TEACHING AND EXAMINATION REGULATIONS (TER)

2019-2020

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
&
4TU MASTER DEGREE PROGRAMME CONSTRUCTION MANAGEMENT AND ENGINEERING

TU Delft Delft University of Technology

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Paragraph 1 - General

Article 1 – Applicability of the regulations[1]

1. These regulations including the programme specific annexes, apply to the teaching and the examinations of the Master degree programme in Civil engineering, the Master degree programme in Applied Earth Sciences and the Interfaculty 4TU Master degree programme Construction Management and Engineering, hereinafter referred to as 'the programme' or 'programmes'.

2. The programmes are provided under the responsibility of the Faculty of Civil Engineering and Geosciences at Delft University of Technology, hereinafter referred to as the 'faculty'.

Article 2 – Definitions of terms used

The following concepts apply in this Regulation:

a. Act:	the Higher Education and Scientific Research Act (in Dutch, the WHW), Dutch Bulletin of Acts, Orders and Decrees, number 593 and as amended since;
b. academic year	the period from 1 September till 31 August of the following calendar year;
c. annex (former: IR)	the appendix which forms part of these Teaching and Examination Regulations;
d. Board of Examiners:	the programme's Board of Examiners, which has been installed in accordance with Article 7.12 of the Act;
e. bridging programme:	a deficiency rectifying programme aimed at moving up to a Master degree programme, while enrolled in a Bachelor degree programme, but without obtaining a Bachelor degree, as stipulated in Article 7.30e or Article 7.57i of the Act;
f. cohort:	the group of students who have registered for a degree programme for the first time in a given academic year;
g. course (or: 'subject'):	a teaching unit within the programme as intended in Article 7.3, sections 2 and 3 of the Act; a subject can consist of a number of components;
h. credit:	a European Credit (EC) awarded in line with the European Credit Transfer System (ECTS); one credit denotes a study load of 28 hours;
i. (component) partial examination:	an assessment of the knowledge, insight and skills of a student in relation to a component within a subject, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the Board of Examiners;
j. 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);
k. 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;
l. 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;
m. education registration system:	the current education registration system is Osiris;
n. 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;
o. 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;
p. institute:	Delft University of Technology;
q. 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;
r. learning management platform	the current learning management platform is Brightspace;
s. practical exercise:	subject or component of a subject aimed at the acquisition of particular skills. The following can be understood as practical exercises: • writing a thesis,

[1] These Teaching and Examination Regulations (TER) are drafted per academic year and are valid as of the first day of the relevant academic year. This TER replaces all previous versions of the TER.

		• conducting a project or experimental design, • carrying out a project or a design/research assignment, • conducting a literature review, • completing an internship, • participating in fieldwork or an excursion, • conducting tests and experiments, or • participating in other educational activities that are considered essential and that are aimed at enabling participants to attain certain skills;
t.	programme:	the Master degree courses (Civil Engineering) as stipulated in Article 7.3a Paragraph 1, Subsection b of the Act;
u.	programme duration:	the duration starting from the enrolment of the student up and to including the last examination;
v.	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;
w.	study guide:	a digital guide to the programme containing specific information pertaining to the various subjects;
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 or partial examination', with the exception of Articles 19, section 1, first complete sentence and 22.

Paragraph 2 - Admission and prior education

Article 3a – Admissions to the Master degree programme

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

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

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

   c. Construction Management and Engineering
   - Bachelor degree Bouwkunde/Architecture from Delft University of Technology or from Eindhoven University of Technology,
   - Bachelor degree Civiele Techniek/Civil Engineering from Delft University of Technology or University of Twente,
   - Bachelor degree Technische Bedrijfskunde from Eindhoven University of Technology or from University of Twente,
   - Bachelor degree Technische Bestuurskunde/Systems Engineering, Policy Analysis and Management from Delft University of Technology,
   - Bachelor degree in Innovation Sciences from Eindhoven University of Technology.

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

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

   a. Other university Bachelor degree (not including those listed in section 1)
   The following applies to this category:

Successful completion of the stated bridging programme for admission to the Master degree programme:

For Civil Engineering and Applied Earth Sciences:
- University Bachelor degree
Bridging programme to be followed: to be specified upon application.

For Construction Management and Engineering:
- University Bachelor degree: students who do not possess any of the degrees mentioned in section 1 may be eligible for, and should therefore seek advice on, a possible tailor-made bridging program.

b. Higher professional education degree
The following applies to this category:
Successful completion of the stated bridging programme for admission to the Master degree programme and, if applicable, the language requirement
- higher professional education degree [Dutch higher vocational institute (HBO)]

For Civil Engineering and Applied Earth Sciences:
Bridging programme to be followed: Transitional programme for students with a Dutch higher vocational institute Bachelor degree ("HBO") as stipulated in the annex.

For Construction Management Engineering:
- University Bachelor degree: students who do not possess any of the degrees mentioned in section 1 may be eligible for, and should therefore seek advice on, a possible tailor-made bridging program.

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 of art. 3.

3. For admission in accordance with section 2, the following additional condition apply:
   Access to the education of the Master degree programme in Civil Engineering, Applied Earth Sciences and Construction Management Engineering is open to individuals who have demonstrated to the admissions committee that they possess knowledge, insight and skills at the level of the Bachelor degree mentioned in section 1.

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.

Article 3b – Admission 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 of the specific programme.

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

1. A student who is enrolled in a Bachelor degree programme for a bridging programme with the aim of being admitted to the Master degree programme at TU Delft, must complete this bridging programme within two academic years. Deviations from the bridging programme are not allowed.

2. After the programme duration of the bridging programme the enrolment of the student will be cancelled. Under exceptional circumstances the student can submit a well-founded request for an extension of the course duration for a period of at most twelve months.

3. The Executive Board will set the tuition 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

1. The programmes intend to educate students to earn a Master of Science in Civil Engineering respectively in Applied Earth Sciences or Construction Management and Engineering, 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, Applied Earth Sciences or Construction Management and Engineering, that graduates can fulfil positions on the labour market at the Master's level.

2. Graduates must also meet the specific final attainment levels for each degree programme as listed below:
    1. be capable of being analytical in their work, on the basis of a broad and deep scientific knowledge;
    2. be able to synthesise knowledge and to solve problems in a creative way when dealing with complex issues;
    3. possess the qualities needed for employment in circumstances requiring sound judgement, personal responsibility and initiative, in complex and unpredictable professional environments;
    4. be able to assume leading roles, including management roles, in companies and research organisations, and be able to contribute to innovation;
    5. be able to work in an international environment, helped by their social and cultural sensitivity and language and communication abilities, partly acquired through experience of team work and any study periods abroad;
    6. possess an awareness of possible ethical, social, environmental, aesthetic and economic implications of their work and the insight to act accordingly;
    7. possess an awareness of the need to update their knowledge and skills.

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

The programme-specific requirements are listed in the annex to article 5 of the specific programmes.

Article 6 – Track and annotations

1. The Master degree programme in Civil Engineering has the following tracks, with the stated content in the annex:
    - Building Engineering
    - Environmental Engineering
    - Geo-engineering
    - Geoscience and Remote Sensing
    - Hydraulic Engineering
    - Structural Engineering
    - Transport & Planning
    - Water Management

Double track

A student can opt to study two tracks within the Master Degree Programme in Civil Engineering, for which the criteria are stipulated in the annex.

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 degree programme in Applied Earth Sciences has the following tracks, with the stated content in the annex:
   - Geo-Energy Engineering
   - Geo Engineering
   - Geoscience and Remote Sensing
   - Environmental Engineering
   - Applied Geophysics
   - European Mining, Minerals and Environment
     - *specialisation*: European Mining Course (EMC)

Within a track or within a specialisation the student may opt for the annotations, mentioned here and here (or see the annex of the MSc Civil Engineering):
- Technology in Sustainable Development
- Entrepreneurship

3. The Master Degree Programme CME has no tracks.
   Within the Master degree programme in Construction Management and Engineering students may choose the annotation of which the specifics can be found in the annex of the MSc Civil Engineering:
   - Integral Design and Management
   - Entrepreneurship
   - Urban Planning and Engineering

Article 7 – Composition of the programme and degree audits

1. The programme includes the Master degree audit, with a study load of 120 credits.

2. Following approval from the two Boards of Examiners concerned, a student may take an individual double degree programme in which two Master programmes are combined simultaneously to create a programme of at least 180 credits. Upon completion the student is awarded two Master diplomas. The student must earn at least 60 unique credits for each Master degree programme.

3. Courses that were part of the Bachelor degree programme that qualified a student for admission to the Master degree programme may not be included in the Master degree programme. If a compulsory component has already been completed in the aforementioned Bachelor degree programme, the Board of Examiners will designate an alternative course. If an elective course of the degree programme has already been completed in the aforementioned Bachelor degree programme, the student will select an alternative elective course.

4. The Master degree audit is concluded with an MSc thesis, a final test or assignment. The MSc thesis, final test or assignment demonstrates that the student possesses and is able to apply the knowledge, insight and skills acquired in the degree programme.

5. The degree programme is described in the annex of the specific MSc programme, along with the courses and subjects, including the study load, number of contact hours and form of examination of each course, as well as the programming of the examination and the language.

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

Article 8 – Form of the programme

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

Article 9 – Language

1. The teaching is in English, and the examinations, practical exercises and degree audits are administered in English.

2. Under exceptional circumstances only, a student can apply for an exemption with the Board of Examiners from taking the examination in Dutch, if it can be demonstrated that this would be to the benefit of the student.

Article 10 – Honours Programme

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.

3. 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.

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

5. 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

1. All students are expected to have participated actively in the courses 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

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 and withdrawal for courses and examinations [2]

Article 12a – Compulsory registration for courses

1. All students must register each semester for every course that they wish to or are obliged to take, subject to the further provisions of this article. Students must register for each course in the education registration system (Osiris).

[2] Please note: articles 12a and 12b will be applicable to students CEG and CME from September 2020 onwards.

2. Students who have not registered for a course according to the prescribed procedure are excluded from participation in that course.

3. Students who are participating for the first time in the first year of a Bachelor, Master or Bridging programme will be registered by the faculty for all compulsory courses in the first semester of the first academic year of the programme. The procedure for registering for electives for these students who are registering for the first time is described in the study guide.

4. Registration for courses takes place each semester during the registration period described below. Note that the registration period for a course with limited capacity as referred to in Section 6 of this article is one week shorter.
   a. The registration period for courses in the first semester is
      - from Monday (9:00) of teaching week 4.6 up to and including Sunday (23:59) of teaching week 4.7, and
      - from Monday (9:00) up to and including Sunday (23:59) of teaching week 4.2 for a course as referred to in Section 6 of this article.
   b. The registration period for all courses in the second semester is
      - from Monday (9:00) of teaching week 2.3 up to and including Sunday (23:59) of teaching week 2.4, and
      - from Monday (9:00) up to and including Sunday (23:59) of teaching week 2.1 for a course as referred to in Section 6 of this article.

   Two weeks after the closing of the registration period a first check will take place based on the entry requirements described in the study guide. The registration for students who fulfil the entry requirements at the time of the check is finalised. If students do not meet the entry requirements at that time, they will be given the opportunity to meet the entry requirements if possible.

   One week before the start of the semester, a second and final check will take place. The registration for students who fulfil the admission requirements at the time of this check is finalised. Students who do not fulfil the admission requirements at the time of this check will not be permitted to participate in the course.

5. Students may register for courses with a total maximum study load of 40 credits per semester. A student who wishes to take more courses must submit a written request for this, giving their reasons, to the Director of Education of the faculty before the registration period as referred to in subsection a or b in section 4 of this Article, after first seeking advice from the academic counsellor. If permission for this is granted, the programme will arrange the registration for the extra course(s).

6. Before the start of the registration period the study guide will show which courses or parts of courses are a compulsory part of the programme. The Programme Director may restrict participation in a course within a programme in the following cases:

a. for a course with a maximum number of participants, admission is based on the criteria stated in the study guide, on the understanding that priority will be given to students for whom the course is a compulsory part of their programme.

b. for a course with an admission requirement, registration for the course is seen as a pre-admission which will be checked against the admission requirements stated in the prospectus before being finalised.

c. if participation in an elective is subject to further requirements as stated in the course description in the study guide.

7. Students who wish to register for a course outside of the official registration period on the grounds of exceptional personal circumstances may send a written request to Director of Education up to two weeks before the start of the semester, giving their reasons for this.

8. If a student has taken a course (or part of a course) for which an assessment will be given, without having registered for this course correctly or on time, any given assessment is invalid. The student may submit a written request to the Board of Examiners asking for a valid assessment and explaining their reasons. The Board of Examiners will only honour such a request in the event of exceptional circumstances.

9. Registration for a course does not count as registration for an examination. Students must register for examinations separately in accordance with the relevant provisions.

Article 12b – withdrawal from a course

1. Students may withdraw from a course at any time, via the education registration system (Osiris). Such a withdrawal is final.

2. A student who has withdrawn from a course and wishes to take it at a following opportunity must re-register for the course in accordance with the provisions of Article 12a.

Article 13 - Registration for written examinations

1. Registration to participate in a written examination is compulsory and is done by entering the requested data into the education registration system (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 the education registration system (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

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) or in the annex of the TER for the relevant examination.

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

1. Students can withdraw from an examination through the education registration system (Osiris) up to three calendar days before the examination.

2. Any student who has withdrawn from an examination should re-register on a subsequent occasion, in accordance with the provisions of Articles 13 and 14.

Paragraph 5 – Examinations

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

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

2. The study guide of the specific programmes contains a description of the moments at which and the numbers of times that examinations can be taken, along with their frequency, without prejudice to the provisions of these regulations concerning written and oral examinations.

3. A student may participate in an examination for a course no more than twice in one academic year.

4. In special cases, the Board of Examiners may deviate from the provisions of the above sections in favour of the student.

5. Ultimately two weeks before a written examination, the examiner will give the students the opportunity to familiarise themselves with examples of examination questions and answers.

Article 17 – Times and number of written examinations

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 course is taught,
   - the second opportunity is in the fifth week or at the end of the next teaching period, except for courses taught in the fourth and last quarter of the academic year for which the second opportunity is during the resit period in the months July and August, unless otherwise stated in the study guide. Both opportunities need to be offered in the same academic year the course is taught in.

2. 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 course 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, for discontinued courses two opportunities to sit an examination will be offered after the academic year in which the course was last taught. Both opportunities are in the academic year following the one in which the course was last taught

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

Article 18 – Oral examinations

1. For oral examinations, no more than one student shall be tested at a time, unless determined otherwise by the 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. The oral examination is administered by at least two examiners.

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

Article 19 – Determination and announcement of results

1. The examiner determines the result of a written examination as quickly as possible but by no later than 15 working days after the examination. The results of written interim examinations shall be announced no later than five working days before the next written interim examination.

2. The examiner determines the result of an oral examination 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

1. Upon request, students will have the right to inspect their assessed work during a period of 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

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, 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.

Article 22 – Period of validity of examinations

1. The period of validity of the results of an examination is indefinite. The dean can restrict the period of validity of a successfully completed examination only if the knowledge or insight that was examined has become outdated or if the skills that were examined have become outdated.

2. In cases involving a limited period of validity based on section 1, 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 section 1 or further extend periods of validity that have been extended based on section 2.

4. The provisions of section 1 likewise apply to partial 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

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

2. After having obtained recommendations from the relevant examiner, the Board of Examiners may grant exemption from the requirement to participate in a practical exercise with a view to admission to the related examination, possibly subject to alternative requirements.

Article 24a - Periods and frequency of degree audits

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

Article 24b – invalidation of examinations

The Board of Examiners is authorised to declare invalid an examination or an examination component, if a correct assessment of the knowledge, insight and skills of the student has been proved reasonably impossible, based on the examination or that component. The Board of Examiners may draw up further rules for this.

Paragraph 6 - Studying with a disability

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

1. Upon a written and substantiated request to that effect, students with disabilities or chronic illnesses may be eligible for adjustments in teaching and examinations. These adjustments are coordinated to the situations of the students as much as possible, but they may not alter the quality or level of difficulty of a 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

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 the 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 (annex of 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 course 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 course, a resit in the same academic year and two resits in the following academic year.

Article 31 – Announcement

1. The dean is responsible for ensuring a suitable announcement of these regulations and any amendments to them.

2. In any case, the Teaching and Examination Regulations are to be posted on the programme's website.

Article 32 – Entry into force

These Regulations shall enter into force on 1 September 2019.

Adopted by the dean of the faculty on 27 June 2019.

ANNEX to Article 3 of the TER

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. Only the following certificates are accepted:
    - C1 Advanced (Certificate of Advanced English) with an overall minimum score of 176.
    - C2 Proficiency (Certificate of Proficiency in English) with an overall minimum score of 180.

  Certificates that are older than two years on the day you have uploaded the document and completed your application are not accepted.

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 the USA, U.K., Ireland, Australia, New Zealand and Canada.

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 section, or
- an IELTS (academic version) with an overall Band score of at least 6.5 and a minimum score of 6.0 for each section, 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. Only the following certificates are accepted:
    - C1 Advanced (Certificate of Advanced English) with an overall score of 176 and a minimum of 169 for each section.
    - C2 Proficiency (Certificate of Proficiency in English) with an overall score of 180 and a minimum of 169 for each section

Certificates older than two years on the day you have uploaded the document and completed your application are not 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 to Article 5 TER

Construction Management and Engineering

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

a. the needs of the construction industry as well as on the needs emerging from the development of society and innovations as outlined in the "Introduction" to this document. Also, with regard to this domain, an important characteristic of the development and application of newly acquired knowledge is the fact that it has to be introduced in existing managing and engineering practices. In other words, students also have to become familiar with the management of transition processes and organizational changes in the construction industry;

b. the domain-specific and internationally accepted qualifications as defined by the ABET organization Accreditation Board for Engineering and Technology)

The domain-specific requirements have been translated into final qualifications that fit into the 3TU Academic criteria in which the academic level of the programme is indicated as well. The Master of Science Construction Management and Engineering':

1. Competent in one or more scientific principles

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

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

2. Competent in doing research

- The graduate has the competence to acquire new scientific knowledge through research or systematic reflection.
- He understands the potential benefits of research and is able to understand and incorporate the results of research into his own work.

3. Competent in designing

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

This means that:

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

4. A scientific approach

- The graduate has the habit of reflecting upon his own work and continuously uses relevant information to improve his capabilities.
- The graduate has the attitude to endorse his personal development and enhancing his expertise.

- The graduate knows that models only approximate reality and is able to develop and use them adequately whenever this is beneficial
- The graduate makes decisions based on calculated risks, costs, time, quality, stakeholders' participation, value creation, legislation and is able to evaluate these decisions
- The graduate's scientific attitude is not restricted to the boundaries of Construction Management and Engineering, and he is able to cross these where and whenever necessary

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

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

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

Annex

2019-2020

MASTER OF SCIENCE
CIVIL ENGINEERING

TU Delft Delft University of Technology

Table of Contents

Paragraph 1 – Compiling the study programme

Article 1 – The study load

The study load for the Master's degree course is 120 credits. None of the components of the course may have formed part of the Bachelor's degree course in 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 16A – 16G:
   - 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 or 5 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.

Compulsory courses that are part of both tracks can count for both tracks. Overlap in courses must be checked by the coordinator, who will ensure that the specialisation is well represented in the MSc programme for 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/citg-studentenportal/organisatie/board-of-examiners/faq/ (double 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. At least 4 credits:
   Choose one out of five:
   - Philosophy, Technology Assessment and Ethics for CT (WM0312CIE)
   - Climate Change: Science & Ethics (CIE4510)
   - Ethics of transportation (WM1302TU)
   - Ethics of technological risk (WM0376TU)
   - Water ethics (TPM003A)

CIE4510 is compulsory 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 all MSc programmes hosted by the faculty CEG 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),
   - interfacultary Master's-level electives at Delft University of Technology with a "WM-code" are admissible up to a maximum of 6 credits. However, language courses, courses on skill subjects and MOOCs are not allowed, irrespective their code. Such courses can only be part of the extracurricular paragraph of the diploma supplement.[3]
   - 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, research project (10 EC, CIE50505-09) 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 the 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 ".

[3] This means that subjects like writing, oral presentation, didactics etc. are not allowed within the examination programme but only as extracurricular. Courses with obvious technical-scientific added value for the student's individual program are admissible. The student must state the reasons for this added value when submitting a request for adding the course to the study program.

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.

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 article[4].

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.

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

2. Common compulsory block Structural Engineering

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

code	subject	ECs
CIE4100	Materials and Ecological Engineering	4
CIE4110	Timber Structures and Wood Technology	4
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:

code	subject	ECs
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:

code	subject	ECs
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:

code	subject	ECs
CIE4125	Structural Design - Case Study Steel, Timber or FRP	3
CIE5122	Capita Selecta Steel and Aluminium Structures	4
CIE5124	Biobased Structures and Materials	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:

code	subject	ECs
CIE4030	Methodology for Scientific Research	3
CIE4240-19[5]	Forensic Structural Engineering	3
CIE5100	Repair and Maintenance of Construction Materials	4
CIE5102	Forensic Building Materials Engineering	3
CIE5110	Concrete – Science and Technology	4
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:

code	subject	ECs
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:

code	subject	ECs
CIE3310-09[6]	Open Channel Flow	4
CIE3330[7]	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[8]	River Dynamics 1	4

In case one or more courses have been completed in the Bachelor's phase select one or more courses from the following list for at least the same number of credits

[5] Students cohort 2018-2019 have to follow CIE5126 Fatigue instead of CIE4240-19
[6] Not if CT3310-09 has been completed in the Bachelor's phase
[7] Not if CT3330 has been completed in the Bachelor's phase
[8] Not if CT3340 or CIE4345MI has been completed in the Bachelor's phase

code	subject	ECs
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 -19	Flood Defences	4

Article 6 – The Building Engineering track

1. 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.

2. Common compulsory block Building Engineering

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

code	subject	ECs
CIE4202	Architectural History of Buildings	4
CIE4210	Parametric Design and Engineering	3
CIE4220	Introduction to Building Physics and Façades	6
CIE4240 -19	Forensic Structural Engineering	3
CIE5981	Forms of Collaboration in Civil Engineering	4

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:

code	subject	ECs
CIE4030	Methodology for Scientific Research	3
CIE4100	Materials and Ecological Engineering	4
CIE4225	Advanced & Applied Building Physics	6
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 37 credits:

code	subject	ECs
CIE3109-09[9]	Structural Mechanics 4	4
CIE3150[10]	Concrete Structures 2	4
CIE4110	Timber Structures and Wood Technology	4
CIE4115	Steel Structures 2	4
CIE4190	Analysis of Slender Structures	4
CIE4281	Building Structures 2	4
CIE4285-18	Structural Glass	4
CIE5251-09	Structural Design, Special Structures	5

[9] Not if CT3109-09 has been completed in the Bachelor's phase
[10] Not if CT3150 has been completed in the Bachelor's phase

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:

code	subject	ECs
CIE4030	Methodology for Scientific Research	3
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
CIE4381	Engineering Asset Management	4
CIE5124	Biobased Structures and Materials	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:

   - 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 have to complete Dynamics and Introduction to Continuum Mechanics (CIE4145-09) as a compulsory elective subject, if required by intake.

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:

code	subject	ECs
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:

code	subject	ECs
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:

code	subject	ECs
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:

code	subject	ECs
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:

code	subject	ECs
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:

code	subject	ECs
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

code	subject	ECs
CIE3109-09[11]	Structural Mechanics 4	4
CIE3150[12]	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:

code	subject	ECs
CIE4420[13]	Principles of Geohydrology	4
CIE5310	Probabilistic Design in Hydraulic Engineering	3
CIE5314-19	Flood Defences	4

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

code	subject	ECs
CIE4140	Structural Dynamics	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
CIE4460	Polders and Flood control	4
CIE5308	Breakwaters and Closure Dams	4
CIE5311	River Dynamics 2	4
CIE5313-18	Hydraulic Structures 2	4
CIE5401	GIS & Remote Sensing for Water Resources	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:

code	subject	EC
CIE4120	Information Systems for the Construction Industry	4
CIE4145-09[14]	Dynamics and Introduction to Continuum Mechanics	4

[11] Not if CTB3330 has been completed in the Bachelor's phase.
[12] Not if CTB3335 has been completed in the Bachelor's phase.
[13] Not if CTB3390 has been completed in the Bachelor's phase. Not combined with CIE3325 or an equivalent course.
[14] For foreign students only

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 Systems Modelling	4
CIE4381	Engineering Asset Management	4
CIE5304	Waterpower Engineering	3
CIE5305	Bored and Immersed Tunnels	4
CIE5318	Fieldwork Hydraulic Engineering	4
CIE5450	Hydrology of Catchments, Rivers and Deltas	4
CIE5580-19	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 coordinator of the MSc track Hydraulic Engineering.

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 15 credits, and 41 credits Water Management specialisation electives.

2. Common compulsory block Water Management

   All students opting for the track Water Management must complete the following subject:

code	subject	ECs
CIE5431	Research skills 1	3[15]
CIE4440	Hydrological Processes and Measurements	4

   In addition, they must select two of the following three subjects.
   This selection must be approved by the graduation coordinator:

code	subject	ECs
CIE4450	Integrated Water Management	4
CIE4491	Urban Drainage and Water Management	4
CIE4495-13	Fundamentals of water quality and Treatment	4

   Adding up to 15 credits of obligatory courses.

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 41 credits from the following five categories. Electives from the categories b to e can only be included in this selection upon approval from the graduation coordinator.

[15] The different modules in this course must be followed shortly before or during the initial phase of the MSc thesis research.

Category a:

code	subject	ECs
CIE3365-16[16]	Introduction to Water Treatment	4
CIE3410-09[17]	Water System Analysis	4
CIE4400	Environmental Modelling	4
CIE4410	Water Systems, People and Society	4
CIE4415	Design of Water Treatment Plants	5
CIE4420[18]	Principles of Geohydrology	4
CIE4431	Hydrological Modelling	4
CIE4460	Polders and Flood Control	4
CIE4486	Industry Water	5
CIE4703	Water Treatment	6
CIE5401	GIS & Remote Sensing for Water Resources	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
CIE5432	Research Skills 2	3

The subjects mentioned in section 2 that have not been included in the common compulsory block of 15 EC.

Category b:

The Hydraulic Engineering subjects mentioned in Article 7.

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:

code	subject	ECs
BK7250	Sustainable Urbanism	3
AR1U131	Sustainable Urban Engineering of Territory	5

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

The Hydraulic Engineering and Water Resources Management programme has been discontinued as of 2017-2018 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.

[16] Not if an equivalent subject has been completed in the Bachelor's phase
[17] Not if an equivalent subject has been completed in the Bachelor's phase
[18] Not for students who passed CTB3390 or an equivalent course.

Common compulsory block TUD-NUS programme

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

code	subject	ECs
CIE4440	Hydrological processes and measurements	4
CIE4450	Integrated Water Management	4
CIE4491	Urban drainage and Watermanagement	4
CIE4495-13	Fundamentals of water quality and 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 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

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:

code	subject	ECs
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:

code	subject	ECs
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:

code	subject	ECs

CIE5805-18	Intelligent Vehicles for Safe and Efficient Traffic: Design and Assessment	4
CIE5810-19	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:

code	subject	ECs
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:

code	subject	ECs
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
AE4423-19	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

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:

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

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

code	subject	ECs
AES1730[19]	Introduction to Geotechnical Engineering *for students without a background in soil mechanics and geotechnical engineering*	3
AESM4370	Introduction to Geology *for students with a Civil Engineering background*	1
CIE4370-19	Introduction to Structural Mechanics	2

[19] Not for students who passed CTB2310 (Soil Mechanics) or an equivalent course.

	for students with an Applied Earth Science background	
CIE4420[20]	Principles of Geohydrology	4
	for students without geohydrology background	

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.

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

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 Msc coordinator.

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:

code	subject	ECs
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:

code	subject	ECs
CIE4522-15	GPS for Civil Engineering and Geosciences	4
CIE4602	Cryosphere: remote sensing and modeling	4
CIE4605	Atmospheric Turbulence	4
CIE4607	Ocean topography and Sea-level change	4
CIE4608	Atmospheric Remote Sensing	4

[20] Not for students who passed CTB3390, AESB3340 or an equivalent course.

CIE4609	Geodesy and Natural Hazards	4
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 "CTB2001WO Computer programming BSc Bridging" as an elective subject.[21]

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

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

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

CIE4510	Climate change: Science & Ethics	4

Additional block Environmental Technology

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

code	subject	ECs
CIE4703-19	Water Treatment	6
CIE4704	Chemical Conversions in Environmental Engineering	5
CIE4705	Environmental Biotechnology & Microbiology	6
CIE4710	Materials separation in Waste Processing	5
CIE5421	Water and Health	4
CIE5702	Conceptual Process design	5

[21] 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.

CIE5704	Water Treatment Research	5

Additional block Environmental Science

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

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

Article 13 – Internship

1. Before the internship commences, an internship agreement has to be concluded between the university supervisor (the examiner from the relevant subject area), the supervisor at the company or institution where the student is undertaking the internship, and the student. If no signed internship agreement has been handed in at the Internship Office according to the administrative procedure as described in the study guide before the commencement of the internship, the internship will not be accepted.
   Any internship that has not been approved (signed by the Internship Office) before the internship commences will not be accepted, neither will a grade be awarded.

2. The internship agreement must at least outline the aims and contents of the practical training period, and the personal learning objectives defined by the student.

3. The learning objectives stated in the study guide, form the basis for the assessment. The period of the internship will be seven (7) full time weeks and the assessment will be based on these seven weeks. Should the duration of the internship exceed seven weeks, the agreement will need to stipulate which particular seven weeks of the internship will be assessed.

4. The university supervisor will assess the subject-related aspects as well as student's own assessment of the internship and will determine whether the report meets the requirements laid down for the structure and production of the report. The university supervisor is responsible for the final mark, taking into consideration the evaluation made by the company or institution supervisor.

5. The official date of exam (i.e. the completion of the internship) will be the date on which the final internship document(s) is/are submitted to the Internship Office.

Article 14 – Multidisciplinary Project, Civil Engineering Consultancy Project

1. In the Multidisciplinary Project, Civil Engineering Consultancy Project manual an indication is given of the number of phases into which a project is divided.

2. The first phase must be rounded off with a work plan that has to be approved by the supervisory team after the initial assessment. If the work plan is not approved then a supplement must be added. The project cannot be pursued until the work plan has been approved.

3. Roughly mid-way through the second phase there will be a briefing when the group will be expected to present the results and the activities still to be carried out to the supervisory team.

4. At the beginning of the third phase the group will submit the draft final report.

5. The last phase will be rounded off with the production of the final report and a summary of that same report. Subsequently, during the final assessing, there will be an oral presentation of the final report and an evaluation report will be produced.

6. The student is expected to attend the initial assessment, the briefing and the final assessment and to be present at any other point deemed necessary by the supervisory team. If a student has no valid excuse for being absent at such times then the student can be banned from further participating in the project.

7. The work plan and the final report must be assessed by at least two examiners, one of whom must be the main supervisor.

8. When it comes to the final assessment, the work aspects definitely taken into consideration will be the following:
   a. the quality of the final topic
   b. how the various sub-topics have been integrated.
   c. written reporting
   d. oral presentation
   e. the group process
   The learning objectives stated in the study guide form the basis for the assessment. The study guide should indicate the assessment method, including the weighing of components as well.

9. In case of group work, the group result will also be the individual final result unless the main supervisor has sound reason to deviate from that in the case of one or more students in the group.

10. The group is responsible for ensuring that there is regular contact with the main supervisor, especially in instances where the project is being completed abroad.

11. The projects, carried out in one course year, are to be evaluated by one of the concerned examiners, who will report to the Director of Education.

12. The official date of the completion of a project will be the date on which the final report or project is submitted or the date on which the oral final presentation is given.

It is not allowed to start the Multidisciplinary Project, Civil Engineering Consultancy Project until the student has completed the BSc.

Article 15 – Additional Graduation Work, Research Project

1. The Additional Graduation Work, Research Project should be distinguishable from the normal Master Thesis Project.

2. For the assessment the additional thesis, the learning objectives stated in the study guide form the basis. The study guide should indicate the assessment method, including the weighing of components as well. In case of group work, the group result will also be the individual final result unless the main supervisor has sound reason to deviate from that in the case of one or more students in the group.

3. The Additional Graduation Work, Research Project must be assessed by at least two examiners from the academic staff at Delft University of Technology. One of them, being a professor, an associate professor, an assistant professor or lecturer in the Civil Engineering or Applied Earth Science Master programme, is responsible for the assessment and determines the grade only after close consultation of the other examiner. The examiner who is responsible for the assessment has a UTQ or is active in acquiring it.
   At least one of the two examiners must have a permanent position.
   When the Additional Graduation Work, Research Project is assessed the following aspects will be taken into consideration. The final mark will be determined using the additional thesis grading sheet.
   a. Scientific approach:
      - theoretical profundity
      - state of the art description and literature study
      - scientific argumentation
      - quality of experimental work and design
      - creativity
   b. Quality of result:
      - scientific reflection and judgment
      - utilization of result
      - extension of methods

- quality of abstract
- amount of work

c. Behavioural competencies
- initiative
- responsibility
- communicative skills
- independency
- time planning

d. Quality of written presentation
- structure and consistency
- acknowledgement of sources
- English proficiency

4. The student must register his Additional Master Thesis Project by submitting an application to the additional thesis coordinator.

5. The additional thesis coordinator is responsible for the administration of the final mark. The final mark will only be registered in the educational registration program (Osiris) when all the requirements – the report and the original assessment form must be handed in – are met.

It is not permitted to start with the Additional Master Thesis until the student has obtained 45 EC of the MSc examination programme.

Paragraph 2 – Annotations and Honours Programme

Article 16A – 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 16B – 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 16C – 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 16D – 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 16E – 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

code	subject	ECs
CIE4381	Engineering Asset Management	4
CIE4120	Information Systems for the Construction Industry	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 two lists below adding up to a total of at least 6 credits (10 credits if CTB3380 has been completed in the Bachelor's phase):
      i. Students may use one course out of their own MSc track program as an IDM elective from the list below:

code	subject	ECs
CIE4100	Materials and Ecological Engineering	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

ii. Additional elective(s) from the list below, which is not yet a compulsory for his/her track specialization:

CIE4170	Construction Technology for Civil Engineering Projects	4
CIE4391	Quantitative Asset Modelling	4
CME2210	Open Design & Construction Management	4

Another elective course which is related to the learning objectives of the IDM annotation (digital construction, asset management, and systems engineering), to be approved by the IDM annotation coordinator.

c. A Multidisciplinary Project (CIE4061-09/Multidisciplinary Project, Civil Engineering Consultancy Project) or an Internship (CIE 4040-09/Internship) carrying 10 credits as mentioned in Article 3 Subsection 1 clause c.
The Multidisciplinary Project or Internship 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 CME1200 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 16F – 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:

code	Subject	EC's
CIE4874	Elements of Railway Engineering	4 EC
CIE5826	Railway Operations and Control	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:

code	subject	ECs
CIE4811-18	Planning and Operations of Public Transport Systems	6
CIE4870	Structural Design of Railway Track	4
CIE4871	Design and Maintenance of Railway Vehicles	4
CIE4873	Wheel-Rail Interface	4
CIE5803-18	Railway Traffic Management	4
CIE5871	Capita Selecta Railway and Road Structures	4
CIE5874	Life-Cycle Performance by Design of Railway Assets	4
CIE5875	Railway Asset Management	4
TPM004a	Transport Safety	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 16G – 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 a minimum of 20 credits:

code	course	ECs
CIE4140	Dynamics of Structures	4
CIE4260	Measurement and Analysis of Vibrations	4
CIE5145	Random Vibrations	4
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 17 – 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 18 – 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

code	subject	ECs
CTB1210	Dynamics and Modelling	5
CTB2001HBO-16	Computer Programming HBO	3
CTB2400	Numerical Methods for differential Equations	3
WI1708TH1	Analysis 1	3
WI1708TH2	Analysis 2	3
WI1708TH3	Analysis 3	3
WI1807TH1	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:

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

In case the track Building Engineering has been chosen:

code	subject	ECs (total 29 + 15)
CT1730HBO	Introduction to Geotechnical Engineering	3
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

In case the track Hydraulic Engineering has been chosen:

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

In case the track Water Management has been chosen:

code	subject	ECs (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:

code	subject	ECs (total 29 + 11)

CT1730HBO	Introduction to Geotechnical Engineering	3
CTB3370-18	Geometrical Design of Roads and Railways	4
CTB3420	Integral Design of Infrastructure	4

In case the track Geo-Engineering has been chosen:

code	subject	ECs (total 29 + 12)
CT1730HBO	Introduction to Geotechnical Engineering	3
CTB2210	Structural Mechanics 3	5
CTB3425-17	Monitoring and Stability of Dikes and Embankments	4

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

code	subject	ECs (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:

code	subject	ECs (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 19 – 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 20 – Deviate from the examination programme

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

Paragraph 5 – Examinations and practicals

Article 21 – 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 22 – 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 23 – 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 – Procedure to Master Thesis Project

Article 24 – Access to the Master Thesis Project

1. Before starting the Master Thesis Project, the student must complete the form CIE-1 respectively AES-1, which can be downloaded from internet. On the basis of that form the Student Administration will check on behalf of the Board of Examiners, whether the student complies with the requirements laid down for the Master Thesis Project. If everything is in order the student can report so to the coordinator linked to the chosen track, and further compile the master's examination programme.

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

3. The final assessment is the meeting during which the assessment committee's chair grades the results of the student's work. The accompanying presentation constitutes part of the final assessment and takes place preferably on the same day as the final assessment. The final assessment has to occur within four weeks (the months of July and August excluded) after the final thesis report has been handed in.

Article 25 – Working method of the assessment committee

1. As soon as the final study phase begins, the assessment committee's chair will indicate to the student which members of the assessment committee are directly involved in the student's supervision.

2. In consultation with the chair and the daily supervisor, the student must draw up a work plan which at least describes the subject and the approach and which gives a list of contents. The work plan must also contain a time schedule with dates for the interim meetings and the final presentation.

4. The date of approval of the work plan marks the official start of the Master Thesis Project. The coordinator will monitor the schedule.

5. Significant changes in the work plan must be approved by the assessment committee.

6. During the final study phase there must be at least one interim meeting with the assessment committee to gauge the progress being made.

7. Before a presentation date can be agreed, the student must have completed all the other examination programme obligations and present the draft report to the complete assessment committee (the so-called green light meeting).

8. The examiner in the assessment committee from the other section (article 23 Rules & Guidelines Board of Examiners) must at least participate in the deliberations from the moment of the assessment of the draft report text referred to in section 7.

9. After the student has received the assessment committee's approval the student must arrange a presentation date.

10. The final assessment and the presentation of the Master Thesis Project should be preferably planned on the same day. At least two of the three academic staff members of the assessment committee, one of whom must be the chair, have to be present at the time of the presentation.

11. Members of the assessment committee who are unable to be present at the time of assessment should react in writing, possibly by email, to the report received from the student beforehand. The reaction has to

be addressed to the chair.

12. Each time the assessment committee evaluates matters, the student must compile an official report and post or mail it to the assessment committee for approval. If after a week no reaction has been received, the student can assume that the agreements detailed in the report have been accepted.

13. The chair is responsible for the assessment and determines the final mark after close consultation with the other committee members. The student will not be notified of the procedure that led to the determination of the final mark.

16. The coordinator or a member of the assessment committee appointed in conjunction with the coordinator is responsible for ensuring that the relevant Teaching and Examination Regulations and the Rules and Guidelines laid down by the Board of Examiners are adhered to, in particular whether the commencement stipulations are observed, the subsequent procedures are followed, and the Master Thesis Project is assessed according to uniform norms.

17. The coordinator must keep a record of how long the student has worked on the Master Thesis Project. If this has not been completed within a year, then the coordinator will ask the student and the assessment committee's chairperson why that is so. If the student subsequently does not progress fast enough, the coordinator will notify the Board of Examiners.

Paragraph 7 – Transition Rulings

Article 26 – Transition rulings 1 September 2009 and before

Transition Rulings of 1 September 2009 and before can be found in previous Annexes (Implementation Rules).

Article 27 – Transitional Ruling for CTB/CIE3345, CIE4215 (specialisation Building Engineering) and the Transport and Planning track

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.[22]
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.[23] 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
Students who switch from the 2017-2018 programme to the new 2018-2019 programme can use the following list of equivalencies:

New code	Subject	Former code
CIE4801-18	Transport Modelling	CIE4801
CIE4811-18	Planning and Operations of Public Transport Systems	CIE4811-09

[22] Flowchart transition ruling CIE3345-CIE4215
[23] Flowchart transition ruling CIE3345-CIE4215

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.

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:

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

Article 28 – When the rules do not provide

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