TEACHING AND EXAMINATION REGULATIONS (TER)

2018-2019

In accordance with article 7.13 of the [Dutch] Higher Education and Research Act [WHW]

MASTER DEGREE PROGRAMME CIVIL ENGINEERING & MASTER DEGREE PROGRAMME APPLIED EARTH SCIENCES

DELFT UNIVERSITY OF TECHNOLOGY

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Paragraph 1 - General

Article 1 – Applicability of the regulations

1. These regulations apply to the teaching and the examinations of the Master's degree programme in Civil engineering and to the Master's degree programme in Applied Earth Sciences, hereinafter referred to as 'the programme' or 'programmes'.

2. 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'.

Article 2 – Definitions of terms used

The following concepts apply in this Regulation:

a. Act:	the Higher Education and Scientific Research Act (in Dutch, the WHW), Dutch Bulletin of Acts, Orders and Decrees, number 593 and as amended since;
b. academic year	the period from 1 September till 31 August of the following calendar year;
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's degree programme, while enrolled in a Bachelor's degree programme, but without obtaining a Bachelor's 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. credit:	a European Credit (EC) awarded in line with the European Credit Transfer System (ECTS); one credit denotes a study load of 28 hours;
h. (component) partial examination:	an assessment of the knowledge, insight and skills of a student in relation to a component within a subject, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the Board of Examiners;
i. 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 (here: MSc in Civil Engineering);
j. 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 subjects of the degree programme have been successfully completed;
k. 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;
l. education registration system:	the current education registration system is Osiris;
m. examination:	an assessment of the knowledge, insight and skills of a student in relation to a subject, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the Board of Examiners;
n. 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;
o. institute:	Delft University of Technology;
p. 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;
q. learning management platform	the current learning management platform is Brightspace;
r. practical exercise:	subject or component of a subject aimed at the acquisition of particular skills. The following can be understood as practical exercises: • writing a thesis, • conducting a project or experimental design, • carrying out a project or a design/research assignment, • conducting a literature review, • completing an internship, • participating in fieldwork or an excursion, • conducting tests and experiments, or

	• participating in other educational activities that are considered essential and that are aimed at enabling participants to attain certain skills;
s. programme:	the Master's degree courses (Civil Engineering) as stipulated in Article 7.3a Paragraph 1, Subsection b of the Act;
t. programme duration:	the duration starting from the enrolment of the student up and to including the last examination;
u. 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;
v. study guide: a	digital guide to the programme containing specific information pertaining to the various subjects;
w. subject:	a teaching unit within the programme as intended in Article 7.3, Subsection 2 and 3 of the Act; a subject can consist of a number of components;
x. teaching period:	half a semester;
y. track	major, as stipulated in Article 7.13, Paragraph 2, Subsection b of the Act;
z. virtual learning environment:	the electronic system designed for the exchanging of teaching information;
aa. 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 Articles 19, 22 and 25.

Paragraph 2 - Admission and prior education

Article 3a – Admissions to the Master's degree programme (Art. 7.30b WHW) BoS advisory powers; SC advisory powers 2018-2019 (amendment RIB)[1]

1. Individuals holding one of the following degrees have access to the education of the Master's degree programme in Civil Engineering (under a) or Applied Earth Sciences (under b) on the condition that all of the stated requirements have been met.

   a. Specific university Bachelor's degree for Civil Engineering
   Required to enter to Master's degree programme in Civil Engineering:
   - Bachelor's degree at Delft University of Technology or at University of Twente.

   b. Specific university Bachelor's degree for Applied Earth Sciences
   Required to enter to Master's degree programme in Applied Earth Sciences
   - Bachelor's degree in "Technische Aardwetenschappen" or in "Applied Earth Sciences" at Delft University of Technology.

2. Students who do not possess the degree mentioned in subsection 1a 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's degree (not including those listed in subsection 1a and 1b)
   The following applies to this category:
   Successful completion of the stated bridging programme for admission to the Master's degree programme:
   - University Bachelor's degree TU Delft Architecture, as stipulated in the study guide.
   Bridging programme to be followed: to be specified upon application.

   b. Higher professional education degree
   The following applies to this category:
   Successful completion of the stated bridging programme for admission to the Master's degree programme and, if applicable, the language requirement
   - higher professional education degree [Dutch higher vocational institute (HBO)]
   Bridging programme to be followed: Transitional programme for students with a Dutch higher vocational institute Bachelor degree ("HBO") as stipulated in article 15 of the annex.

[1] BoS = Board of Studies; SC = Student Council; FSC = Faculty Student Council

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 annex.

3. For admission in accordance with section 2, the following additional condition apply:
Access to the education of the Master's degree programme in Civil Engineering and Applied Earth Sciences is open to individuals who have demonstrated to the admissions committee that they possess knowledge, insight and skills at the level of the Bachelor's degree mentioned subsections 1a, or of a university Bachelor's degree, in addition to the further requirements mentioned in subsections 1b and 1c.

4. All students are also subject to the following qualitative admission requirements:
In order to obtain proof of admission, the student must meet or, as the case may be, possess:
   a. the general relevant criteria set by the Executive Board, laid down in the "Policy on fees and enrolment", laid down in Annex 1 of the Student Charter (central part), and clarified in Part 1.2 "Entrance and admission" of the mentioned Student Charter.
   b. a certificate, together with the accompanying list of marks, proving that he/she possesses knowledge of a sufficiently high level and broad scope to successfully complete the programme within the allotted period.

5. 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 12 credits. The missing subjects can be integrated into the MSc programme

Article 3b – Admissions to the bridging programme

1. In order to be admitted to the bridging programme, the student must satisfy the general relevant criteria set by the Executive Board in the "Policy on fees and enrolment", laid down as annex 1 of the Student Charter (main part), and clarified in Chapter 2 "Entrance and admission" of the mentioned Student Charter.

2. The criteria mentioned in section 1 are elaborated further in the annex.

Article 3c – Completion of bridging programme prior to the degree programme

1. A student who is enrolled on a Bachelor's degree programme for a bridging programme with the aim of being admitted to the Master's 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.

3. The Executive Board will set the fee to be charged, as denoted in Article 7.57i of the Act, for the enrolment as student in a bridging programme and for the extension thereof, as denoted in Subsection 2 of this article.

4. A well-founded request for extension must be submitted to the Board of Examiners. 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

Paragraph 3 - Content and composition of the programme

Article 5 – Goal of the programme (Art. 7.13 Paragraph 2, Subsection c WHW)
BoS right of approval

1. The programmes is intended to educate students to earn a Master of Science in Civil Engineering respectively in Applied Earth Sciences, whereby the final attainment levels described below must be achieved, providing

them with such a level of knowledge, insight and skills in the area of Civil Engineering and Applied Earth Sciences, 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's graduates should possess the following

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.

Article 6 – Track and annotations (Art. 7.13 Paragraph 2, Subsection b WHW)
BoStudies right of approval

1. The Master's degree programme in Civil Engineering has the following tracks, with the stated content:
   - 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's Degree Programme in Civil Engineering, for which the criteria are stipulated in article 2 of the annex.

Within a track or within a specialisation the student may (partly) opt for the annotations, mentioned in the annex:
- Technology in Sustainable Development
- Entrepreneurship
- Urban Planning and Engineering
- Integral Design and Management
- Railway Systems
- Dynamics of Structures

2. The Master's degree programme in Applied Earth Sciences has the following tracks, with the stated content:
   - Petroleum Engineering and Geosciences, as laid down in Article 4 Annex
     Specialisations:
     - Petroleum Engineering
     - Reservoir Geology
   - Geo-Engineering, as laid down in Article 5A Annex
   - Geoscience and Remote Sensing, as laid down in Article 5B Annex
   - Environmental Engineering, as laid down in Article 5C Annex
   - Applied Geophysics, as laid down in Article 6 Annex
   - Resource Engineering, as laid down in Article 7 Annex
     Specialisation:
     - European Mining Course (EMC)
     Structured exchange:
     - Mineral and Recycling Process Engineering Course (EMREC)

Within a track or within a specialisation the student may opt for the annotations, mentioned in the annex:
- Technology in Sustainable Development
- Entrepreneurship.

Article 7 – Composition of the programme and degree audits (Art. 7.13 Paragraph 2, Subsections a, e and g of the WHW); BoS advisory powers (a); right of approval (e and g)
(Art. 7.13 Paragraph 2, Subsection x WHW; FSCl right of approval, BoS advisory powers

1. The programme includes the Master's degree audit, with a study load of 120 credits. Subsection e and g

2. Students following two simultaneous Master's degree programmes at TU Delft must earn at least 60 additional unique credits in addition to a complete Master's degree programme of 120 credits.

3. Subjects that were 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 subject. If an elective module of the degree programme has already been completed in the aforementioned Bachelor's degree programme, the student will select an alternative elective module. Subsection a

4. The Master's degree audit is concluded with a MSc thesis. This MSc thesis demonstrates that the student possesses and is able to apply the knowledge, insight and skills acquired in the degree programme. Subsection a

5. The degree programme is described in the annex, along with the subjects, including the study load, number of contact hours and form of examination of each subject, as well as the programming of the examination and the language. Subsection e and x

6. The actual design of the education is elaborated in greater detail in the study guide. Subsection x

Article 8 – Form of the programme (Art. (7.13 Paragraph 2, Subsection i WHW)
FSC right of approval, BoS advisory powers

This programme is offered exclusively on a full-time basis.

Article 9 – Language
FSC right of approval, BoS advisory powers

1. The teaching is in English, and the examinations are administered in English.

2. Should a student request permission to complete one or more parts of the examination or the degree audit in a language other than English, this will be subject to the stipulations of the Board of Examiners, as laid down in the Rules and Guidelines of the Board of Examiners.

Article 10 – Honours Programme
FSC right of approval, BoS advisory powers

1. Based on the criteria referred to in the Master's Honours Programme, students will be selected and admitted to the Master's Honours Programme by the Director of Studies/an Honours Coordinator or an Honours Committee established by the Director of Studies.

2. The Master's Honours Programme comprises at least 20 credits.
   a. At least five credits must be completed in the institution-wide component of the Master's Honours Programme: the subject 'Critical Reflection on Technology' (UD2010),
   b. At least 15 credits must be completed in the faculty component of the Master's Honours Programme, the composition of which (including its content and options) is described in the Honours Programme.

4. All students selected for participation in the Honours Programme must submit their options for the faculty component to the director of studies, the Honours coordinator or Honours committee for approval.

5. The Board of Examiners will be responsible for assessing whether all the requirements of the Master's Honours Programme have been met.

6. Any student who has successfully completed the Master's 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 (Art. 7.13 Paragraph 2, Subsection t WHW)
FSC right of approval, BoS advisory powers

1. All students are expected to have participated actively in the subjects for which they are examined.

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 has the authority to grant an exemption from this obligation, and can require a substitute requirement.

3. Any supplementary obligations are described by component in the study guide.

Article 12 - Programme evaluation (Art. 7.13 Paragraph 2, Subsection a1 WHW)
BoS right of approval

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 a separate document, that is presented 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 and withdrawal from examinations

Article 13 - Registration for written examinations
FSC right of approval; BoS advisory powers

1. Registration to participate in a written examination is compulsory and is done by entering the requested data into Osiris no later than 14 calendar days before the examination. Students receive examination tickets by email as confirmation of their registration.

2. Students who have not registered within the term specified in section 1 may request registration for that examination after this term until no later than three calendar days before the examination by entering the requested data into Osiris. The request will be honoured providing that places are available in the room or rooms where the examination is scheduled to take place. Students receive examination tickets by email as confirmation of their registration.

3. 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.

4. 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.

5. 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.

Article 14 - Registering for other examinations and practicals
FSC right of approval; BoS advisory powers

1. Registration for participation in an examination other than a written examination and/or practicals is compulsory, and will take place in the manner and by the deadline indicated in the study guide or for additional information on the virtual learning environment (Brightspace).

2. In special cases, the Board of Examiners may deviate from the period of registration referred to in section 1, however only in favour of the student.

3. Students who have not registered on time will not be allowed to participate in the examination and/or practicals. In exceptional circumstances the Board of Examiners may allow the student to participate in the examination and/or practicals.

4. In the event of unauthorised participation in an examination and/or practicals, the Board of Examiners may declare the result invalid.

Article 15 - Withdrawal
FSC right of approval; BoS advisory powers

1. Students can withdraw from an examination through education registration system 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 (Art. 7.13 Paragraph 2, Subsections h and l WHW)
FSC right of approval, BoS advisory powers

1. Examinations (oral, written or otherwise) are taken in the manner described in the study guide.

2. The annex 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 subject no more than twice in one academic year.

4. Well before a written examination, the examiner will give the students the opportunity to familiarise themselves with examples of representative examination questions and answers and the examination assessment standards.

5. In special cases, the Board of Examiners will deviate from the provisions of this Article in favour of the student.

Article 17 – Times and number of written examinations (Art. 7.13 Paragraph 2, Subsection j WHW)
FSC right of approval, BoS advisory powers

1. Two opportunities to take written examinations will be offered each academic year:
   - the first opportunity is during or at the end of the teaching period in which the subject is taught,
   - the second opportunity is in week five and eight or equivalent weeks in Q4 or at the end of the next teaching period, or during the resit period in the months July and August, unless otherwise stated in the study guide.

2. The number of times in which examinations are held is laid down in the annex. A timetable of all the opportunities for sitting written examinations is drawn up on an annual basis and distributed before the start of the relevant semester.

3. If there is no indication as to the number of times a particular examination can be taken in any one academic year because it relates to a subject not taught by the programme itself, the relevant stipulations in the Teaching and Examination Regulations of the other programme will apply. The Board of Examiners reserves the right to make decisions that deviate from the norm regarding this matter.

4. Contrary to the provisions of section 1, there will be at least one chance in a year to sit examinations relating to subjects not taught in a given academic year.

5. In exceptional cases, the Board of Examiners may permit more than two opportunities in a year for certain examinations.

Article 18 – Oral examinations (Art. 7.13 Paragraph 2, Subsection n WHW)
FSC right of approval, BoS advisory powers

1. For oral examinations, no more than one student shall be tested at a time, unless determined otherwise by the examiner.

2. Oral examinations shall be public, except in special cases in which the Board of Examiners has decided otherwise, or if the student has filed an objection to the public nature of the examination.

3. In principle, an oral exam will take place with two examiners and in any case when it is requested by the student. A request to this end has to be submitted to the lecturer at least seven (7) days before the exam.

4. Prior to an oral examination, the examiner must ask the student to provide proof of identity.

Article 19 – Determination and announcement of results (Art. 7.13 Paragraph 2, Subsection o WHW)
FSC right of approval, BoS advisory powers

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 immediately after it is administered and issues the student 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 in principle 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 achieved in the resit period in August shall be registered and published no later than the last working day of the week following the examination week in August.

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 (Art. 7.13 Paragraph 2, Subsection p WHW)
FSC right of approval, BoS advisory powers

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. 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 become acquainted with 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 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 (Art. 7.13 Paragraph 2, Subsection q WHW)
FSC right of approval, BoS advisory powers

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.

3. If a collective discussion is organised by the examiner, students may submit requests as referred to in the last section 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 deviation from the provisions of sections 2 and 3.

5. The provisions of section 3 are similarly applicable if either the Board of Examiners or the examiner first gives the student the opportunity to compare his/her answers with model answers.

Article 22 – Period of validity of examinations (Art. 7.13 Paragraph 2, Subsection k, Art. 7.10, Paragraph 4 WHW).
FS Council right of approval, BoS advisory powers

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. The provisions of section 1 likewise apply to examinations, unless the validity of the partial examination is linked to a time period stated in the study guide.

Article 23 - Exemption from an examination or obligation to participate in a practical exercise
(Art. 7.13 Paragraph 2, Subsection r WHW)
FSC right of approval, BoS advisory powers

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 24 - Periods and frequency of degree audits (Art. 7.13 Paragraph 2 WHW)
FSC right of approval, BoS advisory powers

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.

Paragraph 6 - Studying with a disability

Article 25 – Adjustments to the benefit of students with disabilities or chronic illnesses
(Art. 7.13 Paragraph 2, Subsection m WHW)
FSC right of approval, BoS advisory powers

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 subject 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, or a change to the distribution 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 (Art. 7.13 Paragraph 2, Subsection uWHW)
FSC right of approval, BoS advisory powers

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. He 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 education registration system (Osiris).

3. The Student Administration is responsible for ensuring that all students are able to review and check their results in the education registration system (Osiris).

Article 27 – 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.

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.
   Transitional measures can be found in the TER of the cohort involved.

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 subject within a degree programme is cancelled, four opportunities for taking the examination in this subject shall be offered after it has been taught for the last time: the examination at the end of the teaching of the subject, 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 2018.

Adopted by the Dean of the faculty on 24 July 2018.

ANNEX to Art. 3 of the Model TER (for Master's degree programmes)

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

The English language, through the successful completion of one of the following tests:
- A TOEFL iBT (Test of English as a Foreign Language internet-Based Test) with an overall band score of at least 90, or
- an IELTS (academic version) with an overall Band score of at least 6.5, or
- a proof of completion of the 'Certificate of Proficiency in English' (CPE) or the 'Certificate in Advanced English' (CAE), both of the University of Cambridge

Certificates must have been completed successfully before the start of the bridging programme.

The following candidates shall be exempted from the requirement to pass an English language test:
- Nationals from the USA, UK, Ireland, Australia, New Zealand or Canada
- Applicants with a Dutch Pre-university (VWO) certificate
- Applicants who have obtained a higher professional education degree in an English-language programme.

Language level for individuals holding a foreign degree (d)

The English language, through the successful completion of one of the following tests:
- A 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 Paragraph, or
- an IELTS (academic version) with an overall Band score of at least 6.5 and a minimum score of 6.0 for each Paragraph, or
- a proof of completion of the 'Certificate of Proficiency in English' (CPE) or the 'Certificate in Advanced English' (CAE), both of the University of Cambridge

Certificates older than two years shall not be accepted.

The following candidates shall be exempted from the requirement to pass an English language test:
- Nationals from the USA, UK, Ireland, Australia, New Zealand or Canada
- Applicants who have obtained a Bachelor's degree in one of the countries mentioned.

ANNEX

Implementation Regulations

2018-2019

MASTER OF SCIENCE
APPLIED EARTH SCIENCES

DELFT UNIVERSITY OF TECHNOLOGY

Table of Contents

Paragraph 1 – Compiling the study programme

Article 1 – The study load

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

Article 2 – Tracks, specialisations and annotations

1. The course comprises the following tracks:
   - Petroleum Engineering and Geosciences, as laid down in Article 4
     Specialisations:
     - Petroleum Engineering
     - Reservoir Geology
   - Geo-Engineering, as laid down in Article 5A
   - Geoscience and Remote Sensing, as laid down in Article 5B
   - Environmental Engineering, as laid down in Article 5C
   - Applied Geophysics, as laid down in Article 6
   - Resource Engineering, as laid down in Article 7
     Specialisation:
     - European Mining Course (EMC)
     Structured exchange:
     - Mineral and Recycling Process Engineering Course (EMREC)

2. Within a track or within a specialisation the student may opt for the annotations, mentioned in Articles 8 and 9:
   - Technology in Sustainable Development
   - Entrepreneurship.

Article 3 – Registering the tracks and compiling the examination programme

1. At the start of the programme the students need to determine their examination programme in cooperation with the relevant MSc-track coordinator.

2. Prior to the start of the Final Thesis students need to present their examination programme together with the title, a short abstract, a time schedule and the chairman and members of the assessment committee of the Final Thesis for approval. In case the examination programme satisfies the rules as laid down in this annex then it can be approved by the MSc-track coordinator only; in case the programme does not satisfy the rules as laid down in this annex, then it also needs to be approved by the Board of Examiners, with a motivation for the deviation from these Regulations.

3. Any amendments made to the previously approved examination programme or to the previously approved assessment committee should be presented to the MSc-track coordinator and in the case of the program not satisfying the rules as laid down in this annex also to the Board of Examiners for final approval, with a motivation for the deviation from these Regulations.

4. Students who opt for the annotations Technology in Sustainable Development or Entrepreneurship need the approval of their examination programme from the referee of the chosen annotation prior to presenting their examination programme to the MSc-track coordinator and/or Board of Examiners according to section 2 and 3 of this article.

Article 3A – Rules for choosing electives

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 which TU Delft has an exchange contract with,
- an internship (CIE4040-09, 10 EC), Additional Additional Graduation Work, Research project (CIE4061-09, 10 EC) 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, however language, skills subjects and MOOCs are **not** allowed within the examination programme. Language, skill subjects and MOOCs can only be part of the extracurricular section of the diploma supplement.[1]

[1] This means that subjects like writing, oral presentation, English and Dutch are not allowed within the examination programme.

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 4 – The Petroleum Engineering and Geosciences track

1. The study programme of the Petroleum and Geosciences track is compiled in the following way:

- track-linked compulsory core programme
  44 credits, laid down in subsection 2
- specialisation-linked subjects:
  65 credits for the specialisation Petroleum Engineering, laid down in subsection 3
  67 credits for the specialisation Reservoir Geology, laid down in subsection 4
- electives:
  11 credits for the specialisation Petroleum Engineering, as laid down in subsection 5
  9 credits for the specialisation Reservoir Geology.

2. Compulsory core programme Petroleum Engineering and Geosciences track:

code	subject	ECs
AES0102	Image Analysis	1
AESM1300-18	Properties of subsurface Fluids	4
AESM1310-18	Rock Fluid Physics	4
AES1320	Modelling of fluid Flow in porous Media	3
AES1340	Reservoir Engineering	2
AES1510	Geologic Interpretation of Seismic Data (practical included)	3
AES1520	Log Evaluation	2
AES1802	Geological Fieldwork	3
AES1820-09	Reservoir Characterisation and Development	4
AES1890	Sedimentary Systems	3
AES1920	Geostatistics	2
AES1930	Quantification of Rock Reservoir Images	1
AES2009	Field Development Project	9
AES3820[2]	Petroleum Geology	3

3. Subjects linked to the specialisation Petroleum Engineering:

code	subject	ECs
AES1304	Introduction to Petroleum Engineering and NAM Visit	3
AES1330	Drilling and Production Engineering (lab. exp. included)	4
AES1350	Reservoir Simulation	2
AES1360	Production Optimization	3
AES1500	Fundamentals of Borehole Logging	4
WI4012TA	Mathematics, Special Subjects	4
AESM2006	Final Thesis Petroleum Engineering	45

4. Subjects linked to the specialisation Reservoir Geology:

code	subject	ECs
AES1800	Exploration Geology	3
AES1830	Reservoir Sedimentology	3
AES1840	Advanced Structural Geology	3
AES1850	Geological Modelling	4
AES1860-05	Analysis of Sedimentological Data	3
AES1902	Reservoir Geological Fieldwork	6
AESM2006	Final Thesis Reservoir Geology	45

5. The following optional electives are offered within the specialisation Petroleum Engineering:

code	subject	ECs
AES1370-12	Non-Thermal Enhanced and Improved Oil Recovery	3
AES1460	Heavy Oil	2
AES1470	Geothermics	2
AES1490	Advanced Reservoir Simulation	2
AES1760	Introduction to Log Evaluation	1
AESM1805	Regional Geology Field Trip	1

[2] Not if AES3820 has been completed in the Bachelor's fase.

AESM	Geothermal Field Trip	2
Free	Master of Science electives	

Article 5A – The Geo-Engineering track

1. The study programme for the Geo-Engineering track consists of:
   - a common compulsory Geo-Engineering block
     74 credits, laid down in subsection 2
   - Geo-Engineering electives
     adding up to a total of 100 track-linked credits, as laid down in subsections 2 and 3
   - electives
     20 credits, as laid down in subsection 4.

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
AES1630	Engineering Geology	4
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
CIE5320	Experimental methods in geotechnical engineering	6
AESM1700	Consolidation of Soils	3
AESM2606	Final Thesis Geo-Engineering	40

3. Geo-Engineering electives
If the Bachelor's phase did not include WM0325TA, Technics and Responsibility, students shall choose one out of two:

CIE 4510	Climate Change: Science and Ethics	4
WM0312CIE	Philosophy, Technology Assessment and Ethics	4

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

code	subject	ECs
AES1730	Introduction to Geotechnical Engineering *for students without soil mechanics and geotechnical engineering background*	4
CIE4420	Geohydrology 1 *for students who did not pass CTB3390 or AESB3340*	4
AESM4370	Introduction to Geology *for students with a civil engineering background*	1
CIE4370	Introduction to Structural Mechanics *for students with an applied earth science background*	1

Students are required to complete a selection of the following subjects adding up to a total of 100 track-linked credits.

code	subject	ECs
AES1640-11	Environmental Geotechnics	4
AES1720-11	Rock Mechanics Applications	5
AES1730[3]	Introduction to geotechnical Engineering	3
AESM2901-16	Geoscience and Engineering Fieldwork	10
CIE4353	Continuum Mechanics	6
CIE4362	Soil-structure Interaction	3
CIE4363	Deep Excavations	4
CIE4367-16	Design of Embankments	3
CIE4390	Geo-risk Management	3
CIE4420[4]	Geohydrology 1	4
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

[3] Students who passed CTB2310 (Soil Mechanics) or an equivalent course cannot take this course.
[4] Students who passed CTB3390, AESB3340 or an equivalent course cannot take this course.

4. Electives

Choose two out of:

code	subject	ECs
Any Master's degree course subject	Applied Earth Sciences or Civil Engineering	10
Free	Master of Science electives	10

Other courses than the ones listed for the specialisation part may be acknowledged as an elective only after consultation with and explicit approval of the chair of the graduation committee.

Article 5B – 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[5]	Climate Change: Science & Ethics	4
CIE4601	Physics of the Earth and Atmosphere	5
CIE4603-16	Geo-signal Analysis	6
CIE4604	Simulation and Visualization	5
CIE4606	Geodesy and Remote Sensing	5
CIE4611	Geo-measurement Processing	5
CIE4615	GRS Fieldwork	3
AESM2640	Final Thesis Geoscience and Remote Sensing	40

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 12 credits out of:

code	subject	ECs
CIE4522-15	GPS for Civil Engineering and Geosciences	4
CIE4602	Cryosphere: remote sensing and Modelling	4
CIE4605	Atmospheric Science	4
CIE4607	Ocean topography and sea-level change	4
CIE4608	Atmospheric Remote Sensing	4
CIE4609	Geodesy and Natural Hazards	4
CIE4610	Mass Transport in the Earth's System	4
CIE4614-18	3D Surveying of Civil and Offshore Infrastructures	4

and choose adding up to a total of 27 credits out of:

code	subject	ECs
CIE4612	Research Seminar Geoscience and Remote Sensing II	1
CIE5601	Advanced topics in Geoscience and Remote Sensing	3
CIE5602	Research Seminar Geoscience and Remote Sensing I	1
CIE5603	Advanced Project on GRS	3
CIE5604	Journal club on climate change and geoscience	3
AE4890-11	Planetary sciences I	4
GEO1002	Geographical Information Systems (GIS) and cartography	5

Any Master's degree course subject Applied Earth Sciences or Civil Engineering.

[5] Not compulsory if Bachelor's phase did include WM0325TA Technics and Responsibility

4. Electives

Choose two out of:

code	subject	ECs
Any Master's degree course subject	Applied Earth Sciences or Civil Engineering	10
Free	Master of Science electives	10

Article 5C – Environmental Engineering track

The Environmental Engineering track has two specialisations:
- Environmental Technology
- Environmental Science

The compulsory programme for each specialisation consists of a common compulsory Environmental engineering block of 21 credits and 4 credits compulsory Ethics course. Depending on your specialisation profile you have an additional block of 36 credits (Environmental Technology) or 34 credits (Environmental Science).

Common compulsory block Environmental Engineering

All students opting for the track Environmental Engineering must complete the following subjects adding up to 21 credits:

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

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

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[6].

AESM2650	Final Thesis Environmental Engineering	40

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	Water Treatment	6
CIE4704	Chemical Processes in Water Technology	5
CIE4705	Environmental Biotechnology & Microbiology	6
CIE4710	Materials separation in Waste Processing	5
CIE5421	Water and Health	4
CIE5704	Water Treatment Research	5
CIE5702	Conceptual Process design	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
CIE4707	Air Quality	5
CIE4706	Introduction into Meteorology	5
CIE4709	Remote Sensing for Environmental Monitoring	5
CIE4708	Water in the Atmosphere	5
CIE5703	Urban Climate & Hydrology	5
CIE5701	From Field Observations to Modelling	5

[6] 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.

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 3. 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 6 – The Applied Geophysics track

The Applied Geophysics programme is taught at three partner universities:
- TU Delft
- ETH Zürich
- RWTH Aachen

The study programme is compiled in the following way:

First year

Delft

A minimum of 25 credits should be passed from TU Delft subjects, whereby two of the following three blocks must be passed:
- Geology and Interpretation: AES1510 and AES1890 and AES3820
- Electromagnetic Methods: AES1540-11
- Seismic Wave Propagation and Imaging: AES1560.

code	subject	ECs
AES1540-11	Electromagnetic Exploration Methods	6
AES1550-06	Geophysics Special Subjects	6
AES1560	Advanced Reflection Seismology and Seismic Imaging	6
AES1890	Sedimentary Systems	3
AES3820	Petroleum Geology	3
AESM1501	Seismic acquisition to data information content	6
AESM1511	Field geophysics and signal analysis with exercises	6
CIE4606	Geodesy and Remote Sensing	5

Zürich

A minimum of 25 credits should be passed from the ETH Zürich subjects, whereby two of the following three blocks must be passed:
- Reflection seismology processing: 651-4079-00L
- Geophysical Fieldwork and Processing: 651-4104-00L and 651-4106-03L
- Modelling and Inverse Theory for Appleid Geophysics: 651-4094-00L and 651-4096-00L.

code	subject	ECs
651-4079-00L	Reflection Seismology Processing	6
651-4087-00L	Case Studies in Engineering and Environmental Geophysics I	3
651-4087-02L	Case Studies in Engineering and Environmental Geophysics II	3
651-4094-00L	Numerical Modelling for Applied Geophysics	3
651-4094-02L	Numerical Modelling for Applied Geophysics II	3
651-4096-00L	Inverse Theory for Applied Geophysicists	3
651-4096-02L	Inverse Theory for Applied Geophysicists II	3
651-4104-00L	Geophysical Fieldwork and Processing: Methods	2
651-4106-03L	Geophysical Field Work and Processing: Preparation + Field Work	7
102-0448-00L	Groundwater II	6
701-0106-00L	Mathematics V: Applied Deepening of Mathematics I – III	3

Second year

Aachen

A minimum of 25 credits should be passed from the RWTH Aachen subjects, whereby two of the following five blocks must be passed:
- Geophysics Special Methods: 16ws-29463 and 16ws-14238
- Geophysical Logging and Log Interpretation: 16ws-14570
- Geothermics: 16ws-13943
- Hydrogeophysics and Data Analysis in Geoscience: 16ws-18482 and 16ws-18162
- Numerical Reservoir Engineering + Numerical Methods and Programming: 16ws-42235 and 16ws-42487

code	subject	ECs
16ws-18667	Applied Structural Geology	3
16ws-29463	Geophysics special Methods: NMR	3
16ws-14238	Geophysics Special Methods: Spectral IP	3
16ws-14570	Geophysical Logging and Log Interpretation	5
16ws-13943	Geothermics	5
16ws-18482	Hydrogeophysics	3
16ws-18162	Data Analysis in Geoscience	3
16ws-18598	Mineral Exploration (if Energy Resources Management not taken)	3
16ws-32124, 23301	Petroleum System Modelling/Sedimentary Basin Dynamics	6
16ws-29469	Engineering Geophysics	3
16ws-33690, 16689	Remote Sensing of Sedimentary Basins	3
16ws-24349	Planning-Realization-Optimization in Geo-resources Management	3
16ws-24537	Prospect Evaluation and Risk Analysis	3
16ws-45471	Portfolio Management	3
16ws-24346	Energy Resource Management (if Mineral Exploration not taken)	3
16ws-42235	Numerical Reservoir Engineering: Geophysics, Uncertainties and optimal experimental Design	3
16ws-42487	Numerical Methods and Programming for Reservoir Engineering3	
16ws-14775	Introduction to scientific Computing Languages	6
16ws-24760	Microstructural Analysis	6
16ws-12379	Einführung in Geographische Informationssysteme (GIS)	3
153ss-00086	Coal Geology	3
16ws-47549,47550	Numerical Methods for Geophysical Flows	3
16ws-00220,28046	Finite Elements in Fluid Dynamics	3

Delft/Aachen/Zürich

code	subject	ECs
AESM2506	Final Thesis Applied Geophysics	30

Article 7 – The Geo-Resource Engineering track

1. The study programme for the Geo-Resource Engineering track consists of:
   - a common compulsory Geo-Resource Engineering block adding up to 80 credits, as laid down in subsection 2
   - 20 credits of Geo-Resource engineering track-linked electives, as laid down in subsection 3
   - a research driven project or free electives adding up to 15 credits, as laid down in subsection 4.

2. Common compulsory block Geo-Resource Engineering

All students opting for the track Geo-Resource Engineering must complete the following subjects adding up to 80 credits:

Code	subject	ECs
AESM1026	Economic Geology & Mineral Exploration: Introduction for Geo-Resource Engineers	5
AESM1025	Data analysis and Resource Modelling	5
AESM1024	Legal, Health and Safety	5
AESM1023	Computer aided mine design and optimization	5
AESM1022	Principles of mine design	5
AESM1021	Mine Operational Management	5
AESM1020	Mine Feasibility Case Study	5
AESM2023	Thesis Proposal	5
AESM2025	Final Thesis	40

3. Geo-Resource engineering electives

Students are required to complete track linked electives of the following subjects, adding up to a total of 25 credits (see a and b). Students are required to opt for a focus on mining, geo or environmental engineering.

Choose at least one of the following three focusses and complete the course(s) linked to the focus to a total of 5EC:

Focus Geo-engineering:

Code	subject	ECs
AES1720-11	Rock Mechanics Applications	5

Focus Mining-engineering:

Code	subject	ECs

AES1720-11	Rock Mechanics Applications	5

Focus Environmental-engineering:

Code	subject	ECs
MS43997	Recycling Engineering Materials	3
AESM4151-2	Additional Assignment for Geo-Resource Engineers (for MS43997)	2

Choose a focus and select electives based upon that focus. A list of approved electives for each focus is given below. Students can choose all of the electives in this list. Students can also opt for other electives that are not in the list, but these electives need to be approved of beforehand by the MSc coordinator (dr. Mike Buxton). Students complete a selection of electives adding up to a total of 20EC.

Focus Geo-engineering (approved electives):

code	subject	ECs
OE44030	Offshore Geotechnical Engineering	4
CIE4366	Numerical Modelling in Geo-Engineering	6
AES1470	Geothermics	2

Choose electives from the Focus Mining-Engineering, Environmental Engineering or other approved electives;
Adding up to a total of 20 EC

Focus Mining-engineering (approved electives):

code	subject	ECs
ME44200	Intelligent Control for Transport Technology	3
AES1470	Geothermics	2

Choose electives from the Focus Mining-Engineering, Environmental Engineering or other approved electives;
Adding up to a total of 20 EC

Focus Environmental-engineering (approved electives):

code	subject	ECs
CIE4420	Geohydrology	4
CIE4365-16	Modelling Coupled Processes for Engineering Applications	5

Choose electives from the Focus Geo-Engineering, Mining Engineering or other approved electives;
Adding up to a total of 20 EC

Other approved electives:

code	subject	ECs
WM0320TU	Ethics and Engineering	3
SPM8000	Project management	7
Geo1009	Geo-information organisation & legislation	5
SPM4416	Strategic management of large engineering projects	6
CME2200	Dynamic control of projects	4

4. Research driven project or free electives

In the 2nd year students can opt for completing a research driven project for 15 credits or can opt for completing a selection of free Master of Science electives adding up to a total of 15 credits.

5. European Mining Course

The specialisation European Mining Course (EMC), as laid down in this subsection, is taught at three partner universities:

- Helsinki University of Technology
- RWTH Aachen
- TU Delft

The study programme of the specialisation European Mining Course (EMC) 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

2nd semester: Aachen

code	subject	ECs
17ss-49733	Feasibility Studies, Project Management and Financial Modelling	5
17ss-49767	Reserve Modelling and Estimation	4
17ss-49735	Underground Mine Design	4
17ss-49769	Surface Mine Design	4
17ss-49732	Mine Ventilation	6
Choose option 1:		
17ss49768	Case StudyUnderground Mining Project	7
OR		
Choose option 2:		
17ss-49734	Case Study – Surface Mining Project	7

Second year

3rd semester: Delft

code	subject	ECs
AESM1023	Computer aided mine design and optimization	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

4st semester :

code	subject	ECs
AESM2010	Final Thesis	30

6. Mineral and Recycling Process Engineering Course

The structured exchange Mineral and Recycling Process Engineering Course (EMREC), as laid down in this subsection, is taught at two partner universities:

- Helsinki University of Technology
- TU Delft

The study programme of the structured exchange Mineral and Recycling Process Engineering Course (EMREC) is compiled in the following way:

First year

1st semester: Delft

code	subject	ECs
AESM1022	Principles of mine design	5
AESM1023	Computer aided mine design and optimization	5
AESM1024	Health, Safety and Environment	5
AESM1025	Data analysis and Resource Modelling	5
AESM1026	Economic Geology & Mineral Exploration: Introduction for Geo-Resource Engineers	5

Depending on focus

for Geo-Engineering and for Mining-engineering:

AES1720-11	Rock Mechanics Application	5

for Environmental-engineering:

MS43997	Recycling Engineering Materials	3
AESM4151-2	Additional Assignment for Geo-Resource Engineers (for MS43997)	2

2nd semester: Helsinki

code	subject	ECs
CHEM-E6145	Unit Operations in Mineral Processing and Recycling	5
CHEM-E6155	Minerals Engineering Project Work	5
CHEM-E6125	Environmental Management in Industry	5
CHEM-E6135	Planning Exercise in Sustainable Metals Processing	5
CHEM-E6200	Materials processing and synthesis	10

Second year
3rd and 4st semester:

code	subject	ECs
Choose core subjects in consultation with the graduation coordinator from one field:		
Material Science or *Resources and Recycling*		10
Master of Science electives		5
AESM2023	Thesis Proposal	5
AESM2025	Final Thesis	40

Paragraph 2 – Annotations and Honours Programme

Article 8 – Technology in Sustainable Development

1. The examination programme for students who have opted for the annotation known as Technology in Sustainable Development must at least include the following:
   a. A sustainable development colloquium totalling 5 credits: WM0939TU, Engineering for Sustainable Development,
   b. Subjects within or outside the realm of the programme adding up to a total of at least 10 credits to be selected from the two clusters:
      - Design, Analysis and Tools
      - Organisation and Society.
      At least 3 credits should derive from each of the clusters.
      Further information on the subjects to be selected and on the clusters is available from the programme coordinator, in the study guide and from the website of Delft University of Technology.
   c. The Final Thesis must partly focus on the topic of sustainable development. The referent will test the hypothesis of the Final Thesis and the way in which it has been tackled against the extent to which sustainable development issues have been integrated into the project.

1. Students who complete the annotation successfully, receive an annotation Technology in Sustainable Development with their degree certificate.

Article 9 – Entrepreneurship

1. The examination programme for students who have opted for the annotation Entrepreneurship must at least include the following:
   a. Electives related to entrepreneurship adding up to a total of 15 credits, 10 of which are extracurricular,
   b. The Final Thesis must partly focusing on the topic of entrepreneurship.

2. The examination programme for the Entrepreneurship annotation needs the prior approval by the Programme director and a coordinator of Delft Centre for Entrepreneurship.

3. Students who complete the annotation successfully, receive an annotation Entrepreneurship with their degree certificate.

Article 10 – Honours Programme Master

1. Motivated students who have finished their Bachelor's degree course with a weighed averaged mark of 7.5 or higher, and students who have excelled during the first semester (no fails and a weighted average of 7.5 or higher) are eligible for a special individual programme of 20 credits on top of the Master's degree course: the Honours Programme Master.

2. The content of the Honours Programme Master should be thematically consistent. The subject UD2010, Critical Reflection on Technology, 5 credits, is compulsory for the Honours Programme Master.

3. Students who fulfil, or will fulfil, the requirements laid down in subsection 1, and are interested in the Honours Programme Master can send their application to the programme coordinator together with an essay in English, containing their motivation and a proposal for the programme. The programme has to be approved by a scientific staff member and the programme coordinator.

4. The Honours Programme Master has to be completed during the course of the student's Master's programme. None of the results may be lower than 6,0.

5. The various parts of the programme will be assessed by the respective examiner(s). The fulfilment of all criteria to the Honours Programme Master will be assessed by the board of examiners.

6. Students who have successfully completed the Honours Programme Master will receive a special certificate from the university with their degree certificate.

Paragraph 3 – Bridging programme

Article 11 – Transitional programme for students with a Dutch higher vocational institute Bachelor degree

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	Geology 1: Basics		5
AESB1230	Geology 2: North West Europe		5
AESB1420-15	Mechanics 2		5
AESB2320	Physical Transport Phenomina		5
AESB2330	Soil Mechanics	*(only for Geo-Engineering)*	5
AESB2440	Geostatistics and Remote Sensing		5
AESB3340	Mechanics and Transport by flow in porous Media		5
WI1708TH1	Analysis 1		3
WI1708TH2	Analysis 2		3
WI1708TH3	Analysis 3		3
WI1808TH1	Linear Algebra (part 1)		3
WI1909TH	Differential Equations		3
CTB2400	Numerical Methods for Differential Equations		3

Paragraph 4 – Deviate from examination programme

Article 12 – 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 preliminary approval referred to in subsection 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 13 – 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 otherwise indicated in the study guide.

Article 14 – 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 15 – The frequencies, times and sequences of the exams

1. Written or oral examinations are to be completed in principal at the end of the teaching period in which the subject was taught.

2. The resit periods for any of the written exams referred to in subsection 1 are at the end of the next teaching period. For subjects taught in the fourth teaching period the resit period is in August.

3. Practicals and/or exercises may be completed in the way laid down in the relevant timetables.

Paragraph 6 – Access to Field Development Project, Geoscience and Engineering Fieldwork and Final Thesis

Article 16 – Access to Field Development Project

Students may not embark on the Field Development Project (AES2009) until they have completed the following subjects:
AES1300, Properties of Hydrocarbons
AES1310 or AES 1310-10, Rock Fluid Interaction 1
AES1320, Rock Fluid Interaction 2
AES1340, Applied Reservoir Engineering and Simulation 1
AES1510, Geologic Interpretation of Seismic Data
AES1520, Log Evaluation
AES1820 or AES1820-09, Reservoir Characterisation and Development
AES1870, Sequence Stratigraphy, or AES1890, Sedimentary Systems
AES1920, Geostatistics.

Additionally, students with the specialisation Petroleum Engineering are advised to have completed the subjects:
AES1330, Drilling and Production
AES1360, Production Optimisation.

Article 17 – Access to Geoscience and Engineering Fieldwork

Students may not embark on the Geoscience and Engineering Fieldwork (AESM2901) until they have completed the subjects Engineering Geology (AES1630) and Site Characterisation and Testing (CIE5320).

Article 18 – Access to Final Thesis

1. Students may embark on the Final Thesis only when they have no more than 15 credits of uncompleted subjects of the Master's degree course from all their other subjects of the course.

2. In addition to subsection 1, students Geo-Resource engineering must also have completed the course Thesis proposal (AESM2023).

3. Students are only allowed to present their Final Thesis if they have successfully completed all other obligations.

Paragraph 7 – Extracurricular Certificate

Article 19A – Certificate

1. Students can receive a certificate for organising the Delft University Fund supported excursion focused on the Master Choice together with the student association for AES students (*Mijnbouwkundige Vereeniging*). This certificate is worth 1 credit.

2. A student who wants to obtain this certificate must submit a request to the Director of Studies.

Article 19B – Administrating the credit

1. Students are allowed to take this certificate as an extracurricular subject on their diploma supplement, and not as a part of the examination programme stipulated in this annex.

2. Students who want to obtain the credit on their diploma must send the approval of the Director of Studies (see art. 12) to the Secretary to the Board of Examiners.

Paragraph 8 – Transition Rulings

Article 20 – Transition Ruling

Students who started the Master's degree course before September 1, 2008 and who have a delay in their study progress, have to request the coordinator of the track programme to define a contract in which is stated which new subjects replace former subjects. The contract needs the approval of the Board of Examiners.

Article 21 – Transition Ruling

1. In principle, students who have already received a passing mark in one or more of their Master's degree programme subjects of the track European Geotechnical and Environmental Course (EGEC) before September 1 2016 must complete the degree programme of the track in accordance with the study programme applicable for the academic year in which they began the degree programme (the old programme).

2. The first year of the EGEC-track (1th and 2nd semester) will be no longer offered starting September 1, 2016. Students who did not pass all the exams at the university of Miskolc of Wroclaw can request the Board of Examiners to replace the not obtained subjects with as closely as possible similar MSc level subjects from the TU Delft. Students to whom this applies should mention this as soon as possible to the graduating coordinator.

3. The second year of the EGEC-track (3th and 4th semester) will be offered for the last time in the academic year 2016-2017 conform the annex 2015-2016.

   If the student did not receive a passing mark before September 1, 2017 for the subject:

- D-IP, Integrated Project (15 EC)	this project is based on group work which is based on a minimum number of students. If the student does not pass this course, a special program will be made consisting of courses from the MSc track Environmental Engineering and a 5EC individual project to be decided with the course coordinator and discussed with the Board of Examiners.
- D-SR-14, Material Models for Soil and Rocks (6 EC)	follow CIE4361, the same subject with a different code
- D-RMA, Rock Mechanics Applications (5 EC)	follow AES1720-11, the same subject with a different code
- D-EG-14, Environmental Geotechnics (4 EC)	follow AES1640-11, the same subject with a different code

4. The study programme must in any case encompass at least 120 credits. Any inconsistencies in credits arising as a result of the transitional measures will be compensated for with free Master of Science electives.

5. In the event that this is not possible to complete the degree programme or that finishing the degree programme causes study delay, the student – after consultation with the graduation coordinator – can request the Board of Examiners to convert the degree programme into a self-composed study programme.

Article 22 – 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.