it does not exceed the level of 10 credits. The missing subjects can be integrated into the MSc programme.

#### **Article 3b**      **Completion of bridging programme prior to the degree programme**

1. A student who is enrolled in a Bachelor degree programme for a bridging programme with the aim of being admitted to the Master degree programme at TU Delft, must complete this bridging programme within two academic years. Deviations from the bridging programme are not allowed.
2. After the programme duration of the bridging programme the enrolment of the student will be cancelled. Under exceptional circumstances the student can submit a well-founded request for an extension of the course duration for a period of at most twelve months. The Board of Examiners can decide to grant extension of the programme duration when a student is experiencing or has experienced a study delay due to circumstances that are beyond the student's control.

#### **Article 4**      **Not applicable**

Not applicable.

## Paragraph 3

# Content and composition of the programme

#### **Article 5**      **Goal of the programme**

1. The programme is intended to educate students to earn a Master of Science degree in respectively Civil Engineering (CE), Applied Earth Sciences (AES), Construction Management and Engineering (CME) or Transport, Infrastructure and Logistics (TIL), providing them with such a level of knowledge, insight and skills in the area of the above mentioned programmes, that graduates can fulfil positions on the labour market at the Master's level.
2. Graduates must also meet the specific final attainment levels for each degree programme, as listed below:
  1. be capable of being analytical in their work, on the basis of a broad and deep scientific knowledge;
  2. be able to synthesise knowledge and to solve problems in a creative way when dealing with complex issues;
  3. possess the qualities needed for employment in circumstances requiring sound judgement, personal responsibility and initiative, in complex and unpredictable professional environments;
  4. be able to assume leading roles, including management roles, in companies and research organisations, and be able to contribute to innovation;
  5. be able to work in an international environment, helped by their social and cultural sensitivity and language and communication abilities, partly acquired through experience of team work and any study periods abroad;
  6. possess an awareness of possible ethical, social, environmental, aesthetic and economic implications of their work and the insight to act accordingly.
  7. possess an awareness of the need to update their knowledge and skills.



In addition, Master of Science graduates should possess the following competences:

1. required core knowledge and understanding in their field of study;
2. knowledge of methods and technical practice in their field of study;
3. training in theoretical knowledge and methods, including modelling;
4. advanced knowledge of specific areas in their field of study;
5. specific attitude and way of thinking expected in a particular subject;
6. awareness of connections with other disciplines and ability to engage in interdisciplinary work.

The programme-specific requirements for CME and TIL are listed in the appendix to article 5 TER.

## Article 6 Track

1. The Master degree programme in [Civil Engineering](#) has the following tracks, with the stated content in the annex to this TER:
  - » Building Engineering
  - » Environmental Engineering
  - » Geo-engineering
  - » Geoscience and Remote Sensing
  - » Hydraulic Engineering
  - » Structural Engineering
  - » Transport & Planning
  - » Water Management

### Double track

A student can opt to study two tracks within the Master degree programme in [Civil Engineering](#), for which the criteria are stipulated in the annex to this TER.

2. The Master degree programme in [Applied Earth Sciences](#) has the following tracks, with the stated content in the annex to this TER:
  - » Geo-Energy Engineering
  - » Geo Engineering
  - » Geoscience and Remote Sensing
  - » Environmental Engineering
  - » Applied Geophysics
  - » European Mining Course (EMC)
3. The Master Degree Programme [Construction Management and Engineering \(CME\)](#) has no tracks.
4. The Master Degree Programme [Transport, Infrastructure and Logistics \(TIL\)](#) has no tracks.

## Article 7 Composition of the programme and degree audits

1. The programme includes the Master's degree audit, with a study load of 120 credits.
2. Following approval from the two Boards of Examiners concerned, a student may take an individual double degree programme in which two Master's programmes are combined simultaneously to create a programme of at least 180 credits. Upon completion the student is awarded two Master's diplomas. The student must earn at least 60 unique credits for each Master's degree programme.
3. A course that was part of the Bachelor's degree programme that qualified a student for admission to the Master's degree programme may not be included in the Master's degree programme. If a compulsory component has already been completed in the aforementioned Bachelor's degree programme, the Board of Examiners will designate an alternative course. If an elective course of the degree programme has already been completed in the aforementioned Bachelor's degree programme, the student will select an alternative elective course. Subsection a.
4. The Master's degree audit is concluded with a final test or assignment. This test or assignment demonstrates that the student possesses and is able to apply the knowledge, insight and skills acquired in the degree programme.

5. The degree programme and its courses are described in the annex, including the study load, number of contact hours and form of examination of each course, as well as the programming of the examination and the language.
6. The actual design of the educational programme is elaborated in greater detail in the study guide.

### **Article 8**      **Form of the programme**

The degree programmes are offered exclusively on a full-time basis.

### **Article 9**      **Language**

The education is in English, and the examinations are administered in English.

### **Article 10**      **Honours Programme**

1. Based on the criteria referred to in the Honours Programme, students will be selected and admitted to the [Honours Programme](#) by the Honours Programme Committee established by the Director of Studies.
2. The Honours Programme comprises at least 20 credits.
  - a. At least five credits must be completed in the institution-wide component of the Honours Programme: the course 'Critical Reflection on Technology', UD2010, and
  - b. At least 15 credits must be completed in the faculty (organised) component of the Honours Programme, the composition of which (including its content and options) is described in the Guidelines Honours programme CEG and/or annex.
3. All students selected for participation in the Honours Programme must submit their options for the faculty component for approval to the Honours Coordinator.
4. The Board of Examiners will be responsible for assessing whether all the requirements of the Honours Programme have been met.
5. Any student who has successfully completed the Honours Programme will be awarded a certificate signed by the chair of the Board of Examiners and the Rector Magnificus.

### **Article 11**      **(Compulsory) participation in the programme**

1. All students are expected to participate actively in the programme for which they are registered.
2. If necessary, there will be an obligation to participate in practical exercises, with a view to admission to the related examination. The Board of Examiners may grant an exemption from this obligation, with or without imposing a substitute requirement.
3. Any supplementary obligations are described by component in the course description in the study guide.

### **Article 12**      **Programme evaluation**

1. The Director of Studies is responsible for the evaluation of the education.
2. The manner in which the education in the programme is evaluated is documented in the faculty's Quality Assurance Manual, which is submitted to the Faculty Student Council and the Board of Studies.
3. The Director of Studies informs the Board of Studies concerning the outcomes of the evaluation, the intended adjustments based on these outcomes and the effects of the actual adjustments.

# Paragraph 4

## Registration for courses and examinations

### Article 12a **Cancelled**

Not applicable.

### Article 13 **Registration for written examinations**

1. Registration to participate in a written examination, including a written examination that is taken online, remotely from the university, is compulsory and is done by entering the requested data into the education registration system (Osiris) no later than six calendar days before the examination. Students receive examination tickets by email as confirmation of their registration.
2. In the event of circumstances beyond a student's control resulting in the student being unable to register for an examination, the Board of Examiners may nevertheless permit the student to participate in the examination.
3. Students who have not registered for the examination and are therefore not included on the list of examinees can report on the day of the examination to the invigilator beginning 15 minutes before the start of the examination until the actual start. They will be admitted to the examination room, in the order that they reported to the invigilator, 30 minutes after the start of the examination, if sufficient places are available. The loss of 30 minutes of examination time cannot be compensated. Students who have been granted late access to the examination will be added to the list of examinees. The student participates in the examination subject to the validation of entitlement to participate in the examination.
4. In the situation described in the previous section, if it is found that a student was not entitled to participate in the examination, the examination work will be deemed invalid, it will not be marked and it will not count towards a result. The student may subsequently submit an appeal to the Board of Examiners, accompanied by reasons, requesting that the examination work that has been deemed invalid be declared valid and to have it assessed. The Board of Examiners will approve the request only in case of extenuating circumstances.
5. Section 3 of this article does not apply to a written examination that is taken online, remotely from the university.
6. If unforeseen circumstances or measures make it necessary to change the form or manner of taking the examination, the Dean may determine a different registration period in favour of the student.

### Article 14 **Registration for other examinations**

1. Registration for participation in an examination other than a written examination is compulsory, and is possible up to six calendar days before the examination takes place in the manner that is stated in the study guide for the relevant examination.  
If unforeseen circumstances or measures make it necessary to change the form or manner of taking the examination, the provisions stated in the study guide apply in full unless the Dean decides to deviate from the manner or term of registration prescribed in the study guide.
2. In special cases, the Board of Examiners may deviate from the registration term stated in Section 1, but only in favour of the student.
3. Students who have not registered on time will not be allowed to participate in the examination. The Board of Examiners can nevertheless admit a student to the examination, but only in case of special circumstances.
4. In the event of unauthorised participation in an examination, the Board of Examiners may declare the result invalid.

## Article 15      Withdrawal from examinations

1. Students can withdraw from an examination through the education registration system (Osiris) up to three calendar days before the examination.
2. Any student who has withdrawn from an examination should re-register on a subsequent occasion, in accordance with the provisions of Articles 13 and 14.

# Paragraph 5

## Examinations

## Article 16      Form of the examinations and the manner of testing in general

1. Examinations (oral, written or otherwise) are taken in the manner described in the study guide. In the event of unforeseen circumstances or measures, the Board of Examiners may determine that the manner prescribed may be deviated from. If an examination is taken using online proctoring, this takes place in accordance with the TU Delft Online Proctored Examination Regulation.
2. The study guide contains a description of the moments at which and the numbers of times that examinations can be taken, along with their frequency, without prejudice to the provisions of these regulations concerning written and oral examinations.
3. A student may participate in an examination for a course no more than twice in one academic year, with the understanding that registration for an examination without timely withdrawal counts as participation.
4. In special cases, the Board of Examiners may deviate from the provisions of the above sections 1 to 3 in favour of the student.
5. Well before a written examination, the examiner will give the students the opportunity to familiarise themselves with a set of representative examination questions and the criteria by which they will be assessed. The lecturer or examiner will provide accompanying guidelines for the way in which the sample questions are answered.

## Article 17      Times and number of examinations

1. Two opportunities to take written examinations will be offered each academic year. The previous provision applies equally to examinations other than written examinations, unless this cannot be reasonably demanded of the programme. The times in which the examinations can be taken are:
  - » at the end of the teaching period in which the course is taught, and
  - » in the fifth week or at the end of the next teaching period or during the summer resit period according to the TU Delft academic calendar.
2. An annual timetable is issued detailing when examinations may be taken, and it is published before the start of the relevant teaching period.
3. Contrary to the provisions in Section 1, the opportunity to take the examination for a course that is not taught in a certain academic year must be given at least once in that year.
4. Contrary to the provisions of section 1, two opportunities to sit an examination will be offered for discontinued courses in the academic year following the year in which the course was last taught.
5. In exceptional cases, the Board of Examiners may permit more than two opportunities in a year for certain examinations.

## Article 18 Oral examinations

1. For oral examinations, no more than one student shall be tested at a time, unless determined otherwise by the Board of Examiners.
2. Oral examinations shall not be public unless the Board of Examiners has decided otherwise. In deviation from this first clause, a final presentation is given publicly except in special cases in which the Board of Examiners has decided otherwise, or if the student has filed an objection to the publicity of the final presentation.
3. The oral examination is administered by at least two examiners. In the event of unforeseen circumstances or measures, the Board of Examiners may determine that the oral examination be administered by a single examiner, provided the student consents to an audio and/or video recording with sound of the oral examination.

## Article 19 Determination and announcement of results

1. The examiner determines the result of a written examination as quickly as possible but by no later than 15 working days after the examination. The results of written interim examinations shall be announced no later than five working days before the next written interim examination.
2. The examiner determines the result of an oral examination as quickly as possible but no later than 15 working days after it is administered. The student is issued with a written statement of this result.
3. The examiner records the results of the assessment of a practical exercise as quickly as possible, but no later than 15 working days after the completion of the practical exercise at the designated time. In the education registration system (Osiris), the result will be dated on the date of completion of the practical exercise. With regard to a series of practical exercises in which the knowledge acquired in a previous practical exercise is important to the subsequent practical exercise, the result of the previous practical exercise shall be announced before the subsequent practical exercise. If this is not possible, the examiner shall schedule a timely discussion of the previous practical exercise.
4. The examiner is responsible for the registration and publication of the results in the education registration system (Osiris), with observance of the student's privacy. When the result of an examination is announced, the student is informed about the right of perusal as stipulated in Article 20 as well as about the possibility of appealing to the Examinations Appeals Board.
5. Contrary to the previous provisions, results for examinations in the last regular teaching period, as well as for resits from the first academic year taken during the summer resit period, shall be determined, registered and published within five working days of the week following the week in which the examination was taken place.
6. If special circumstances prevent the examiner from registering the results on time, the examiner will report this to the Board of Examiners, accompanied by reasons, and notify the students and student administration as quickly as possible.

## Article 20 Right to inspect the results

1. Upon request, students will have the right to inspect their assessed work during a period of at least 20 working days after the announcement of the results of a written examination or the assessment of a practical exercise. During the inspection of the assessed work, it is not permitted to copy the underlying examination questions in any way. Students intending to appeal against the assessment of their work will be issued with a copy of the assessed work.
2. During the period mentioned in Section 1, all students who have participated in the examination can inspect/review the questions and assignments of the relevant examination, as well as with the standards that form the basis of the assessment.
3. The examiner can determine that the inspection or cognizance intended in Sections 1 and 2 will take place at a pre-established place and at a pre-established time.
4. Students proving that they were unable to appear at such an established place and time because of circumstances outside of their control will be offered another possibility, if possible within the period mentioned in Section 1. The place and times mentioned in the first sentence will be made known in good time.

## Article 21 Discussion of the results of examinations

1. Students who have taken a written examination or who have received the assessment of a practical exercise can ask the relevant examiner for a discussion of the results during a period of 20 working days after the announcement of the results. The discussion will take place within a reasonable period, at a place and time to be determined by the examiner.
2. At the request of the student or at the initiative of the examiner, a discussion justifying the assessment will take place between the examiner and the student as soon as possible after the announcement of the result of an oral examination. During the discussion of the assessed work it is not permitted to copy the underlying examination questions in any way.
3. If a collective discussion is organised by the examiner, students may submit requests as referred to in section 1 only if they have been present at the collective discussion and have motivated their requests, or if they were unable to be present at the collective discussion because of circumstances outside their control.
4. The Board of Examiners may allow deviations from the provisions in Sections 2 and 3.

## Article 22 Period of validity of examinations

1. The period of validity of the results of an examination is indefinite. The Dean can restrict the period of validity of a successfully completed examination only if the knowledge or insight that was examined has become outdated or if the skills that were examined have become outdated.
2. In cases involving a limited period of validity based on the first section, the period of validity shall be extended at least by the duration of the acknowledged delay in studies, based on the TU Delft Profiling Fund Scheme.
3. In individual cases involving special circumstances, the Board of Examiners can extend periods of validity that have been limited based on the first section or further extend periods of validity that have been extended based on the second section.
4. If a course consists of partial examinations, the period of validity of the partial examination for which no credits are assigned shall be restricted to a time period stated in the study guide.

## Article 23 Exemption from an examination or obligation to participate in a practical exercise

1. After having obtained recommendations from the relevant examiner, the Board of Examiners may grant exemptions to students:
  - a. who have successfully completed an examination or degree audit in a system of higher education within or outside the Netherlands that corresponds to the examination for which the exemption has been requested in terms of content and level, or
  - b. who demonstrate that they possess sufficient knowledge and skills that have been acquired outside the system of higher education.
2. After having obtained recommendations from the relevant examiner, the Board of Examiners may grant exemption from the requirement to participate in a practical exercise with a view to admission to the related examination, possibly subject to alternative requirements.

## Article 24a Periods and frequency of degree audits

In principle, the opportunity to take the Master's degree audit will be offered once each month. The dates for the meetings of the Board of Examiners shall be published before the beginning of the academic year.

## Article 24b Invalidation of examinations

The Board of Examiners is authorised to declare invalid an examination or part thereof if a proper assessment of the knowledge, insight and skills of the student has not proved reasonably possible based on the examination or the part thereof. The Board of Examiners may draw up further rules for this.

# Paragraph 6

## Studying with a disability

### Article 25 Adjustments to the benefit of students with disabilities or chronic illnesses

1. Upon a written and substantiated request to that effect, students with disabilities or chronic illnesses may be eligible for adjustments in teaching and examinations. These adjustments are coordinated to the situations of the students as much as possible, but they may not alter the quality or level of difficulty of a course or the study programme. Facilities to be provided may include modifications to the form or duration of examinations and/or practical exercises to suit individual situations or the provision of practical aids.
2. Requests as mentioned in Section 1 must be accompanied by a recent statement from a physician or psychologist or, in cases involving dyslexia, from a testing office registered with BIG, NIP or NVO. If possible, this statement should include an estimate of the extent to which the condition is impeding the student's academic progress.
3. Decisions concerning requests for adjustments relating to educational facilities are taken by the Dean or by the Director of Studies on the Dean's behalf. Decisions concerning adjustments relating to examinations are taken by the Board of Examiners.
4. Adjustments to examinations can involve the following or other matters:
  - » form (e.g. replacing a written test with an oral test or vice versa, testing the required material in the form of interim examinations or granting exemptions to the attendance requirement);
  - » timing (e.g. additional time for an examination, wider spreading of examinations across the examination period, granting exemptions to admission requirements or extending the period within which a component must be completed);
  - » aids permitted during testing (e.g. English-Dutch dictionaries for students with dyslexia);
  - » location (taking the examination in a separate, low-stimulus space).
5. Adjustments in educational facilities could include:
  - » providing modified furniture in teaching and examination spaces;
  - » providing special equipment (e.g. magnification or Braille equipment for students with visual impairments and blindness or loop systems and individual equipment for students with hearing impairments and deafness);
  - » providing more accessible course material;
  - » providing special computer facilities (e.g. speech-recognition or speech-synthesising software);
  - » providing a rest area.

# Paragraph 7

## Study support and (binding) recommendation on the continuation of studies

### Article 26 Study support and Monitoring of student progress

1. The Dean is responsible for providing individual study supervision to students registered for the degree programme, partly for their orientation towards potential study options within and outside the degree programme. The Dean will also ensure that effective support and supervision is provided to students in making choices related to their studies.
2. The examination and study programme applying to each student is documented in the educational registration system (*Osiris*).
3. The Student Administration is responsible for ensuring that all students are able to review and check their results in the educational registration system (*Osiris*).

### Article 27 Not applicable

Not applicable.

# Paragraph 8

## Final provisions

### Article 28 Conflicts with the regulations

In the case of conflict between provisions in the study guide or other document concerning the relevant teaching and examination education and study programme and these regulations, the provisions of these regulations shall take precedence.

### Article 29 Amendments to the regulations

1. Amendments to these regulations are adopted separately by the Dean.
2. Amendments that are applicable to the current academic year will be made only if they would not reasonably damage the interests of students.
3. Amendments to these regulations may not lead to disadvantageous changes to any decisions that have been made with regard to individual students.
4. In the event of unforeseen circumstances or measures, the Dean may decide to deviate from these regulations, including the actual form of the education and any compulsory attendance requirements. This also means that the provisions in the study guide may be deviated from.



## Article 30 Transitional regulations

1. If the composition of the degree programme undergoes substantive changes, transitional measures will be established and published through the Dean.
2. These transitional measures shall include at least the following:
  - a. an arrangement regarding exemptions that may be obtained based on examinations that have already been passed;
  - b. the period during which the transitional arrangement shall be valid.
3. Students shall follow the degree programme as it applied or applies during the first academic year of their enrolment, unless components of the programme are no longer offered. In such cases, students must transfer according to the applicable transitional measures. Deviations require the approval of the Board of Examiners. Before submitting a request to this end, the student must have first obtained recommendations from an academic counsellor.
4. If a course within a degree programme is cancelled, four additional opportunities for taking the examination in this course shall be offered after it has been taught for the last time: the examination at the end of the teaching of the course, a resit in the same academic year and two resits in the following academic year.

## Article 31 Announcement

1. The Dean is responsible for ensuring a suitable announcement of these regulations and any amendments to them.
2. In any case, the Teaching and Examination Regulations are to be posted on the programme's website.

## Article 32 Entry into force

These regulations shall enter into force on **1 September 2021**.

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*Adopted by the Dean of the faculty on 21 June 2021.*

# Appendix & Addendum TER MSc

## APPENDIX to Article 2 - relevant websites

Student portal with links to relevant regulations, e.g.

- Student Charter,
- privacy statement online proctoring,
- Code of Ethics,
- Online Proctored Examination Regulation etc.

» <https://www.tudelft.nl/en/student>

Rules & Regulations of the Board of Examiners

» <https://www.tudelft.nl/studenten/faculteiten/citg-studentenportal/onderwijs/onderwijsinformatie/educational-rules-and-regulations/>

Board of Examiners general website

» <https://www.tudelft.nl/studenten/faculteiten/citg-studentenportal/organisatie/board-of-examiners-ceg/>

Wet op het hoger onderwijs en wetenschappelijk onderzoek (WHW)

» <https://wetten.overheid.nl/BWBR0005682/2019-02-01>

Examination Appeals Board

» <https://www.tudelft.nl/en/student/legal-position/central-complaints-desk-for-students/objections-and-appeals>

Studying with a disability

» <https://www.tudelft.nl/en/student/counselling/studying-with-a-disability>

## APPENDIX to Article 3 TER (for Master's degree programmes)

### Language level for individuals holding a higher professional education degree (c)

The following candidates are exempted from the English language test requirement:

- Students with a Bachelor degree from a Dutch university
- Students with a VWO diploma or VWO English certificate
- Students with an HBO (University of Applied Sciences) degree from a degree programme taught entirely in English
- Students who hold the nationality of one of the following countries: USA, UK, Ireland, Australia, New Zealand or Canada.

Sufficient competence in the English language can be demonstrated by passing one of the following tests:

- TOEFL iBT (Test of English as a Foreign Language internet-Based Test) with an overall band score of at least 90
- IELTS (academic version) with an overall band score of at least 6.5
- Cambridge Assessment English:
  - » C1 Advanced (Certificate of Advanced English) with an overall score of at least 176.
  - » C2 Proficiency (Certificate of Proficiency in English) with an overall score of at least 180.

If a bridging programme needs to be completed before a candidate can be admitted to a Master's programme, the certificate should be obtained before the start of the bridging programme.

### Language level for holders of a non-Dutch diploma (d)

- Competence in the English language as demonstrated by passing one of the following tests:
- TOEFL iBT (Test of English as a Foreign Language internet-Based Test) with an overall band score of at least 90 and a minimum score of 21 for each section
- IELTS (academic version) with an overall band score of at least 6.5 and a minimum score of 6,0 for each section
- Cambridge Assessment English:
  - » C1 Advanced (Certificate of Advanced English) with an overall score of 176 and a minimum score of 169 for each section.
  - » C2 Proficiency (Certificate of Proficiency in English) with an overall score of 180 and a minimum score of 169 for each section

### Certificates more than two years old will not be accepted

The following candidates are exempted from the English language test requirement:

- Students who hold the nationality of one of the following countries: USA, UK, Ireland, Australia, New Zealand or Canada;
- Students who hold a Bachelor degree from one of the above countries.

## APPENDIX to Article 5 TER

### Construction Management and Engineering

**The MSc CME domain-specific requirements as specified below are based upon:**

- a. the needs of the construction industry as well as on the needs emerging from the development of society and innovations as outlined in the "Introduction" to this document. Also, with regard to this domain, an important characteristic of the development and application of newly acquired knowledge is the fact that it has to be introduced in existing managing and engineering practices. In other words, students also have to become familiar with the management of transition processes and organizational changes in the construction industry;
- b. the domain-specific and internationally accepted qualifications as defined by the ABET organization Accreditation Board for Engineering and Technology) The domain-specific requirements have been translated into final qualifications that fit into the 3TU Academic criteria in which the academic level of the programme is indicated as well.

**The Master of Science Construction Management and Engineering final-qualifications are:**

#### 1. Competent in one or more scientific principles

The graduate has knowledge on the following sub-areas of Construction Management and Engineering, is an expert in at least one of them and is able to maintain and expand his expertise in the field of Construction Management and Engineering (for instance, by consulting relevant literature but also look for connections).

- Project and Process management in the field of Construction Engineering (i.e. complex constructions, large-scale infrastructure, urban developments)
- Legal and Governance aspects in the field of Construction Engineering
- Markets and organisations in the field of Construction Engineering
- Innovations and Integral Design in Construction Engineering
- The graduate is able to combine management theory and technical knowledge. This ability covers the knowledge and application of technical process management and innovation regarding construction and engineering processes in the subareas above.

#### 2. Competent in doing research

The graduate has the competence to acquire new scientific knowledge through research or systematic reflection.

The graduate understands the potential benefits of research and is able to understand and incorporate the results of research into the own work.

#### 3. Competent in designing

The graduate is able to Contribute to a functional design of complex constructions or Design management processes in the field of Construction Engineering.

**This means that:**

- The graduate has creativity and synthetic skills with respect to design projects;
- The graduate is application-oriented towards the construction industry when designing constructions or management processes;
- The graduate is able to translate technological concepts and developments into appropriate process innovations for construction;
- The graduate is able to find a balance between possible solutions of complex requirements, technical possibilities, genuine interests of the parties involved and justified value creation on scientific and operational levels.

#### 4. A scientific approach

- The graduate has the habit of reflecting upon his own work and continuously uses relevant information to improve his capabilities;
- The graduate has the attitude to endorse his personal development and enhancing his expertise;
- The graduate knows that models only approximate reality and is able to develop and use them adequately whenever this is beneficial;
- The graduate makes decisions based on calculated risks, costs, time, quality, stakeholders' participation, value creation, legislation and is able to evaluate these decisions;
- The graduate's scientific attitude is not restricted to the boundaries of Construction Management and Engineering, and he is able to cross these where and whenever necessary.

## 5. Basic intellectual skills

- The graduate is able to work independently;
- The graduate is able to work systematically and methodically;
- The graduate is able to reflect on the complete scope of Construction Management and Engineering issues, to critically analyse and to generate novel ideas;
- The graduate is able to invent his own tools, theories and techniques if these are not available.

## 6. Competent in cooperating and communicating

- The graduate is able to work effectively in the context of a multidisciplinary environment, is able to manage complex assignments and can act in different roles depending on the situation;
- The graduate knows the importance of oral and written communication, in particular in English, and can make effective use of these, this means that:
  - a. The graduate is skilled in properly documenting and presenting results of scientific and design work, including the underlying knowledge, choices and considerations, to colleagues and to a broader public;
  - b. The graduate is competent in reasoning;
  - c. The graduate adheres to existing academic conventions, such as giving proper credit and referencing.

## 7. Takes account of the temporal and societal context

- The graduate is able to form an opinion or judgement and contribute to discussions about complex matters related to Construction Management and Engineering;
- The graduate knows that compromises are unavoidable and is able to effectively deal with these;
- The graduate is aware of the disadvantages for society of certain decisions and can communicate these to the relevant parties (stakeholders). The graduate can take the purpose of the design and its context into consideration.

## Transport, Infrastructure and Logistics (TIL)

### MSc TIL-domain specific final-qualifications for MSc-TIL students are:

#### 1. Knowledge and Understanding of the TIL-domain

##### • Scientific Disciplines:

Has a profound understanding of the TIL-domain. Has demonstrated broad understanding of the scientific disciplines that relate to the TIL-domain. Has systematic knowledge about the socio- technical context of TIL- systems. Has a broad understanding of the required knowledge in respect of research and design related to the TIL-domain.

##### • Inter-disciplinary:

Understands insightfully how to act in an interdisciplinary manner and how to bridge and integrate the knowledge between several disciplines and the temporal and techno-social context of TIL- systems.

##### • Contribute:

Is able to make considerable research and/or design contributions to the TIL-domain through original research and/or design that extends the traditional frontiers of knowledge towards integrative TIL- knowledge by means of developing a substantial body of work, corresponding with the level of national and international refereed publications.

#### 2. Application of knowledge and understanding within the TIL-domain

##### • Scientific Approach:

Has a critical attitude and is able to apply a systematic scientific approach characterised by the development and application of theories, methods, models and coherent interpretations (both in doing research and designing) in the TIL-domain.

##### • Problem Solving:

Is competent in applying problem solving abilities in new or unfamiliar environments within broader, multi-disciplinary and/or inter-disciplinary contexts related to the TIL-domain.

##### • Doing Research:

Has demonstrated the ability to acquire new scientific knowledge in respect of the TIL-domain through a substantial process of research by means of the development of new knowledge and new insights in a purposeful and methodological way.

##### • Designing:

Has largely demonstrated the ability to apply a substantial design process by means of applying synthesising activities aimed at the realisation of new or modified artefacts, processes and/or systems within the TIL-domain, with the intention of creating value in accordance with predefined TIL- domain-related requirements and desires.

- **Judgmental skills:**

Has the ability to gather, integrate and interpret relevant, incomplete or limited data, information and knowledge, and understands the complexities in the TIL-domain to reason about and reflect on possible social, scientific and ethical responsibilities linked to the application of this data, information and knowledge to form judgements.

### 3. Communicational and co-operational skills

- **Communication:**

Has the competence to clearly and unambiguously communicate information, ideas, problems, problem solving approaches, their origins and possible solutions to both audiences of specialists (peers within the TIL-domain, the larger scholarly population) and non-specialists (society in general).

- **Co-operation:**

Has the competence of effectively working with and for others on complex problems of the TIL- domain in interdisciplinary teams (colleagues and non-colleagues) and arenas (several organisations that have influence on the outcome “together”) by judging the background, positions, desires, cultural habits, and the political and strategic behaviour of the members of these teams and arenas.

### 4. Learning skills

- **General Learning:**

Has developed considerable learning skills necessary to undertake further study autonomously.

- **Relational Learning:**

Has developed broad appreciations to judge, gather and apply relevant and “new” knowledge to its existing body of knowledge as a result of interdisciplinary teamwork working on complex problems to reach feasible solutions.

### Article 3 TER MSc

Article 3 - Admission to the Master's degree programme - is supplemented with Section 3, which reads:

3. For the 2021-2022 academic year, in the context of the outbreak of Covid-19, students who were enrolled at a Dutch university or HBO (University of Applied Sciences) in the 2020-2021 academic year may be conditionally admitted provided that, on 31 August 2021, they:
  - have a deficit not exceeding 15 ECTS for the Bachelor's degree audit of the Bachelor's programme referred to in this article,  
or
  - have a deficit not exceeding 15 ECTS for completion of the bridging programme referred to in this article. If, on 31 August 2022, students have not met the admission requirements referred to in Section 1 of this article, they will be unenrolled from the degree programme.

The foregoing does not apply to the student who used the regulation applicable in the academic year 2020/2021 in connection with the Covid-19 outbreak for conditional admission in the event of a deficit not exceeding 15 ECTS.





# ANNEX

**MASTER DEGREE PROGRAMME**  
APPLIED EARTH SCIENCES

2021  
2022

# Paragraph 1

## Compiling the study programme

### Article 1 The study load

The study load for the Master's degree programme is 120 credits. None of the components of the programme may have formed part of the Bachelor's degree programme in Applied Earth Sciences or any other Bachelor's programme.

### Article 2 Tracks, specialisations and annotations

1. Students can choose one of the following tracks in the MSc AES programme:
  - Geo-Energy Engineering, as laid down in Article 5
  - Geo-Engineering, as laid down in Article 6
  - Geoscience and Remote Sensing, as laid down in Article 7
  - Environmental Engineering, as laid down in Article 8
  - Applied Geophysics, as laid down in Article 9
  - Resource Engineering: European Mining Course as laid down in Article 10
2. Information about courses and admission requirements for courses can be found in the online [study guide](#).

### Article 3 Registering the tracks and compiling the examination programme

1. All students must submit an Individual Study Plan (ISP) before the end of their first semester. The ISP provides an overview of the full MSc programme the student intends to follow and is worth a minimum total of 120 credits, including all compulsory courses, all specialisation courses and all electives. For the submission of the ISP the following rules apply:
  - a. Students of cohort 2020-2021, or later, must submit their ISP using [My Study Planning](#);
  - b. All students of cohort 2019-2020, or earlier, must submit their ISP using the form "[Master Examination Programme](#)" and follow the directions given on the form.
2. All submitted ISPs are assessed by the MSc coordinator on behalf of, and in consultation with, the Board of Examiners. Approval of the ISP is granted when, in judgement of the Board of Examiners, it is plausible that the proposed programme leads to the achievement of the learning objectives of the programme, as formulated in article 4 of the [Teaching and Examination Regulations](#).
  - a. Students who have submitted their ISP using My Study Planning will be informed of the ISP evaluation through My Study Planning;
  - b. Students who have submitted their ISP using the form "[Master Examination Programme](#)" will be informed of the ISP evaluation by e-mail.
3. During the course of the study programme, students may request changing electives in their ISP through My Study Planning. Any request will be assessed for approval by the MSc coordinator. In case of a free specialisation, the specialisation will preferably also be approved by an academic staff member from the faculty of Civil Engineering and Geosciences from this specialisation.

If an ISP is not approved, the student must adapt the ISP based on the directions given in the evaluation and re-submit. Once approved, the ISP is registered in Osiris and used to monitor the student's progress and to check if the student has fulfilled all components to graduate.

4. During the course of the study programme, students may always request to change their track and/or specialisation, and thereby their track, specialisation and elective courses:
  - a. Students who have submitted their ISP using My Study Planning may request a change of their study programme using My Study Planning;
  - b. Students who have submitted their ISP using the form “Master Examination Programme” may request a change of their study programme by using the form “Changes in Master Examination Programme”.

All requests for changes of the study programme are assessed by the MSc coordinator on behalf of, and in consultation with, the Board of Examiners. Students are informed of the evaluation of any change request as formulated in article 3, section 2.

5. Prior to the start of the Master thesis, students need to present their examination programme together with the title, a short abstract, a time schedule and the chairperson and members of the assessment committee of the Final Thesis for approval. If the examination programme satisfies the rules as laid down in this Annex it can be approved by the MSc-track coordinator only; if the programme does not satisfy the rules as laid down in this Annex, it also needs to be approved by the Board of examiners, with a motivation for the deviation from these regulations.
6. Before the Master Thesis Project is started, the student must draw up his/her assessment committee's composition to the MSc-track coordinator for approval. The regulations for the composition of the assessment committee can be found in article 23 of the Rules and Guidelines Board of Examiners.

#### Article 4 Rules for choosing free electives

1. The student may choose:
  - All subjects offered in conjunction with the degree course;
  - All subjects offered in conjunction with other Master's degree courses at a Dutch university or at an international university with which TU Delft has an exchange contract;
  - An internship (CIE4040-09, 10 EC), or Additional Thesis (AES4011-10), or Multidisciplinary Project/ Civil Engineering Consultancy Project (CIE4061-09, 10 EC);
  - Interfaculty Master's level electives at Delft University of Technology with a “WM-code” to a maximum of 6 credits;
  - 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<sup>1</sup>
2. Examinations pertaining to subjects given by other programmes are to be completed in the way stipulated by or on behalf of the Teaching and Examination Regulations laid down by the relevant programme.

#### Article 5 The Geo-Energy Engineering track

1. The study programme of the Geo-Energy Engineering track is compiled in the following way:
  - track-linked compulsory core programme  
*93 credits, laid down in section 2*
  - electives:  
*45 credits as laid down in section 3*

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<sup>1</sup> This means that subjects like writing, oral presentation, English and Dutch are not allowed within the examination programme.

## 2. Compulsory core programme Geo-Energy Engineering:

code	subject	ECs
AESM1305	Geo-Energy Engineering Challenge	12
AESM1315	Energy Transition	3
AESM1320	Geology for Geo-Energy	5
AESM1325	Physics for Geosystems	5
AESM1330-21	Forward and Inverse Geomodelling	5
AESM1470	Field Lab	3
AESM2305	Geo-Energy Engineering Project	15
AESM2310	MSc Thesis	45

## 3. The following electives are offered within the Geo-Energy Engineering track:

code	subject	ECs
AESM1400	Geothermal Energy	3
AESM1405	Petroleum Exploration and Production	3
AESM1410	Subsurface Storage	3
AESM1415	Effects of subsurface Engineering	3
AESM1420	Advanced Sedimentary Geology	3
AESM1425	Geomechanics and Structural Geology	3
AESM1440	Multiphase Flow in Porous Rocks	3
AESM1445	Dynamic Modelling and Optimization	3
AESM1450	Geophysical Prospecting	3
AESM1430	Simulation and Building of Stratigraphy	3
AESM1435	Production Science and Technology	3
AESM1460	Reservoir Characterisation and Petrophysics	3
AESM1465	Geological Interpretation of Geophysical Data	3
AESM1455	Numerical Methods for Subsurface Geoscience Simulation	3
AESM1475	Outcrop Geology for Subsurface Characterization	3

From the total of 45 EC of electives the student is required to take a total of 27 EC, with the added requirement that the student takes at least two courses from category 1 and one from each of the other categories:

- Category 1** AESM1400 Geothermal Energy, AESM1405 Petroleum Exploration and Production, AESM1410 Subsurface storage and AESM1415 Effects of subsurface engineering.
- Category 2** AESM1420 Advanced Sedimentary Geology, AESM1430 Simulation and Building of Stratigraphy, AESM1435 Production Science and technology, AESM1450 Geophysical Prospecting and AESM1425 Geomechanics and Structural Geology.
- Category 3** AESM1440 Multiphase Flow in Porous Rocks, AESM1445 Dynamic Modelling and Optimization, AESM1450 Geophysical Prospecting and AESM1455 Numerical Methods for Subsurface Geoscience Simulation.
- Category 4** AESM1460 Reservoir Characterization and Petrophysics, AESM1465 Geological Interpretation of Geophysical data, and AESM1475 Outcrop Geology for Subsurface Characterization.

## Article 6 The Geo-Engineering track

### 1. The Geo-Engineering track has one specialisation:

- Geo-Engineering

The Geo-Engineering track follows the structure of the [Civil Engineering programme](#). It consists of:

### 2. Common compulsory block Geo-Engineering

All students opting for the track Geo-Engineering must complete the following subjects adding up to 74 credits:

code	subject	ECs
AESM1630-19	Engineering Geology	5
AESM1700	Consolidation of Soils	3
CIE4361	Behaviour of Soils and Rocks	6
CIE4365-16	Modelling Coupled Processes for Engineering Applications	5
CIE4366	Numerical Modelling in Geo-Engineering	6
CIE4395	Risk and Variability in Geo-Engineering	4
CIE5321	Experimental Methods in Geotechnical Engineering	5
AESM2606	Final Thesis Geo Engineering	40

### 3. Additional block Geo-Engineering

Students are required to complete a selection of the following recommended subjects adding up to a total of 46.

#### a. Convergence courses

If the Bachelor's phase did not include the contents of the following subjects, these subjects are compulsory on the advice of the master coordinator:

code	subject	ECs
AES1730	Introduction to Geotechnical Engineering <i>Not for students who passed CTB2310, AESB2330, (Soil Mechanics) or an equivalent course</i>	3
AESM4370	Introduction to Geology <i>for students with a Civil Engineering background</i>	1
CIE4370-19	Introduction to Structural Mechanics <i>for students with an Applied Earth Science background</i>	2
CIE4420	Principles of Geohydrology <i>Not for students who passed CTB3390, AESB3340 or an equivalent course</i>	4

#### b. Track-linked electives

code	subject	ECs
AES1640-11	Environmental Geotechnics	4
AES1720-11	Rock Mechanics Applications	5
AESM2901-16	Engineering Geology Fieldwork	10
CIE3109-09	Structural Mechanics 4	4
CIE4353	Continuum Mechanics	6
CIE4362-20	Soil-structure Interaction	4
CIE4363	Deep Excavations	4
CIE4367-16	Design of Embankments	3
CIE4390	Geo-risk Management	3
CIE4780	Trending Topics in Geo-Engineering	4
CIE5305	Bored and Immersed Tunnels	4
CIE5340-18	Soil Dynamics	4
CIE5741	Trenchless Technologies	4
OE44030	Offshore Geotechnical Engineering	4

**c. Ethics courses (4 or 5 EC)**

Choose one out of five:

- » Philosophy, Technology Assessment and Ethics for CT (WM0312CIE)
- » Climate Change: Science & Ethics (CIE4510-20)
- » Ethics of transportation (WM1302TU)<sup>2</sup>
- » Ethics of technological risk (WM0376TU)
- » Water ethics (TPM003A)

**d. Free electives**

Choose 10 credits out of:

- » An internship (CIE4040-09, 10 EC) *or*
- » Additional Thesis (AES4011-10) *or*
- » Multidisciplinary Project (CIE4061-09, 10 EC)

Choose 10 credits of electives out of:

- » Other subjects from all MSc programs hosted by the faculty CEG with the exception of the three mentioned subjects above under part d;
- » All subjects offered in conjunction with other Master's degree courses at a Dutch university or at an international university with which TU Delft has an exchange contract;
- » Interfaculty Master's level electives at Delft University of Technology with a "WM-code" to a maximum of 6 credits.

However, 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.

Other courses than the ones listed for the specialisation part or the 20 ECs free electives may be acknowledged as an elective only after consultation with and **explicit approval** of the MSc coordinator.

**Article 7 The Geoscience and Remote Sensing track****1. The study programme for the Geoscience and Remote Sensing track consists of:**

- A common compulsory Geoscience and Remote Sensing block: 73 credits, as laid down in subsection 2;
- Geoscience and Remote Sensing electives: 27 track-linked credits, as laid down in subsection 3;
- Electives: 20 credits, as laid down in subsection 4.

**2. Common compulsory block Geoscience and Remote Sensing:**

All students opting for the track Geoscience and Remote Sensing must complete the following subjects, adding up to 73 credits:

code	subject	ECs
CIE4510-20 <sup>3</sup>	Climate Change: Science & Ethics	4
CIE4601	Physics of the Earth and Atmosphere	5
CIE4603-16	Geo-signal Analysis	6
CIE4604	Simulation and Visualisation	5
CIE4606	Geodesy and Remote Sensing	5
CIE4611	Geo-measurement Processing	5
CIE4615	GRS Fieldwork	3
AESM2640	Final Thesis Geoscience and Remote Sensing	40

<sup>2</sup> Students following the Water Management Track cannot choose Ethics of transportation (WM1302TU) as one out of five.

<sup>3</sup> Not compulsory if Bachelor's degree included WM0325TA Technics and Responsibility.

### 3. Geoscience and Remote Sensing electives:

Students are required to complete a selection of the following subjects adding up to a total of 27 credits:

Choose at least 20 EC out of:

code	subject	ECs
CIE4522-15	GPS for Civil Engineering and Geosciences	4
CIE4602	Cryosphere: Remote Sensing and Modelling	4
CIE4605	Atmospheric Turbulence	4
CIE4607	Ocean Topography and Sea-level Change	4
CIE4608	Atmospheric Remote Sensing	4
CIE4609	Geodesy and Natural Hazards	4
CIE4610	Gravity, Geodynamics and Climate Change	4
CIE4614-20	3D Surveying of Civil and Offshore Infrastructure	5
CIE5401	GIS and Remote Sensing for WRM	3
CIE4708	Water in the Atmosphere	5
CIE4620	Climate Data Analysis	5
CIE4625	Climate Modelling	5
CIE4616	Remote Sensing and Big Data	5

And choose out of:

- Master's degree course subjects Civil Engineering or Applied Earth Sciences;
  - GRS-related courses from other faculties;
- to be approved by the track coordinator of Geoscience and Remote Sensing.

### 4. Electives

Choose 10 credits out of:

- An internship (CIE4040-09, 10 EC), or Additional Thesis (AES4011-10), or Research Project (CIE4061-09, 10 EC) or Multidisciplinary Project, Civil Engineering Consultancy Project (CIE4061-09, 10 EC);
- Additional Geoscience and Remote Sensing electives as outlined in subsection 3.

Choose 10 credits of electives out of:

- All subjects offered in conjunction with the degree course;
- All subjects offered in conjunction with other Master's degree courses at a Dutch university or at an international university with which TU Delft has an exchange contract;
- Interfaculty Master's level electives at Delft University of Technology with a "WM-code" to a maximum of 6 credits. However, 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<sup>4</sup>

## Article 8 The Environmental Engineering track

### 1. The Environmental Engineering track has two specialisations:

- Environmental Technology
- Environmental Science

### 2. The compulsory programme for each specialisation consists of:

A common compulsory Environmental Engineering block of 21 credits and a 4 credits compulsory Ethics course. Depending on the student's specialisation profile they have an additional block of 36 credits (Environmental Technology) or 34 credits (Environmental Science).

### 3. Common compulsory block Environmental Engineering:

<sup>4</sup> This means that subjects like writing, oral presentation, English and Dutch are not allowed within the examination programme.

All students opting for the track Environmental Engineering must complete the following subjects adding up to 65 credits:

code	subject	ECs
CIE4701	Transport processes in Environmental Science and Engineering	4
CIE4495-13	Fundamentals of Water Quality and Treatment	4
CIE4440	Hydrological Processes and Measurements	4
CIE4702	Integrated Project: Leapfrog Environmental Degradation	4
CIE4365-16	Modelling Coupled Processes for Engineering Applications	5
AESM2650	Final Thesis Environmental Engineering	40

All students must complete the compulsory ethics course of 4 credits:

code	subject	ECs
CIE4510	Climate Change: Science & Ethics	4

In addition to the presented programme students must meet the following requirements:

- Students who have not done Python or Matlab modelling in the Bachelor's phase must take CIE2001WO Computer Programming BSc Bridging as an elective subject<sup>5</sup>.

#### 4. Additional block Environmental Technology:

Students who have opted for the specialisation Environmental Technology must complete the following subjects adding up to 36 credits:

code	subject	ECs
CIE4703-19	Water Treatment	6
CIE4704	Chemical conversations in Environmental Engineering	5
CIE4705	Environmental Biotechnology & Microbiology	6
CIE4710	Materials Separation in Waste Processing	5
CIE5421	Water and Health	4
CIE5702	Conceptual Process Design	5
CIE5704	Water Treatment Research	5

#### 5. Additional block Environmental Science:

Students who have opted for the specialisation Environmental Science must complete the following subjects adding up to 34 credits:

code	subject	ECs
CIE5450	Hydrology of Catchments, Rivers and Deltas	4
CIE4706	Introduction to Meteorology	5
CIE4707	Air Quality	5
CIE4708	Water in the Atmosphere	5
CIE4709	Remote Sensing for Environmental Monitoring	5
CIE5703	Urban Climate & Hydrology	5
CIE5701	From Field Observations to Modelling	5

#### 6. Environmental Engineering electives:

All subjects listed above and not part of the chosen specialisation can be chosen as electives. In addition, other electives can be chosen as specified in Article 4. Students who have opted for the specialisation Environmental Technology can choose electives with a minimum of 19 credits. Students who have opted for the specialisation Environmental Science can choose electives with a minimum of 21 credits.

## Article 9 The Applied Geophysics track

<sup>5</sup> Students who have not done Introduction to Water Treatment in the Bachelor's phase are strongly advised to take CIE3365 Introduction to Water Treatment as an elective subject.



## 1. The Applied Geophysics programme is taught at three partner universities:

- TU Delft
- ETH Zürich
- RWTH Aachen

## 2. The study programme is compiled in the following way:

- **First year Delft:** A minimum of 24 credits should be passed from TU Delft subjects, whereby AESM1511 Field Geophysics and Signal Analysis with Matlab/Python Exercises is obligatory and two out of three of the following courses must be passed:

- » AESM1320 Geology for Geo-Energy
- » AES1540-11 Electromagnetic Methods
- » AES1560 Advanced Reflection Seismology and Seismic Imaging

code	subject	ECs
AES1540-11	Electromagnetic Exploration Methods	6
AES1550-06	Geophysics Special Subjects	6
AES1560	Advanced Reflection Seismology and Seismic Imaging	6
AESM1590-18	Seismic Acquisition to Data Information Content	6
AESM1511	Field Geophysics and Signal Analysis with Exercises	6
CIE4606	Geodesy and Remote Sensing	5
AESM1320	Geology for Geo-Energy	5

- **First year Zürich:** A minimum of 25 credits should be passed from the ETH Zürich subjects, whereby three of the following three blocks must be passed:

- » 651-4079-00L Reflection Seismology Processing
- » 651-4104-00L and 651-4106-03L Geophysical Fieldwork and Processing
- » 651-4094-00L and 651-4096-00L Modelling and Inverse Theory for Applied Geophysics

code	subject	ECs
651-4079-00L	Reflection Seismology Processing	5
651-4087-00L	Case Studies in Exploration and Environmental Geophysics	3
651-4094-00L	Numerical Modelling for Applied Geophysics	5
651-4096-00L	Inverse Theory I: Basics	3
651-4096-02L	Inverse Theory II: Applications	3
651-4104-00L	Geophysical Fieldwork and Processing: Methods	2
651-4106-03L	Geophysical Field Work and Processing: Preparation + Field Work	7
651-4109-00L	Geothermal Energy	3
651-4240-00L	Geofluids	6
701-0106-00L	Mathematics V: Applied Deepening of Mathematics I – III	3

After the first year, a student should have passed a minimum of 50 credits.

- **Second year Aachen:** A minimum of 25 credits should be passed from the RWTH Aachen subjects, whereby three of the following six blocks must be passed:
  - » 53.14584 and 53.26003 Petrophysics for Applied Geophysics (Petrophysics and Laboratory Practicals: Applied Reservoir Petrophysics),
  - » 53.14570 and 53.50132 Geophysical Logging and Log Interpretation,
  - » 53.26000 Application of Geophysical Prospecting Methods in Earth and Environmental Science,
  - » 53.18482 and 53.29469 Hydrogeophysics and Engineering Geophysics,
  - » 53.42487 and 53.50028 Numerical Reservoir Engineering + Advanced Mathematical Modelling in Applied Geosciences,
  - » 54.12000 Research Module in Applied Geophysics.

code	subject	ECs
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53.14570	Geophysical Logging and Log Interpretation	3
53.50132	Geophysical Logging and Log Interpretation	3
53.18482	Hydrogeophysics	3
53.26000	Application of Geophysical Prospecting Methods in Earth and Environmental Science	6
54.12000	Research Module in Applied Geophysics	6
53.31439	Data Analysis in Geoscience	3
54.34827	Mineral Exploration	3
53.32124	Petroleum System Modelling	3
53.23301	Sedimentary Basin Dynamics	3
53.29469	Engineering Geophysics	3
53.33690	Remote Sensing of Sedimentary Basins	3
53.45471	Portfolio Management and Prospect Evaluation	3
54.24346	Energy Resource Management	3
53.42487	Numerical Reservoir Engineering: Geophysical process simulation	3
53.50028	Advanced Mathematical Modelling in Applied Geosciences	3
53.12002	Principles of Plate Tectonics	3
53.12001	Plate Tectonics Seminar	3
11.47549	Numerical Methods for Geophysical Flows	3
41.00220	Finite Elements in Fluids	6
81.18471	Economics of Technological Diffusion	6
12.53420	Machine Learning	6
53.32383	Underground Excavation	6
53.14584	Petrophysics	3
53.26003	Laboratory Practicals: Applied Reservoir Petrophysics	3
53.49932	Neotectonics and Earthquake Geology	3
53.30255	Seismic Interpretation in Geology	3

#### Delft/Aachen/Zürich

code	subject	ECs
AESM2506	Final Thesis Applied Geophysics	30

## Article 10 The European Mining

- European Mining Course:  
The specialisation European Mining Course (EMC), as laid down in this subsection, is taught at three partner universities:
  - [Aalto University, Finland](#)
  - [RWTH Aachen, Germany](#)
  - [TU Delft](#)
- The study programme of the specialisation European Mining Course is compiled in the following way:

#### First year, 1st semester: Helsinki:

code	subject	ECs
CHEM-E6140	Fundamentals of Minerals Engineering and Recycling	5
CHEM-E6225	Technical Innovation Project	10
GEO-E2030	Rock Mechanics	5
GEO-E3010	Economic Geology & Mineral Economics	5
GEO-E3020	Field Experience and Project in Hard Rock Mining	5

#### First year, 2nd semester: Aachen:

code	subject	ECs
51.00002	Feasibility Studies of Mining Projects	5
51.49767	Reserve Modelling and Estimation	5
51.00005	Mine Design and Simulation	5
51.00003	Mine Waste	5
51.00008	Mine Ventilation	5
51.00031	Case Study – Mining Project	5

#### Second year, 3rd semester: Delft

code	subject	ECs
AESM1023	Computer Aided Mine Design and Optimisation	5
AESM1024	Legal, Health and Safety	5
AESM1025	Data Analysis and Resource Modelling	5
AESM2022	Project Execution and Mine Start-up Planning	10
AESM2300-1	Investment Scenarios	1
CME2300	Financial Engineering	4

#### Second year, 4th semester: Delft

code	subject	ECs
AESM2010	Final Thesis	30

## Paragraph 2

# Annotations & Honours Programme

### Article 11 Annotations

From 1 September 2021 it will no longer be possible for students to choose an annotation.

### Article 12 Honours Programme

1. Motivated students who have completed all courses of the first quarter during the first quarter and have obtained an average grade of at least 7.5 for these courses, are invited by email to apply for participation in the Honours Programme Master CEG as described in the [Teaching and Examination Regulations \(TER\) MSc](#), article 10.
2. Students who fulfil the requirements as described in the [Honours Programme Guidelines, CEG](#), and are interested in the Honours Programme can send their application to the HPM coordinator together with an motivation letter in English, and a proposal and planning for their personal programme. The proposal students submit should show coherence within a specific theme. The requirements for designing the programme are described in the [Honours Programme Guidelines, CEG](#). The programme has to be approved by the Honours Programme Committee.
3. The programme proposal that the student has submitted to the Honours coordinator is considered for approval by the Honours Programme Committee, established by the Director of Education. For more information about application please check the [Honours Programme Guidelines, CEG](#).
4. The Honours Programme Master has to be completed during the student's master degree programme. None of the results may be lower than 6.0.
5. The assessment of the various components of the programme is carried out by the examiner concerned, who must be a TU Delft academic staff member. In special cases, a deviation from this requirement is permitted ([Art. 5.3 Rules & Guidelines of the Board of Examiners](#)).

## Paragraph 3

# Bridging Programme

## Article 13 Transitional Programme for students with a Dutch Higher Vocational Institute Bachelor Degree

1. 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 transitional programme first:

code	subject	ECs
AESB1130-21	Geology 1: Basics	5
AESB1230	Geology 2: North West Europe	5
AESB1211	Mathematics 1	6
AESB1320-17	Mechanics	5
AESB1440-21	Methodology of Geophysics and Remote Sensing	5
AESB2320	Physical Transport Phenomena	5
IFEEMCS010400	Lineaire Algebra	5
WI1909TH	Differential Equations	3
CTB2400	Numerical Methods for Differential Equations	3
CTB2001HBO-16	Computer Programmeren HBO	3
IFEEMCS010500	Kansrekening en Statistiek	3

2. Students who want to do the Environmental Engineering track have to do the [Civil Engineering Bridging Programme](#).
3. As the bridging programme is different compared to 2020-2021, students of the cohort 2020-2021 who did not complete the programme in one year should contact the bridging coordinator, a tailor-made solution will be sought for them.

## Paragraph 4

# Deviation from the Examination Programme

## Article 14 The self-composed study programme

1. Students are free to compile examination programmes that are rounded off with a final exam. Such a programme needs prior approval by the Board of Examiners and it must consist entirely or mainly of subjects given in conjunction with the degree course but it can be complemented with subjects provided by or given in other courses.
2. The approval referred to in section 1 must be presented to the Board of Examiners by the student in the form of a justified request.

# Paragraph 5

## Examinations and Practicals

### Article 15 Practicals and/or exercises

1. The course teaching takes the form of lectures, practicals and/or exercises.
2. Practicals and/or exercises must be completed before students participate in the examination, unless indicated otherwise in the study guide.
3. Unless otherwise specified by the corresponding course description in the study guide, the following rules apply with respect to improving an unsatisfactory result for a project or practical:
  - a. If the result of a practical exercise is less than satisfactory, i.e. if the practical exercise is assessed with a grade 5.5 or lower (rounded off to halves), the grade for the practical exercise may be improved during the next teaching period, 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;
    - » Grade lower than 5.0: The student must redo the practical exercise completely, i.e. based on a new case or a new set of input parameters.
  - b. The maximum grade that can be obtained by improving an unsatisfactory result for a project or a practical is a grade 6.0.

### Article 16 The types of examinations

1. The examinations linked to the different subjects are to be completed in the way laid down in the [study guide](#) pertaining to the subject in question.
2. Examinations pertaining to subjects given by other programmes are to be completed in the way stipulated by, or on behalf of, the Teaching and Examination Regulations laid down by the relevant Programme.

### Article 17 The frequencies, times and sequences of the exams

Article 18 has been moved to the [TEACHING AND EXAMINATION REGULATIONS](#).

# Paragraph 6

## Admission requirements for the Geo-Energy Engineering Project, Geoscience and Engineering Fieldwork and Final Thesis

### **Article 18**      **Access to Geo-Energy Project**

The admission requirements for the Geo-Energy Project can be found in the study guide.

### **Article 19**      **Access to Geoscience and Engineering Fieldwork**

The admission requirements for the Geoscience and Engineering Fieldwork can be found in the study guide.

### **Article 20**      **Access to the Master Thesis Project**

1. Before starting the Master Thesis Project, the student must complete the form CIE-1 respectively AES-1, which can be downloaded from the CEG Student Portal. On the basis of that form the Student Administration will check on behalf of the Board of Examiners, whether the student complies with the requirements laid down for the Master Thesis Project. If everything is in order the student can report so to the coordinator linked to the chosen track, and further compile the master's examination programme.
2. Students may embark on the Master Thesis Project only when they have no more than 15 credits of uncompleted subjects of the Master's degree programme from all their other subjects of the programme.
3. The final assessment is the meeting during which the assessment committee's chair grades the results of the student's work. The accompanying presentation constitutes part of the final assessment and takes place preferably on the same day as the final assessment. The final assessment has to occur within four weeks (the months of July and August excluded) after the final thesis report has been handed in.

### **Article 21**      **Working method of the Master Thesis assessment committee**

1. As soon as the final study phase begins, the assessment committee's chair will indicate to the student which members of the assessment committee are directly involved in the student's supervision.
2. In consultation with at least two committee members, which should include the chair and the daily supervisor, the student must draw up a work plan which at least describes the subject and the approach and which gives a list of contents. The work plan must also contain a time schedule with dates for the interim meetings and the final presentation.
3. The date of approval of the work plan marks the official start of the Master Thesis Project. The daily supervisor will monitor the schedule.
4. Significant changes in the work plan must be approved by the assessment committee.
5. During the final study phase there must be at least one interim meeting with the assessment committee to gauge the progress being made.

6. Before a presentation date can be agreed, the student must have completed all the other examination programme obligations and present the draft report to the complete assessment committee (the so-called green light meeting).
7. The examiner in the assessment committee from the other section (article 23 Rules & Guidelines Board of Examiners) must at least participate in the deliberations from the moment of the assessment of the draft report text referred to in section 7.
8. After the student has received the assessment committee's approval the student must arrange a presentation date.
9. The final assessment and the presentation of the Master Thesis Project should be preferably planned on the same day. At least two of the three academic staff members of the assessment committee, one of whom must be the chair, have to be present at the time of the presentation.
10. Members of the assessment committee who are unable to be present at the time of assessment should react in writing, possibly by email, to the report received from the student beforehand. The reaction has to be addressed to the chair.
11. Each time the assessment committee evaluates matters, the student must compile an official report and post or mail it to the assessment committee for approval. If after a week no reaction has been received, the student can assume that the agreements detailed in the report have been accepted.
12. The chair is responsible for the assessment and determines the final mark after close consultation with the other committee members. The student will not be notified of the procedure that led to the determination of the final mark.
13. The daily supervisor or a member of the assessment committee appointed in conjunction with the daily supervisor is responsible for ensuring that the relevant Teaching and Examination Regulations and the Rules and Guidelines laid down by the Board of Examiners are adhered to, in particular whether the commencement stipulations are observed, the subsequent procedures are followed, and the Master Thesis Project is assessed according to uniform norms.
14. The daily supervisor must keep a record of how long the student has worked on the Master Thesis Project. If this has not been completed within a year, then the coordinator will ask the student and the assessment committee's chairperson why that is so. If the student subsequently does not progress fast enough, the coordinator will notify the Board of Examiners.

## Paragraph 7

# Transitional measures

### **Article 22**      **Transitional Rulings for students of Cohort 2020-2021 and before**

1. AESM1330 Forward and Inverse Geomodelling has been replaced by AESM1330-21.
2. Two resits will be offered for AESM1330 in 2021-2022.
3. If students do not pass the course after these two resits, they will have to do the AESM1330-21 course.

## **Article 23**      **Transitional Rulings for students HBO-Bridging Programme of Cohort 2020-2021 an before**

1. AESB1440-17 Methodology of Geophysics and Remote Sensing has been replaced by AESB1440-21.
2. Two resists will be offered for AESB1440-17 in 2021-2022.
3. If students do not pass the course after these two resits, they will have to do the AESB1440-21 course.
1. AESB1130 Geology:Basics has been replaced by AESB1130-21.
2. Two resists will be offered for AESB1130 in 2021-2022.
3. If students do not pass the course after these two resits, they will have to do the AESB1130-21 course.

## **Article 24**      **When the rules do not provide**

Insofar as this annex does not provide for specific circumstances, the Board of Examiners will make a decision that is in line with this annex to every extent possible and the [Board of Examiners](#) will also take article 6 of its [Rules & Guidelines](#) into account.





