

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:

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| 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: <ul style="list-style-type: none"> • 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 |

- s. programme:
 - participating in other educational activities that are considered essential and that are aimed at enabling participants to attain certain skills;
 - 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; FSCI 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 I 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
CIVIL ENGINEERING**

DELFT UNIVERSITY OF TECHNOLOGY

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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 Civil Engineering.

Teaching and Education Regulations MSc Article 7 Subsection 3:

"It is not permitted for any subject in the study programme to have been part of the Bachelor's degree programme on the basis of which the student was admitted to the degree programme. If a compulsory subject was already completed in the aforementioned Bachelor's degree programme, the Board of Examiners will designate an alternative subject in its place. If an elective subject in the study programme was already completed in the aforementioned Bachelor's degree programme, the student will choose an alternative elective subject."

Article 2 – Tracks, specialisations and annotations

1. The course comprises the following tracks:
 - Building Engineering
 - Environmental Engineering
 - Geo-engineering
 - Geoscience and Remote Sensing
 - Hydraulic Engineering
 - Structural Engineering
 - Transport & Planning
 - Water Management
 - the Erasmus Mundus programme: Coastal and Marine Engineering and Management
2. Within a track or within a specialisation the student may opt for the following annotations mentioned in Articles 13A – 13G:
 - Technology in Sustainable Development
 - Entrepreneurship
 - Urban Planning and Engineering ("Stadsingenieur")
 - ~~Cancelled: Infrastructure Planning and Environmental Engineering ("Infrastructuur en milieu")~~
 - Integral Design and Management
 - Railway Systems
 - Dynamics of Structures
3. The Erasmus Mundus MSc programme Coastal and Marine Engineering and Management is subject to the programme-specific "Implementations Regulations for the MSc Degree CoMEM". These regulations replace the present Annex for the MSc degree in Civil Engineering in the case of CoMEM only.
4. Within a track the student has to complete the common compulsory block. Furthermore the student can choose for one of the specialisations as mentioned in Articles 5 to 12 or for a free specialisation. The student makes sure he will ask for approval in time as is stipulated in Article 4 Subsection 1.
5. **A student can choose to study a double track (two tracks) within one MSc-programme. Both tracks will be mentioned on the diploma (supplement).**
The composition of the programme with a double track should at least fulfil the following requirements:
 - 4 credits in an Ethics related subject as described in article 3A;
 - Meet all track and specialisation -linked compulsory subjects for track 1;
 - Meet all track and specialisation -linked compulsory subjects for track 2;
 - 20 credits in elective subjects as described in article 3C;
 - A MSc thesis subject which relates to both tracks. From both tracks a member is added to the graduation committee. The programme for a double track should be consulted with and approved by the MSc coordinator of each track.

Please note: A double degree (two diplomas, two programmes) is something different than a double track (one diploma, two tracks within one programme). Information on the double degree can be found on:

<https://www.tudelft.nl/studenten/faculteiten/ewi-studentenportal/onderwijs/individual-double-masters-degree/>

The total composition of credits for a double track depends upon the chosen combination.

Article 3 – The composition

1. The study programme tracks are compiled in the following way:

- a. 4 credits: the subject Philosophy, Technology Assessment and Ethics for CT (WM0312CIE) or the subject Climate Change: Science & Ethics (CIE4510). CIE4510 is obligated for Geoscience and Remote Sensing or Environmental Engineering students.
- b. 56 credits: track-linked subjects belonging to the chosen track. The track-linked subjects may be subdivided into those that are general track-linked subjects (the common compulsory block) and those that belong to a specialisation as stipulated in Articles 5 to 12 or a free specialisation. Track-linked credits, exceeding 56 credits, will be considered as credits achieved for electives mentioned under c.
- c. 20 credits as follows:

part 1: 10 credits

- all subjects from the Civil Engineering MSc programme which may include only one of the following subjects:
 - CIE5050-09 Additional Graduation Work, Research project
 - CIE4040-09 Internship
 - CIE4061-09 Multidisciplinary project, Civil Engineering Consultancy project

part 2: 10 credits electives from:

- other subjects from the Civil Engineering MSc programme with the exception of the three mentioned subjects above under part 1,
- all subjects offered in conjunction with other MSc degree courses at a Dutch University or at an international university with an exchange contract with TUD
- the specialisation subjects included in the table 'Track linked BSc electives' ('keuzelijst specialisatievakken') as intended in Article 3 of the annex for the Bachelor's degree course in Civil Engineering at Delft University of Technology, as far as they are considered to be convergence subjects (CIE course codes, see list at end of annex),
- 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, skills subjects and MOOCs can only be part of the extracurricular paragraph of the diploma supplement,¹
- deficiency subjects referred to in article 3, section 5.

Any deviations to this composition requires the approval of the Board of Examiners on forehand. For this a motivated request is needed.

Note :

- i) The Additional Graduation Work (10 EC, CIE5050-09) may or may not be related to the Master Thesis Project mentioned under d but it must, in any case, be separately distinguished. It is not permitted to start with the Additional Master Thesis until the student has obtained 45 EC of his MSc examination programme.
 - j) (Building Engineering) Students who take "AR0026: MEGA" in part 2 are not allowed to combine this with "CIE4061-09: Multidisciplinary Project, Civil Engineering Consultancy project".
 - k) If applicable also subjects from annotations can be selected.
- d. 40 credits: a track-linked Master Thesis Project (CIE5060-09). The Master Thesis Project consists of a final project, a thesis, a summary of the thesis and a final presentation. The project is subject to a strict planning and time table; specific dates and deadlines need to be set for the evaluation(s) and the final presentation of the project. The planning will be monitored by the graduation coordinator.

In article 21, as well as in the Rules and Guidelines laid down by the board of examiners, further stipulations have been laid down in relation to the Internship, the Multidisciplinary Project, Civil Engineering Consultancy project, the Additional Graduation Work and the Master Thesis Project.

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

Article 4 – Registering the tracks and compiling the examination programme

1. At the beginning of his/her study the student must register himself/herself with Studielink as a prospective graduate of the track of his/her choice. After that the student notifies the MSc-track coordinator with the specialisation he/she has chosen. As soon as possible, but no later than after twelve months after the beginning, the track-linked subjects of his/her examination programme need to be chosen. If necessary, this can be done in consultation with the MSc-track coordinator who needs to approve the program. In case of a free specialisation the specialisation will preferably also be approved, in addition to the MSc track coordinator, by an academic staff member from the faculty of Civil Engineering and Geosciences from this specialisation.
2. In accordance with what is determined in section 1, but in any case before the Master Thesis Project or the Additional Graduation Work is started on, the student must draw up his/her entire examination programme. If the programme satisfies the rules as laid down in these annex, then it needs to be presented – together with the assessment committee's composition – to the MSc-track coordinator for approval. If the programme does not satisfy the rules as laid down in these annex, then it also needs to be presented – together with the assessment committee's composition – to the Board of Examiners for approval, 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 these annex also to the Board of Examiners for final approval with a motivation for the deviation from these Regulations.
4. Students who opt for an annotation mentioned in Articles 13A – 13G must also have the discussion mentioned in Subsection 1 with the referent, coordinator or programme director for the chosen annotation. Also, students who opt for an annotation needs the prior approval by the coordinator (or referent/programme director) of the annotation and also the approval of the MSc-track coordinator and/or the Board of Examiners according to Paragraph 2 and 3 of this article².

Article 5 – The Structural Engineering track

1. The Structural Engineering track has six specialisations:
 - Structural Mechanics
 - Concrete Structures
 - Steel and Timber Construction
 - Materials and Environment
 - Road and Railway Engineering
 - Hydraulic Structures

The compulsory programme for each specialisation consists of a common Structural Engineering block of 32 credits and an additional block of 24 credits.

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

- Students with a relevant foreign Bachelor of Science degree will, if required by intake, do CIE4145-09 (Dynamics and Introduction to Continuum Mechanics) as a compulsory elective subject.
- Students who have not done CT3150 or CTB3335 (Concrete Structures 2) in the Bachelor's phase will have to do CIE3150 as a compulsory elective subject.
- Students who have not done CT3109-09 or CTB3330 (Structural Mechanics 4) in the Bachelor's phase are strongly advised to take CIE3109-09 as an elective subject.

2. Common compulsory block Structural Engineering

All students opting for the track Structural Engineering must complete the following subjects adding up to 32 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4100	Materials and Ecological Engineering	4
CIE4110	Timber and Timber Structures 1	4

² It is necessary to also have the consent of an academic staff member of the faculty CEG from the specialisation.

CIE4115	Steel Structures 2	4
CIE4121	Steel Structures 3	4
CIE4140	Structural Dynamics	4
CIE4160	Prestressed Concrete	4
CIE4180	Plates and Slabs	4
CIE4190	Analysis of Slender Structures	4

3. Additional block Structural Mechanics

Students who have opted for the specialisation Structural Mechanics must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4130	Probabilistic Design and Risk Management	4
CIE4143	Shell Analysis, Theory and Application	4
CIE4150	Plastic Analysis of Structures	4
CIE5123	Introduction to the Finite Element Method	4
CIE5145	Random Vibrations	4
CIE5148	Computational Modelling of Structures	4

4. Additional block Concrete Structures

Students who have opted for the specialisation Concrete Structures must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE4281	Building Structures 2	4
CIE5110	Concrete – Science and Technology	4
CIE5127	Concrete Bridges	4
CIE5130	Capita Selecta Concrete Structures	4
CIE5148	Computational Modelling of Structures	4

5. Additional block Steel and Timber Construction

Students who have opted for the specialisation Steel and Timber Construction must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4125	Structural Design - Case Study Steel, Timber or FRP	3
CIE5122	Capita Selecta Steel and Aluminium Structures	4
CIE5124	Timber and Timber Structures 2	4
CIE5125	Steel Bridges	4
CIE5126	Fatigue	3
CIE5128	Fibre-Reinforced Polymer (FRP) Structures	3
CIE5131	Fire Safety Design	3

6. Additional block Materials and Environment

Students who have opted for the specialisation Materials and Environment must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4030	Methodology for Scientific Research	3
CIE5100	Repair and Maintenance of Construction Materials	4
CIE5102	Forensic Building Materials Engineering	3
CIE5110	Concrete – Science and Technology	4
CIE5126	Fatigue	3
CIE5130	Capita Selecta Concrete Structures	4
CIE5146	Micromechanics and Computational Modelling of Building Materials	3

7. Additional block Road and Railway Engineering

Students who have opted for the specialisation Road and Railway Engineering must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4860	Structural Pavement Design	6
CIE4870	Structural Design of Railway Track	4
CIE4880	Road Paving Materials, Laboratory Experiment included	7
CIE5850	Road Construction	3
CIE5871	Capita Selecta Railway and Road Structures	4

8. Additional block Hydraulic Structures

Students who have opted for the specialisation Hydraulic Structures must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3310-09 ³	Open Channel Flow	4
CIE3330 ⁴	Hydraulic Structures 1	4
CIE4130	Probabilistic Design and Risk Management	4
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE4310	Bed, Bank and Shore Protection	4
CIE4345 ⁵	River Dynamics 1	4

9. Structural Engineering electives

All subjects listed above can be chosen as electives. In addition the following subjects are also available:

Of particular interest for Structural Mechanics students:

CIE4353	Continuum Mechanics	6
CIE5142	Computational Methods in Non-linear Solid Mechanics	3
CIE5144	Stability of Structures	3

Of particular interest for Hydraulic Structures students:

³ Not if CT3310-09 has been completed in the Bachelor's phase

⁴ Not if CT3330 has been completed in the Bachelor's phase

⁵ Not if CT3340 or CIE4345MI has been completed in the Bachelor's phase

CIE4305	Coastal Dynamics 1	6
CIE4325	Ocean Waves	6
CIE5304	Waterpower Engineering	3
CIE5310	Probabilistic Design in Hydraulic Engineering	3
CIE5313-18	Hydraulic Structures 2	4
CIE5314	Flood Defences	3

For foreign students only:

CIE4145-09	Dynamics and Introduction to Continuum Mechanics	4
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Of interest to all Structural Engineering students

CIE4381	Engineering Asset Management	4
CIE4481	Systems Engineering Management	4
CIE4120	Information Systems for the Construction Industry	4

Article 6 – The Building Engineering track

- The Building Engineering track has two specialisations:
 - Building Technology and Physics
 - Structural Design

The compulsory programme for each specialisation consists of a common Building Engineering block of 20 credits and an additional block of 36 credits.

- Common compulsory block Building Engineering

All students opting for the track Building Engineering must complete the following subjects adding up to 20 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4202	Architectural History of Buildings	4
CIE4220	Introduction to Building Physics and Façades	6
CIE4240	Forensic Structural Engineering	3
CIE5981	Forms of Collaboration in Civil Engineering	4
CIE4210	Parametric Design	3

- Additional block Building Technology and Physics

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4225	Advanced & Applied Building Physics	6
CIE5100	Repair and Maintenance of Construction Materials	4
CIE5131	Fire Safety Design	3
AR0115	Technoledge Façade Design	6
AR0531	Innovation and Sustainability (theory)	6
Extra electives, as mentioned in Article 3 Subsection 1c		11

4. Additional block Structural Design

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3109-09 ⁶	Structural Mechanics 4	4
CIE3150 ⁷	Concrete Structures 2	4
CIE4115	Steel Structures 2	4
CIE4190	Analysis of Slender Structures	4
CIE4281	Building Structures 2	4
CIE5251-09	Structural Design, Special Structures	5
CIE4110	Timber and Timber Structures 1	4
CIE4282-18	Structural Glass	4
Extra electives, from the list below		6 or 7

If one or both of the above-mentioned subjects CIE3109-09 and CIE3150 has been done in the Bachelor's phase, the student may choose from:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4120	Information Systems for the Construction Industry	4
CIE4121	Steel Structures 3	4
CIE4125	Structural Design - Case Study Steel, Timber or FRP	3
CIE4140	Structural Dynamics	4
CIE4160	Prestressed Concrete	4
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE4362	Soil Structure Interaction	3
CIE4363	Deep Excavations	4
CIE5124	Timber and Timber Structures 2	4
CIE5125	Steel Bridges	4
CIE5127	Concrete Bridges	4
CIE5131	Fire Safety Design	3
CIE5148	Computational Modelling of Structures	4
CIE5260	Structural Response to Earthquakes	4

If a student opts for another technical MSc course as a substitute for one of the courses in the additional block of courses for the specialisation, approval from the master coordinator is mandatory before taking the course. See also art 4.1 for "free specialisation".

Article 7 – The Hydraulic Engineering track

1. The Hydraulic Engineering track has seven specialisations:

- Coastal Engineering
- River Engineering
- Dredging Engineering
- Ports and Waterways
- Environmental Fluid Mechanics
- Hydraulic Structures
- Flood Risk

The compulsory programme for each specialisation consists of a common Hydraulic Engineering block of 24 credits an additional specialisation block and Hydraulic Engineering electives. Together these add up to a total of 56 track-linked credits.

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

⁶ Not if CT3109-09 has been completed in the Bachelor's phase

⁷ Not if CT3150 has been completed in the Bachelor's phase

- Students who have not completed Open Channel Flow (CTB3350) in the Bachelor's phase will have to complete CIE3310-09 as a compulsory elective subject. Students with a relevant foreign Bachelor of Science degree will have to complete CIE3310-09 as a compulsory elective subject, if required by intake.
- Students who have not completed Hydraulic Structures 1 (CTB3355) in the Bachelor's phase will have to complete CIE3330 as a compulsory elective subject. Students with a relevant foreign Bachelor of Science degree will have to complete CIE3330 as a compulsory elective subject, if required by intake.
- Students with a relevant foreign Bachelor of Science degree who opt for the specialisation Hydraulic Structures, will, if required by intake, do Dynamics and Introduction to Continuum Mechanics (CIE4145-09) as a compulsory elective subject.

2. Common compulsory block of Hydraulic Engineering track

All students opting for the track Hydraulic Engineering must complete the following subjects adding up to 24 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4130	Probabilistic Design and Risk Management	4
CIE4305	Coastal Dynamics 1	6
CIE4310	Bed, Bank and Shore Protection	4
CIE4325	Ocean waves	6
CIE4345	River Dynamics 1	4

3. Additional block of specialisation Coastal Engineering

Students who have opted for the specialisation Coastal Engineering must complete the following subjects adding up to 17 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4309	Coastal Dynamics 2	5
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE5308	Breakwaters and Closure Dams	4

4. Additional block of specialisation River Engineering

Students who have opted for the specialisation River Engineering must complete the following subjects adding up to 19 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE5300	Dredging Technology	4
CIE5311	River Dynamics 2	4
CIE5315	Computational Hydraulics	3

5. Additional block of specialisation Dredging Engineering

Students who have opted for the specialisation Dredging Engineering must complete the following subjects adding up to 19 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4330	Ports and Waterways 1	4
CIE5300	Dredging Technology	4
CIE5311	River Dynamics 2	4
OE44035	Dredging Pumps and Slurry Transport	3
OE44040	Dredging Processes I	4

6. Additional block of specialisation Ports and Waterways

Students who have opted for the specialisation Ports & Waterways must complete the following subjects adding up to 20 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE5300	Dredging Technology	4
CIE5306	Ports and Waterways 2	4
CIE5311	River Dynamics 2	4

7. Additional block of specialisation Environmental Fluid Mechanics

Students who have opted for the specialisation Environmental Fluid Mechanics must complete the following subjects adding up to 16 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4340	Computational Modelling of Flow and Transport	4
CIE5302	Stratified Flows	3
CIE5312	Turbulence in Hydraulics	3
CIE5315	Computational Hydraulics	3
CIE5317	Physical Oceanography	3

8. Additional block of specialisation Hydraulic Structures

Students who have opted for the specialisation Hydraulic Structures must complete the following subjects adding up to 24 credits

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3109-09 ⁸	Structural Mechanics 4	4
CIE3150 ⁹	Concrete Structures 2	4
CIE4140	Structural Dynamics	4
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE5260	Structural Response to Earthquakes	4
CIE5313-18	Hydraulic Structures 2	4

9. Additional block of specialisation Flood Risk

Students who have opted for the specialisation Flood Risk must complete the following subjects adding up to 10 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4420 ¹⁰	Principles of Geohydrology	4
CIE5310	Probabilistic Design in Hydraulic Engineering	3
CIE5314	Flood Defences	3

Students who have opted for the specialisation Flood Risk must additionally complete at least 10 EC chosen from the following subjects:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4140	Structural Dynamics	4
CIE4160	Polders & Flood control	4
CIE4308	Sediment Dynamics	3
CIE4330	Ports and Waterways 1	4
CIE4367-16	Design of Embankments	4
CIE4390	Geo Risk Management	3
CIE4395	Risk and variability in Geo-Engineering	4
CIE5308	Breakwaters and Closure Dams	4
CIE5311	River Dynamics 2	4

⁸ Not if CTB3330 has been completed in the Bachelor's phase.

⁹ Not if CTB3335 has been completed in the Bachelor's phase.

¹⁰ Not for students who pass CTB3390 or an equivalent course.

CIE5313 -18	Hydraulic Structures 2	4
CIE5401	Geographical Information Systems (GIS) and remote sensing	3
WI4052	Risk Analysis	6

10. Hydraulic Engineering electives

Apart from what is stipulated in Subsections 1 to 9, Hydraulic Engineering students should make sure they complete - depending on their specialisation - a total of 56 track-linked credits by choosing from the above listed subjects or from the list below:

<u>code</u>	<u>subject</u>	<u>EC</u>
CIE4120	Information Systems for the Construction Industry	4
CIE4145-09 ¹¹	Dynamics and Introduction to Continuum Mechanics	4
CIE4160	Prestressed Concrete	4
CIE4180	Plates and Slabs	4
CIE4190	Analysis of Slender Structures	4
CIE4301	Building with Nature in Hydraulic Engineering	5
CIE4361	Behaviour of Soils and Rocks	6
CIE4362	Soil-Structure Interaction	3
CIE4363	Deep Excavations	4
CIE4367-16	Design of Embankments	3
CIE4400	Environmental Modelling	4
CIE4381	Engineering Asset Management	4
CIE4481	System Engineering Management ⁴	
CIE4760	Assessment of Transport Infrastructure and Systems	6
CIE5304	Waterpower Engineering	3
CIE5305	Bored and Immersed Tunnels	4
CIE5318	Fieldwork Hydraulic Engineering	4
CIE5450	Hydrology of Catchments, Rivers and Deltas	4
CIE5580	Ecology and Morphodynamics in Catchments	5
OE44030	Offshore Geotechnical Engineering	4
OE44055	Load Identification and Monitoring of Structures	4
OE44115	Arctic Engineering	4

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 8 – The Water Management track

1. The Water Management track has three specialisations:

- Hydrology
- Water Resources Engineering
- Urban Water Engineering

Several of the on Campus courses can be followed on distance, ending with exams together with Campus students.

The programme consists of a common compulsory Water Management block of 16 credits, and 40 credits Water Management specialisation electives.

2. Common compulsory block Water Management

All students opting for the track Water Management must complete the following subjects adding up to 16 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4440	Hydrological Processes and Measurements	4
CIE4450	Integrated Water Management	4

¹¹ For foreign students only

CIE4491	Urban Drainage and Water Management	4
CIE4495-13	Fundamentals of Water Treatment	4

3. Water management specialisation courses

Depending on their specialisation and in consultation with the chair of the assessment committee, Water Management students are required to complete a selection of the following electives adding up to 40 credits from the following six categories. The course CIE5431 is obligatory for students who choose the hydrology or the water resources engineering specialisation and have started their MSc in September 2017 or later. Electives from the categories b to e can only be included in this selection upon approval from the graduation coordinator.

Category a:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3365-1612	Introduction to Water Treatment	4
CIE3410-0913	Water System Analysis	4
CIE4400	Environmental Modelling	4
CIE4410	Water Systems, People and Society	4
CIE4415	Design of Water Treatment Plants	5
CIE4420 ¹⁴	Principles of Geohydrology	4
CIE4431	Hydrological Modelling	4
CIE4460	Polders and Flood Control	4
CIE4486	Industry Water	4
CIE4703	Water Treatment	6
CIE5401	GIS & Remote Sensing	3
CIE5421	Water and Health	4
CIE5440	Groundwater modelling	4
CIE5450	Hydrology of Catchments, Rivers and Deltas	4
CIE5471	Hydrological and Ecological Fieldwork in River Systems	4
CIE5490	Operational Water Management	4
CIE5500	Water Law and Organisation	3
CIE5510	Water Management in Urban Areas	4
CIE5541	Urban Drainage Monitoring and Modelling	3
CIE5550	Pumping Stations and Transport Pipelines	4
CIE5560	Engineering and Development	4
CIE5580	Ecology and Morphodynamics in Catchments	5
CIE5704	Water Treatment Research	5
CIE5431	Research Skills 1	3
CIE5432	Research Skills 2	3

Category b:

The Hydraulic Engineering subjects mentioned in Article 7 Subsections 2 to 8.

Category c:

The Geoscience and Remote Sensing subjects mentioned in Article 11.

Category d:

The Environmental Engineering subjects mentioned in Article 12

Category e:

The following subjects offered in the Faculty of Architecture:

<u>code</u>	<u>subject</u>	<u>ECs</u>
BK7250	Sustainable Urbanism	3

¹² Not if an equivalent subject has been completed in the Bachelor's phase

¹³ Not if an equivalent subject has been completed in the Bachelor's phase

¹⁴ Not for students who passed CTB3390 or an equivalent course.

4. Hydraulic Engineering and Water Resources Management (the TUD-NUS WM programme):

The Hydraulic Engineering and Water Resources Management programme will be discontinued and can only be followed by students who started their MSc in 2016-17 or before. It holds a mixture of subjects of Delft University of Technology (TUD) and the National University of Singapore (NUS).

The TUD-NUS WM programme consists of a common compulsory block of 48 credits and electives adding up to a total of 24 credits.

Common compulsory block TUD-NUS programme

All students opting for the TUD-NUS programme Water Management must complete the following subjects adding up to 48 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4440	Hydrological processes and measurements	4
CIE4450	Integrated Water Management	4
CIE4491	Urban drainage and Watermanagement	4
CIE4495-13	Fundamentals of Water Treatment	4

and choose four out of:

CE5307NUS	Wave Hydrodynamics and Physical Oceanography	6
CE5308NUS	Coastal Engineering and Sediment Transport	6
CE5310NUS	Hydroinformatics	6
CE5311NUS	Environmental Modelling with Computers	6
CE5312NUS	River Mechanics	6

and choose 2 subjects with a total of at least 8 credits from the Subsection Water Management subjects listed above in section 3.

TUD-NUS WM programme electives

TUD-NUS WM programme students select for 24 credits from the subjects listed under Subsection 3, categories a to f. These specialisation electives are chosen in consultation with the chairperson of the assessment committee.

Article 9 – The Transport and Planning track (new)

The Transport and Planning track has three specialisations:

- Transport Networks
- Road Traffic Systems
- Public Transport and Railway Systems

The compulsory programme for each specialisation consists of a common Transport & Planning block of 32 credits, an additional block of 16 credits, and an additional block of electives (8 credits minimum).

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

- Students who have not done CTB3370 or CTB3370-18 (Geometric Design of Roads and Railways) in the Bachelor's phase will have to take CIE3370-18 as a compulsory elective subject.

Common compulsory block Transport and Planning

All students opting for the track Transport and Planning must complete the following subjects adding up to 32 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4801-18	Transport Modelling	6
CIE4811-18	Planning and Operations of Public Transport Systems	6
CIE4825	Traffic Flow Modelling and Control Part 1	6
CIE4831-18	Empirical Analysis for Transport & Planning	6
CIE4835	Transport Engineering and Optimisation	4
CIE4845	Emerging Topics for Transport & Planning	4

Additional block Transport Networks

Students who have opted for the specialisation Transport Networks must complete the following subjects adding up to 16 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE5802-18	Advanced Transport Modelling	4
CIE5815	Resilient Transport Systems	4
CIE5816	Urban Regions, Transport and Economics	4
CIE5817	Assessment of Transport Infrastructure and Systems	4

Additional block Road Traffic Systems

Students who have opted for the specialisation Road Traffic Systems must complete the following subjects adding up to 16 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE5805-18	Intelligent Vehicles for Safe and Efficient Traffic: Design and Assessment	4
CIE5810-18	Traffic Safety	4
CIE5821	Traffic Flow Modelling and Control Part 2	4
CIE5822	Active Modes	4

Additional block Public Transport and Railway Systems

Students who have opted for the specialisation Public Transport and Railway Systems must complete the following subjects adding up to 16 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE5802-18	Advanced Transport Modelling	4
CIE5803-18	Railway Traffic Management	4
CIE5825	Advanced Public Transport Operations and Modelling	4
CIE5826	Railway Operations and Control	4

Transport and Planning electives

Choose two out of the above listed subjects for the additional blocks plus the following list adding up to 8 credits or more:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE5830	Freight Transport Systems: Analysis and Modelling	5
TPM004a	Transport Safety (former CIE5811)	4
CIE4330	Ports and Waterways 1	4
CIE4874	Elements of Railway Engineering	4
CIE5875	Railway Asset Management	4
AE4423	Airline Planning and Optimization	4
AE4446	Airport Operations	4
ME41105	Intelligent Vehicles	4
ME44305	Delft Systems and Simulation	5
SC42015	Control Theory	6
SEN1221	Statistical Analysis of Choice Behaviour	5
SEN1721	Travel Behaviour Research	5
IN4170	Databases and Data Mining (Leiden)	6
WI4062TU	Transport, Routing and Scheduling	3

Transition programme

Students who switch from the 2017-2018 programme to the new 2018-2019 programme can use the following list of equivalencies:

<u>New code</u>	<u>Subject</u>	<u>Former code</u>
CIE4801-18	Transport Modelling	CIE4801
CIE4811-18	Planning and Operations of Public Transport Systems	CIE4811-09
CIE4825	Traffic Flow Modelling and Control Part 1	See below*
CIE4831-18	Empirical Analysis for Transport & Planning	CIE4831-09
CIE4835	Transport Engineering and Optimisation	Not relevant
CIE4845	Emerging topic for Transport & Planning	Not relevant
CIE5802-18	Advanced Transport Modelling	CIE5802-09
CIE5803-18	Railway Traffic Management	CIE5803-09
CIE5805-18	Intelligent Vehicles for Safe and Efficient Traffic: Design and Assessment	CIE5805
CIE5810-18	Traffic Safety	CIE5810-09
CIE5815	Resilient Transport Networks	Not relevant
CIE5816	Urban Regions, Transport, and Economics	See below***
CIE5817	Assessment of Transport Infrastructure and Systems	CIE4760**

CIE5821	Traffic Flow Modelling and Control Part 2	See below*
CIE5822	Active Modes	Not relevant
CIE5825	Advanced Public Transport Operations and Modelling	Not relevant
CIE5826	Railway Operations and Control	CIE4872
CIE5830	Freight Transportation Systems: Analysis and Modelling	CIE4840****
TPM004a	Transport Safety	CIE5811

* The courses Traffic Flow Modelling and Control Part 1 (CIE4825) and Part 2 (CIE5821) are equivalent to the combination of CIE4821-09 and CIE5804-09 or CIE4821-09 and CIE4822-09. The second option leads to 2 credits extra.

** CIE4760 is 6EC while CIE5817 is 4 EC. This thus leads to 2 credits extra.

*** The course Urban Regions, Transport and Economics (CIE5816) is equivalent to either CIE5730 or CIE5750.

**** The course CIE4840 is 4EC while CIE5830 is 5EC. This is thus 1 credit short.

Former Transport and Planning programme courses (Exam only/contact responsible lecturer in 2018-2019)

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4760	Assessment of Transport Infrastructure and Systems	6
CIE4821-09	Traffic Flow Theory and Simulation	6
CIE4822-09	Traffic Management and Control	6
CIE4840	Freight Transportation Systems: Analysis and Modelling	4
CIE5730	Freight Transport Geography and Economics	4
CIE5750	Land Use and Transport Interactions in Cities: Empirical Analysis and Modelling	4
CIE5804-09	Innovations in Dynamic Traffic Management	4
CIE5811	Transport safety	4

Article 10 – The Geo-Engineering track

The Geo-Engineering track has one specialisation:

- Geo-Engineering

Common compulsory block Geo-Engineering

All students opting for the track Geo-Engineering must complete the following subjects adding up to 34 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
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
AES1630	Engineering Geology	4
AESM1700	Consolidation of Soils	3

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:

<u>code</u>	<u>subject</u>	<u>ECs</u>
AES1730	Introduction to Geotechnical Engineering <i>for students without soil mechanics and geotechnical engineering background</i>	3
CIE4420	Principles of Geohydrology <i>for students who did not pass CTB3390 or AESB3340</i>	4
AESM4370	Introduction to Geology <i>for students with a civil engineering background</i>	1
CIE4370	Introduction to Structural Mechanics <i>for students with an applied earth science background</i>	1

Additional block Geo-Engineering

Students are required to complete a selection of the following recommended subjects adding up to a total of 56 track-linked credits.

<u>code</u>	<u>subject</u>	<u>ECs</u>
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 ¹⁵	Principles of Geohydrology	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
AES1501	Methods of Exploration Geophysics	3
AES1640-11	Environmental Geotechnics	4
AES1720-11	Rock Mechanics Applications	5
AES1730 ¹⁶	Introduction to geotechnical Engineering	3
AESM2901-16	Geoscience and Engineering Fieldwork	10
CIE3109-09	Structural Mechanics 4	4

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 11 – The Geoscience and Remote Sensing track

The Geoscience and Remote Sensing track has one specialisation:

- Geoscience and Remote Sensing

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

CIE4510 Climate change: Science & Ethics

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 29 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
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

Additional block Geoscience and Remote Sensing

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:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4522-15	GPS for Civil Engineering and Geosciences	4
CIE4602	Cryosphere: remote sensing and modeling	4
CIE4605	Atmospheric Science	4
CIE4607	Ocean topography and Sea-level change	4
CIE4608	Atmospheric Remote Sensing	4
CIE4609	Geodesy and Natural Hazards	4

¹⁵ Not for students who passed CTB3390, AESB3340 or an equivalent course.

¹⁶ Students who passed CTB2310 (Soil Mechanics) or an equivalent course cannot take this course.

CIE4610	Gravity, Geodynamics and Climate Change	4
CIE4614-18	3D surveying of civil and offshore infrastructure	4

and choose out of:

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
And any Master's degree course subject Civil Engineering or Applied Earth Sciences		

Article 12 – The 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

In addition to the presented specialisation 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.¹⁷

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
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
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Additional block Environmental Technology

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
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

¹⁷ 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.

Additional block Environmental Science

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
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

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, part 1c. 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.

Paragraph 2 – Annotations and Honours Programme

Article 13A – Technology in Sustainable Development

1. The examination programme for students who have opted for the annotation Technology in Sustainable Development must at least include the following:
 - a. a sustainable development colloquium of 5 credits: WM0939TU, Engineering for Sustainable Development,
 - b. subjects within or outside the realm of the degree course 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 referent, from the manual and from the website of Delft University of Technology.
 - c. a Master Thesis Project carrying 40 credits in line with what is stipulated in Article 3 Subsection 1 clause d. The Master Thesis Project must partly focus on the topic of sustainable development. The referent will test the hypothesis of the project and the way in which it has been tackled against the extent to which sustainable development issues have been integrated into the project.
2. Students who complete the annotation successfully, receive an annotation Technology in Sustainable Development with their degree certificate.

Article 13B – 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. a Master Thesis Project carrying 40 credits in line with what is stipulated in Article 3 Subsection 1 clause d, partly focusing on the topic of entrepreneurship.
2. The examination programme for the Entrepreneurship annotation needs the prior approval by a coordinator of Delft Centre for Entrepreneurship and the board of examiners.
3. Students who complete the annotation successfully, receive an annotation Entrepreneurship with their degree certificate.

Article 13C – Urban Planning and Engineering (“Stadsingenieur”)

1. The examination programme for students who have opted for the annotation Urban Planning and Engineering must at least include the following:
 - a. 20 credits as mentioned in Article 3 Subsection 1 clause c, relating to one or more of the following fields:
 - Urban and Regional Planning
 - Infrastructure Planning
 - Real Estate
 - Site Development
 - Land Clearing
 - Urban Civil Engineering.
 - b. a Master Thesis Project carrying 40 credits in line with what is stipulated in Article 3 Subsection 1 clause d, partly focusing on the topic of at least one of the above mentioned fields.

The annotation can be obtained within the examination programme (120 credits) if the student uses the electives and/or the possibilities mentioned in Article 3 Subsection 1 clause c, otherwise these electives and/or possibilities will be extracurricular.
2. The examination programme for the Urban Planning and Engineering annotation needs the prior approval by the board of examiners, who will seek the programme director’s advice.
3. Students who complete the annotation successfully, receive an annotation Urban Planning and Engineering with their degree certificate.

Article 13D – Infrastructure Planning and Environmental Engineering (“Infrastructuur en milieu”)

This annotation will no longer be offered.

Students who already commenced with the annotation can finish their programme. Please refer to the TER of the cohort you started in.

Article 13E – Integral Design and Management

1. The examination programme for students who have opted for the annotation Integral Design and Management must include the following:
 - a. subjects within or outside the compulsory or elective subjects of the chosen track and/or specialisation adding up to a total of 8 credits

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4381	Engineering Asset Management	4
CIE4481	System Engineering Management	4

If CTB 3380 has been completed in the Bachelor’s phase, then CIE 4381 must be replaced by 4 credits of the list of courses of (article 13E) clause b.

- b. subjects from the list below within or outside the compulsory or elective subjects of the chosen track and/or specialisation adding up to a total of at least 6 credits (10 credits if CTB3380 has been completed in the Bachelor’s phase):

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE410018	Materials and Ecological Engineering	4
CIE4120	Information Systems for the Construction Industry	4
CIE4130	Probabilistic Design and Risk Management	4
CIE4395	Risk and Variability in GeoEngineering	4
CIE4491	Urban Drainage and Watermanagement	4
CIE5830	Freight Transport Systems: Analysis and Modelling	5
CIE5981	Forms of Collaboration in Civil Engineering	4
CME1210-14	Infrastructure Asset Management	7
CME2300	Financial Engineering	4
EPA1323	Introduction to TPM Modelling	5

¹⁸ Students may use one course out of their own MSc track program as an IDM elective.

SPM8000	Project Management	7
IN4170	Databases and Data Mining	6
WI4051TU	Introduction to Operation Research	6

- c. A Multidisciplinary Project (CIE4061-09/Multidisciplinary Project, Civil Engineering Consultancy Project) carrying 10 credits as mentioned in Article 3 Subsection 1 clause c.

The Multidisciplinary Project must focus on the topic of integral design and management. The coordinator will test the hypothesis of the project and the way in which it has been tackled against the extent to which integral design and management issues have been integrated into the project.

CE-students may replace CIE4061-09 (Multidisciplinary Project, Civil Engineering Consultancy Project) by courses CME 1200 Collaborative Design (7 EC) and CME 2210 Open Design (3 EC).

- d. a Master Thesis Project carrying 40 credits in line with what is stipulated in Article 3 Subsection 1 clause d. The Master Thesis Project must partly focus on the topic of integral design management. The coordinator will test the hypothesis of the project and the way in which it has been tackled against the extent to which integral design and management issues have been integrated into the project.
- e. Deviation from the list of electives may be possible, but only after the explicit approval of the IDM annotation coordinator.

2. Students who complete the annotation successfully, receive an annotation Integral Design and Management with their degree certificate.

Article 13F – Railway Systems

1. The examination programme for students who have opted for the annotation Railway Systems must include the following:

- a. subjects within or outside the compulsory or elective subjects of the chosen track and/or specialisation adding up to a total of 8 credits:

<u>code</u>	<u>Subject</u>	<u>EC's</u>
CIE5826	Railway Operations and Control	4 EC
CIE4874	Elements of Railway Engineering	4 EC

- b. subjects from the list below within or outside the compulsory or elective subjects of the chosen track and/or specialisation adding up to a total of at least 14 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4811-18	Planning and Operations of Public Transport Systems	6
CIE4870	Structural Design of Railway Track	4
CIE4873	Wheel-Rail Interface	4
CIE4871	Design and Maintenance of Railway Vehicles	4
CIE5803-018	Railway Traffic Management	4
TPM004a	Transport Safety	4
CIE5875	Railway Asset Management	4
CIE5874	Life-Cycle Performance by Design of Railway Assets	4

2. Focusing on the topic of railway A Master Thesis Project carrying 40 credits in line with what is stipulated in Article 3 Subsection 1 clause d, operations and/or railway engineering. The annotation coordinators will test the hypothesis of the project and the way in which it has been tackled against the extent to which railway operations and/or railway engineering has been integrated into the project.
3. The examination programme for the Railway Systems annotation needs the prior approval by the board of examiners, who will seek the programme director's advice.
4. Students who complete the annotation successfully, receive an annotation Railway Systems with their degree certificate.

Article 13G – Dynamics of Structures

1. The examination programme for students who have opted for the annotation Dynamics of Structures must at least include the following:

- a. The following subjects adding up to 23 credits:

<u>code</u>	<u>course</u>	<u>ECs</u>
CIE4140	Dynamics of Structures	4
CIE4260	Measurement and Analysis of Vibrations	4
CIE5145	Random Vibrations	3
CIE5260	Structural Response to Earthquakes	4
CIE5340-18	Soil Dynamics	4
OE44055	Load Identification and Monitoring of Structures	4

- b. a Master Thesis Project carrying 40 credits in line with what is stipulated in Article 3 Subsection 1 clause d, partially focusing on the topic of Dynamics of Structures.
2. The annotation can be partly obtained within the examination programme (120 credits) if the student uses track-linked subjects or the electives and/or the possibilities mentioned in Article 3 Subsection 1 clause c, otherwise these electives and/or possibilities will be extracurricular.
3. The examination programme for the Dynamics of Structures annotation needs the prior approval by the coordinator and the board of examiners.
4. Students who complete the annotation successfully, receive an annotation Dynamics of Structures with their degree certificate.

Article 14 – Master’s Honours Programme

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 Master's Honours Programme.
2. The content of the Honours Programme should be thematically consistent. The subject UD2010, Critical Reflection on Technology, 5 credits, is compulsory to the Master's Honours Programme.
3. Students who fulfil, or will fulfil, the requirements laid down in Subsection 1, and are interested in the Master's Honours Programme 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 Master's Honours Programme 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 Master's Honours Programme will be assessed by the Board of Examiners.
6. Students who have successfully completed the Master's Honours Programme will receive a special certificate from the university with their degree certificate.

Paragraph 3 – Transitional programme

Article 15 – Transitional programme for students with a Dutch higher vocational institute Bachelor degree ("HBO")

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 a transitional programme **first**, consisting of a common deficiency block of 26 to 29 credits and an additional track-linked block of 11 to 16 credits.

Students participating in the transitional programme as part of their relevant higher vocational education, have to complete the common deficiency block within their higher vocational education examination programme. Furthermore, they have to complete the additional track-linked block **before** they will be admitted to the Master's degree course.

Deficiency courses from the transitional programme **cannot** be transferred to the Master's Degree Programme.

2. Common deficiency block

<u>code</u>	<u>subject</u>	<u>ECs</u>
CTB1210	Dynamics and Modelling	5
CTB2400	Numerical Methods for differential Equations	3
CTB2001HBO-16	Computer Programming HBO	3
WI1708TH1	Analysis 1	3
WI1708TH2	Analysis 2	3
WI1708TH3	Analysis 3	3
WI1808TH1	Linear Algebra (part 1)	3 (not for GRS)
WI1909TH	Differential Equations	3
WI2031TH	Kansrekening en statistiek voor hbo-instromers	3

3. Additional track-linked block

Furthermore the following subjects have to be completed within the transitional programme:

In case the track Structural Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 15)
CTB2210	Structural Mechanics 3	5
CTB2300	Dynamics of Systems	3
CTB3330	Structural Mechanics 4	4
CT1730HBO	Introduction to Geotechnical Engineering	3

In case the track Building Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 15)
CTB2210	Structural Mechanics 3	5
CTB2300	Dynamics of Systems	3
CTB3340-15	Building Structures 1	4
consisting of:		
CTB3340-15 D1	Constructies van gebouwen 1/ Building Structures 1, deel 1	2
CTB3340-15 D2	Constructies van gebouwen 1/ Building Structures 1, deel 2	2
CT1730HBO	Introduction to Geotechnical Engineering	3

In case the track Hydraulic Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29+ 16)
CTB2110	Fluid Mechanics	5
CTB2210	Structural Mechanics 3	5
CTB2300	Dynamics of Systems	3
CT1730HBO	Introduction to Geotechnical Engineering	3

In case the track Water Management has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29+ 14)
CTB2110	Fluid Mechanics	5
CTB2420-17	Hydrology	5
CTB3365 -16	Introduction to Water Treatment	4

In case the track Transport and Planning has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 11)
CTB3370-18	Geometrical Design of Roads and Railways	4
CTB3420	Integral Design of Infrastructure	4
CT1730HBO	Introduction to Geotechnical Engineering	3

In case the track Geo-Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 12)
CTB2210	Structural Mechanics 3	5
CTB3425	Monitoring and Stability of Dikes and Embankments	4
CT1730HBO	Introduction to Geotechnical Engineering	3

In case the track Geoscience and Remote Sensing has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 26 + 15)
CTB2300	Dynamics of Systems	3
CTB3310	Surveying and Mapping	4
TA2601	Practical Matlab	2
WI1807TH1	Linear Algebra 1	3
WI1807TH2	Linear Algebra 2	3

In case the track Environmental Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 14)
CTB2110	Fluid Mechanics	5
CTB2420-17	Hydrology	5
CTB3365-16	Introduction to Water Treatment	4

Paragraph 4 – Deviate from examination programme

Article 16 – The free 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.

Article 17 – Deviate from the examination programme

The board of examiners may allow students to deviate from the examination programme.

Paragraph 5 – Examinations and practicals

Article 18 – Practicals

1. The course teaching takes the form of lectures and/or practicals.
2. Practicals must be completed before students participate in the examination unless otherwise is indicated in the study guide pertaining to that particular subject.

Article 19 – The types of examinations

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.

Article 20 – The frequencies, times and sequences of the exams

1. Written and oral examinations are to be completed 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 may be completed in the way laid down in the relevant timetables.

Paragraph 6 – Access to Master Thesis Project

Article 21 – Access to the Master Thesis Project

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. Students are only allowed to present their Final Thesis if they have successfully completed all other obligations.
3. The official date of completion of the Master's thesis project will be the date on which the final oral presentation is given.

Paragraph 7 – Transition Rulings

Article 23 – The transition ruling 1 September 2009 and before

Transition Rulings of 1 September 2009 and before can be found in the previous Annex.

Article 24 – Transitional Ruling for CTB/CIE3345, CIE4215 (specialisation Building Engineering) and the Transport and Planning track (new)

1. Transition ruling for CTB/CIE3345

In the academic year 2017-2018, there will be two resits for the exam of the course. The obtained results of the exercises/practicals of the course will remain valid. If a student also needs to retake an exercise/practical, this will be made possible in the academic year 2017-2018. See the learning management page (Blackboard/Brightspace) of the course for a flowchart of the specifics.¹⁹

Students for whom this article is intended are required to contact the responsible examiner, so the examiner can apply this transitional rule to their individual situation.

If a student from cohort 2016-2017 (or earlier) is obligated to follow the course CTB/CIE3345 according to the annex and he/she will not pass this course, then the student must follow the new course CIE4220 Introduction to Building Physics and Facades.

2. Transition ruling for CIE4215

In the academic year 2017-2018, a student can retake the exercises of the course which he/she did not pass. The obtained results of the learning management platform page (Blackboard/Brightspace) assignments and/or the design practical will remain valid. See the learning management platform page (Blackboard/Brightspace) of the course for a flowchart of the specifics.²⁰ Students for whom this article is intended are required to contact the responsible examiner, so the examiner can apply this transitional rule to their individual situation.

If a student from cohort 2016-2017 (or earlier) did not pass this compulsory course CIE4215, he/she is obligated to follow the new course CIE4220 Introduction to Building Physics and Façades (6 EC).

3. Transition ruling for the Transport and Planning track (new)

For students following the programme according to the annex 2017-2018 or earlier, the list of electives to choose two courses from is extended with the following courses:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4835	Transport Engineering and Optimisation	4
CIE4845	Emerging Topics for Transport & Planning	4
CIE5815	Resilient Transport Systems	4
CIE5822	Active Modes	4
CIE5825	Advanced Public Transport Operations and Modelling	4

List of convergence subjects (ex article 3 annex):

Course code MSc	Course name English
CIE3360	Water System Analysis
CIE3415	Water Management Research
CIE3425	Monitoring and Stability of Dikes and Embankments
CIE3430	Integral Design of Infrastructure
CIE3300-09	Use of Underground Space
CIE3325	Mechanics and Transport by Flow in Poreus Media
CIE3425	Monitoring and Stability of Dikes and Embankments
CIE3430	Integral Design of Infrastructure
CIE3310-09	Open Channel Flow
CIE3330	Hydraulic Structures 1
CIE3360	Water System Analysis
CIE3370-18	Geometric design of roads and railways
CIE3415	Water Management Research

¹⁹ Flowchart transition ruling CIE3345-CIE4215

²⁰ Flowchart transition ruling CIE3345-CIE4215