

**EDUCATION AND EXAMINATION REGULATIONS  
(OER)**

**In accordance with Article 7.13 of the [Dutch] Higher  
Education and Scientific Research Act [WHW]**

**3TU MASTER'S PROGRAMME  
CONSTRUCTION MANAGEMENT AND ENGINEERING (CME)**

**2014 - 2015**

**DELFT UNIVERSITY OF TECHNOLOGY  
UNIVERSITY OF TWENTE  
EINDHOVEN UNIVERSITY OF TECHNOLOGY**

The Board of the Faculty of Civil Engineering en Geosciences of the Delft University of Technology (TUD), the Department of Built Environment of the Eindhoven University of Technology (TU/e) and the Faculty of Engineering Technology of the University of Twente (UT).

in view of Articles 9.15, paragraph 1, under a, 7.13, paragraphs 1 and 2, 9.38, under b, and 9.18, paragraph 1, under a, of the Higher Education and Scientific Research Act of the Netherlands

having heard the recommendations of the educational committees involved,

with due observance of the consent of the Faculty Councils

## **hereby adopts**

the Education and Examination Regulations of the degree programme in Construction Management and Engineering (CME).

## **Section 1 - General**

### **Article 1 - Definitions of terms used**

The terms and definitions described in this document are understood to have the same meaning as they have in the Higher Education and Scientific Research Act (in Dutch, the WHW), insofar as they occur in this act.

The following terms and definitions apply to this regulation:

- a. the act: the Higher Education and Scientific Research Act (abbreviated to WHW), in the Dutch Bulletin of Acts, Orders and Decrees, number 593 and as amended since,
- b. the Dean if an institution that is fully or partly responsible for the degree programme has opted for a Joint Faculty Board, then "Dean" will also include the Faculty Board,
- c. degree programme: the Master's degree programme as denoted in Article 7.3a paragraph 1, under b of the Act,
- d. student: anyone enrolled in at least one of the three technical universities as a student or external student: for the purpose of benefiting from education and/or for the purpose of sitting the examinations and undergoing the final examination which form part of the programme,
- e. subject: a study unit within the degree programme as referred to in Article 7.3, paragraphs 2 and 3 of the Act,
- f. practical exercise: a practical exercise as intended in Article 7.13, paragraph 2, under d of the Act, taking one of the following forms:
  - writing a thesis,
  - undertaking an assignment or an experimental design,
  - carrying out a design or research assignment,
  - doing a literature study,
  - completing an internship,
  - making a public presentation,
  - taking part in fieldwork or an excursion,
  - conducting tests and experiments,
  - writing a position paper,
  - or participating in other educational activities aimed at enabling participants to attain certain knowledge, insights or skills,

- g. examination: an evaluation of the knowledge, insight and skills of the student in relation to the subject, as well as the testing of these by at least one examiner appointed by the Examination Committee,
- h. final examination: an assessment during which the Examination Committee, in accordance with Article 7.10 of the Act, establishes whether all examinations in the various study components that constitute the Master's phase have been successfully completed,
- i. Examination Committee: the programme's Examination Committee, which has been installed in accordance with Article 7.12 of the Act. At TU/e and TUD this is the Examination Committee of CME and at UT this is the Examination Committee for the programmes in CIT, CEM and CME. The 'Rules and Guidelines of the Examination Committee refers to the rules and guidelines of the specific Examination Committee of the concerning location,
- j. examiner: the individual who, in line with Article 7.12, paragraph 3 of the Act, is appointed by the Examination Committee to conduct examinations,
- k. credit: credit awarded in accordance with the European Credit Transfer System (EC); one credit denotes a study load of 28 hours,
- l. working day: Mondays through Fridays, except public holidays recognised by the Dutch government, and except for the days when the university is closed,
- m. study guide; a guide to the degree programme containing specific information pertaining to the various subjects,
- n. institution: Delft University of Technology, Eindhoven University of Technology or the University of Twente, collectively designated as 3TU,
- o. disability: all conditions that are (at least for the period in question) 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.

## Article 2 - Programme content

1. With regard to the degree programme, the following is included in the implementation regulations (which are included as an appendix):
  - a. composition of the study programme,
  - b. composition of the specialisations,
  - c. the organisation of practical exercises, if applicable,
  - d. study load of the degree programme and of each of the accompanying study components,
  - e. the number and frequency of the examinations and practical exercises,
  - f. the nature of the programme (full-time, part-time or dual programmes),
  - g. whether the examinations are administered orally, in writing or otherwise,
  - h. if necessary, that a satisfactory result in an examination is a prerequisite for admission to other examinations,
  - i. if necessary, that the requirement to participate in a practical exercise will be part of the admission procedure to a particular examination,
  - j. the study components from which the student may choose to fulfil the programme's elective subject requirements,
  - k. the admission requirements that must be met to receive a certificate of admission,
  - l. Bachelor's degree certificates that provide direct access to the Master's programme,
  - m. the transitional regulations as referred to in Article 22.
2. The Implementation Regulations form an integral part of these regulations.

## Article 3 - Final attainment targets of a programme

### 3.1 Profile of the programme

The programme is intended to provide such knowledge, skills and insight in the domain of Construction Management and Engineering, as well as in sub-domains of business administration and public administration, that the graduate is qualified to practice his profession independently at Master's level.

### 3.2 Translation of the profile into exit qualifications

To satisfy the profile stated in article 3.1, the exit qualifications formulated for the programme in the implementation regulation have been adopted.

## Article 4 - Admission to the programme

Admission scheme TUD and UT

1. Students holding a degree which shows that they have successfully rounded off the bachelor programmes mentioned in paragraph L of the Implementation Regulations, have admission to the programme in conformity with Article 7.30a first paragraph of the [Dutch] law.
2. For the student who does not hold the degree stated in paragraph 1, a statement or certificate of admission is required, which is issued by or on behalf of the dean.
3. To obtain a statement of admission, the student must satisfy the requirements stated in the implementation regulation.
4. In deviation from what is stated in paragraph 1, the dean can, in special cases, permit a student to take part in one or more (interim) examinations or practicals before the bachelor's final examination has been successfully completed. A time limit can be placed on this agreement.

Admission scheme TU/e

1. Students in possession of a diploma which shows that they have passed the final examination for the Bachelor's programme as mentioned in paragraph L of the Implementation Regulations, or have a statement of the Examination Committee that this is the case, will be eligible for admission to the programme.
2. In case of:
  - a student with (harrowing) personal circumstances or:
  - students who are studying almost nominal (3-3.5 years) studying and misses 6 ECTShe/she can request the Examination Committee for an extra attempt for the education units that he still misses.
3. For the procedure in case of (harrowing) personal circumstances, article 2.2.2., paragraph 3 – 6 are of application
4. In the decision of the Examination Committee is motivated if the personal circumstances are recognized and which consequences this will have for the student.
5. In the decision whether a student is studying almost nominal, the Examination Committees can in individual situations decide to expand the study time for almost-nominal study (a part of or the entire) period with spending time with administrative activities in the context of study associations (or other major administrative activities, this in the opinion of the examiners). To qualify for the aforementioned expansion of near-nominal studying is an substantiation of the necessary administrative activities which the Examination Committee individually weigh each request.
6. In case of inflow in the first semester, the Examination Committee is obliged in all cases to ensure that the second attempt before the start of the first semester is completed.
7. In case of inflow of the second semester, the Examination Committee is obliged to ensure that this second attempt is as soon as possible, but will take place in the third quartile. When the student lacks of substantive knowledge for specific master education units, the Examination Committee can decide to allow the student to follow his/her master education unit to follow during the third quartile.
8. In the decision of the Examination Committee will be indicated when and in what way the second attempt occurs. Also, if applicable, the master education units in the third quartile that may be followed will be specified.

## **Article 5 - Language**

The education is provided, and the (interim) examinations and the final examination are taken, in the English language, although in special circumstances the dean has the authority to determine otherwise. If neither the students nor the teacher object to Dutch being the main language, the education programme and the examination can be in Dutch.

## **Section 2 - Examinations**

### **Article 6 - Number, times and frequency of examinations**

1. There are at least two opportunities in each academic year for sitting examinations within the degree programme.
2. A timetable of all opportunities for sitting written examinations is drawn up on an annual basis and details are published before the start of the academic year (TUD, TU/e). In Twente, the first semester will be announced at the beginning of the academic year, and the second semester will be announced within the first semester.
3. Notwithstanding the provisions of paragraph 1, there will be at least one opportunity in a year to sit examinations relating to subjects not taught in that academic year.
4. If a subject is removed from the degree programme, two opportunities to sit an examination in this subject will be granted after the last classes in this subject have been taught: an examination following the last of the classes, and one extra attempt in the same academic year. In the following academic year there will be two subsequent attempts.
5. In exceptional cases, the Examination Committee may permit a deviation from the standard number of times and the way in which certain examinations may be taken.

### **Article 7 - Term of validity and retention period for examinations**

1. The result of an examination is valid for an unlimited period.
2. If an examination result is older than six years, the Examination Committee may, however, require that the student take a supplementary or alternative examination.
3. Written examinations (TUD, TU/e, UT) and two-dimensional projects (UT) must be retained for at least two years.
4. Three-dimensional projects must be retained for at least ten weeks after the grade has been determined but, in any event, for the duration of any objections and appeal procedure.

### **Article 8 - Oral examinations**

Oral examinations will be held in public, unless determined otherwise by the Examination Committee in a special.

### **Article 9 - Confirmation and publication of the results**

1. The examiner is required to determine the result of an oral examination as soon as it is finished and to supply the student with a written statement of the result.
2. In the case of written examinations, the examiner is required to determine the result as soon as possible after the examination but within fifteen working days at most. Taking due account of the student's right to privacy, the student administration then ensures that the results are registered and published within twenty working days of the examination date. A report must be made to the Examination Committee with a full explanation for the delay if the examiner is unable to provide the results in the allotted time due to extenuating circumstances. The student or students in question must be informed of the delay immediately by the Examination Committee and a new date for publication of the results must be established.

3. In the case of examinations taken in other than oral or written form, the Examination Committee will determine beforehand how and within what period the student will receive a written statement giving the result.
4. When receiving the result of an examination, students will be made aware of their right to inspect the results as referred to in Article 10, the opportunity for a subsequent discussion as referred to in Article 11, and the opportunity to lodge an appeal with the Examination Appeals Board.
5. The examination will be dated in accordance with the date on which the written or oral examination is taken. Practical exercises will be dated in accordance with the date on which the final report is submitted or the date of the oral presentation, or, if there is no report or final presentation, the day on which the practical exercise is completed.

## **Article 10 - The right to inspect the results**

1. Students will be given the opportunity, on request, to inspect their assessed work up to at least twenty working days after the announcement of the result of a written examination. If students intend to lodge an appeal regarding the grading of their written work, they will be supplied with a copy of the graded work at cost price.
2. During the period referred to in paragraph 1, all interested individuals may acquaint themselves with the questions and assignments set in the examination in question, as well as with the criteria used for grading.
3. The Examination Committee may determine that the right to inspection as referred to in paragraphs 1 and 2 will be exercised at a location specified beforehand and at no less than two specific times, also to be decided in advance.

If students can prove that they are, or were, unable to be present at the location at the set time due to circumstances beyond their control, then another opportunity will be provided, if possible within the period stated in paragraph 1.

The location and times mentioned in the first sentence will be announced within five working days.

## **Article 11 - Evaluation of the examination results**

1. As soon as possible after the announcement of the result of an oral examination, at the request of the student concerned or on the initiative of the examiner, the examiner and the student can conduct an evaluation. At this meeting, the reasons behind the grades awarded will be explained.
2. Students may request an evaluation of a written exam with the relevant examiner within a period of twenty working days after the results are published. The evaluation will take place within a reasonable time span and at a place and time determined by the examiner.
3. In cases where a collective evaluation is organised by or on the instructions of the examiner (TU/e, UT) or Examination Committee (TUD), a student may only submit a request, as referred to in the preceding paragraph, if the student was present at the collective discussion and if the student provides a good reason for the request or if, due to circumstances beyond the student's control, the student was unable to attend the collective discussion.
4. The provisions of paragraph 3 shall also apply if the Examination Committee or the examiner gives the student the opportunity to compare their answers with the model answers.
5. The Examination Committee may permit deviations from the provisions of paragraphs 2 and 3.

## **Section 3 - Studying with a disability**

### **Article 12 - Adaptations to assist students with a disability**

1. Students who have a physical or sensory disability are entitled to adaptations in teaching, examinations and practical exercises. If possible, the student must submit a written request to the student counsellor (TUD, UT) or STU (TU/e) at least three months before the student is due to participate in coursework, examinations and/or practicals. These adaptations will be geared as much as possible to a student's individual needs, but they must not affect the quality or the degree of difficulty of a subject or an examination programme. The facilities provided to this end may involve adapting the form or duration of examinations and/or practicals to the student's individual situation or making practical aids available.

2. The request referred to in paragraph 1 should be accompanied by a recent medical certificate from a doctor or a psychologist. If there is evidence of dyslexia, for example, the request should be accompanied by a document issued by a recognised dyslexia-testing bureau (i.e. registered with BIG, NIB, or NVO). If possible, the statement should provide an estimation of the extent and likely duration of the disability in question.
3. The Dean will decide on requests for adaptations to the educational environment. The Examination Committee will decide on requests for adapting examinations. The decision must be announced within four weeks.

## **Section 4 - Approval by the Examination Committee**

### **Article 13 - Exemption from an examination or practical**

1. Having received advice from the relevant examiner where applicable, the Examination Committee can award exemption from an (interim) examination or practical. Further condition for this is taken up in the Rules and Guidelines of the Examination Committee.
2. The grounds on the basis of which the Examination Committee can award exemption from the taking of a particular (interim) examination relate exclusively to the level, content and quality of (interim) examinations and examinations already successfully completed by the student in question or the knowledge, insight and skills he has acquired outside higher education.
3. The maximum number of exemptions within a CME programme is regulated by the Rules and Guidelines of the Examination Committee. In all cases, the student must meet the final qualifications of the CME programme.

### **Article 14 - Elective subjects**

Criteria for approval of elective subjects to be followed by the student, as referred to Article 2, paragraph 1, under j, are contained in the Rules and Regulations of the Examination Committee.

### **Article 15 – Free education programme**

The Examination Committee takes the decision on a motivated request for permission to follow a free education programme as intended in Article 7.3c of the [Dutch] law. Further conditions relating to this are stated in the Implementation Regulations.

## **Section 5 - Examinations**

### **Article 16 - The times and frequency of the final examination**

There shall be an opportunity to undergo the Master's final examination at least twice a year. The dates set by the Examination Committee are to be published before the start of the academic year.

### **Article 17 - Student support and guidance**

The dean ensures provision of supervision of students, in part meeting the needs of orientation concerning to the study routes within and outside the programme, by appointing one or more study advisors.

### **Article 18 - Monitoring academic progress**

1. The Dean is responsible for the registration and timely publication of the exam results of individual students in the institution's virtual learning system.
2. Where appropriate, the Dean will organise a discussion of the results between the student and their study adviser.

## Section 5 - Appeals and objections

### Article 19 – Appeal procedure

1. No later than six weeks after the decision has been made known to them, interested parties may lodge an appeal against a decision of the Examination Committee or the examiners, based on these regulations, with the STU (TU/e) or the Central Complaints Desk (TUD and UT).
2. Decisions by the Dean based on these regulations may be appealed within six weeks after the announcement of the decision to the student in question. Objections are to be lodged with the STU (TU/e) or the Central Complaints Desk (TUD and UT).

## Section 6 - Conflicts, Amendments and Implementation

### Article 20 - Conflict with the regulations

If the study guide and/or any other regulations relating to the degree programme and/or the examination programme prove to contravene these regulations and the accompanying appendices, precedence will be given to the provisions of these regulations in combination with the accompanying appendices.

### Article 21 - Amendments to the regulations

1. Any amendments to these regulations will be made by special resolution of the Dean.
2. No amendments to these regulations will affect the current academic year unless it is reasonable to suppose that the interests of students will not be adversely affected.
3. Amendments to these regulations may not retroactively affect a decision by the Examination Committee to the detriment of the student.

### Article 22 - Transitional regulations

1. If the composition of the degree programme undergoes intrinsic changes or if these regulations are amended, the Dean will draw up transitional regulations that will be incorporated into the appendices of these regulations.
2. If and when appropriate, such transitional regulations are required to include:
  - a. a provision concerning the exemptions that can be given on the basis of the examinations already passed,
  - b. the term of validity of the transitional regulations.

### Article 23 – Hardship clause

If the application of the rules in this regulation or of the implementation regulations (see Appendix) leads to unreasonable or unfair situations regarding a student or group of students, the student or group of students can submit a written and reasoned request for derogation of rules to the Dean. The Dean may, after hearing the Examination Committee and counsellor, in favour of the student or group of students differ from these rules.

### Article 24 - Publication of the regulations

The Education and Examination Regulations and the appendices, which form an integral whole with these regulations, shall be published on the institution's website.

### Article 25 - Entry into force

These regulations will take effect on the academic year 2014-2015.



**APPENDIX TO THE 3TU EDUCATION AND EXAMINATION REGULATIONS**

**IMPLEMENTATION REGULATION  
Belonging to the Education and Examination Regulations (OER)**

**2014-2015**

**3TU MASTER'S PROGRAMME  
CONSTRUCTION MANAGEMENT AND ENGINEERING (CME)**

**DELFT UNIVERSITY OF TECHNOLOGY  
EINDHOVEN UNIVERSITY OF TECHNOLOGY  
UNIVERSITY OF TWENTE**

## a. Composition of the study programme

The programme ensures that there is available a current study guide – at least in digital form. For (at the minimum) all the courses stated in Articles a to d inclusive, this guide contains a description of the content, learning objectives, form of teaching and manner of examining.

1. The study programme is composed as follows:
  - a. Core programme, 29 – 32 EC

The core programme consists of the following four courses which can be followed at each of the three institutions:

	TUD		TU/e		UT	
Legal and Governance	AR8002	7 EC	7C800	8 EC	195800100	7,5 EC
Project Management	SPM8000	7 EC	1ZM65 / 1CM90	5+3 EC	195800200	7,5 EC
Process Management	SPM8002	7 EC	7C510	8 EC	195800300	7,5 EC
Collaborative Design and Engineering	CME1200	7 EC	7M885	8 EC	195800400	7,5 EC

At the University of Twente, the course in Research Methodology and Academic Skills (195820400) is mandatory (unless this course was part of the pre-master's programme of the student).

- b. Specialism-related courses, 30 – 45 EC, as described in paragraph b.
  - c. Optional courses, 0 – 15 EC, as described in paragraph j.
  - d. Graduation work, 32 – 40 EC
2. Students undertake graduation work of 32 – 40 EC which relates to the specialisation they have chosen at Delft University of Technology, Eindhoven University of Technology or the University of Twente.
3. The graduation work consists of a component 'Preparation for Graduation' of 4 – 10 EC and a graduation project + report and presentation of in total 30 – 32 EC. The component 'Preparation for Graduation' consists of a more in-depth study of the graduation subject and the production of a set-up for and planning of the graduation project.
4. The extent of the four components can deviate somewhat, depending on the courses chosen.
5. Students who come under consideration for admission on the basis of a bachelor's degree awarded by a Dutch university of professional education (HBO) can only be admitted to the programme after rounding off one of the three preparatory programmes of 30 EC.

The courses are mentioned in Appendix 4.

Students who have passed the preparatory programme have the right to join the programme in any of the three locations.

6. Students can put together their own study programme associated with an examination. The study programme must have the approval of the examination committee beforehand.

Approval is granted when, in the judgement of the examination committee, it is plausible that the proposed programme leads to the achievement of the objectives of the programme as formulated in the appendix to this implementation regulation.

## b. Programme of specialism

The programme of specialisms consists of 30 – 40 EC and must be composed from the following courses:

### 1. At the Technical University Delft :

Course code	Course	EC
CME1210	Integration and Orientation	7 EC
CME2200	Dynamic Control of Projects	4 EC
CIE4130	Probabilistic Design	4 EC
CME2300	Financial Engineering	4 EC
CIE4030	Methodology for Scientific Research*	3 EC
CIE4760	Infrastructure Projects; Assessment and Planning	6 EC
EPA1432	Cross-cultural Management	5 EC
WMO312CT	Philosophy, Technology Assessment and Ethics	4 EC

\*Compulsory course

### 2 At the Technical University Eindhoven:

Course code	Course	EC
1ZS01	Entrepreneurship: literature	3 EC
1ZS02	Entrepreneurship: business plan development	3 EC
1ZM75	Entrepreneurial marketing	3 EC
7CS15	Master project CME: Research approaches for CMUD	14 EC
7CS25	Master project CME: Special Subjects for CMUD	14 EC

### 3 At the University of Twente:

Course code	Course	EC
195820500	Infrastructure Management	7,5 EC
201000095	Procurement Strategies and Tendering	7,5 EC
195810100	Markets, Organization and Innovation	7,5 EC
195810200	Supply Chain Management and ICT	7,5 EC
195810310	Industrialization & Innovation in Construction	7,5 EC
195810400	Sustainable Building	7,5 EC
195810600	Project Control and Risk Management	7,5 EC
201400012	Building Information Modeling and 5D Planning	7,5 EC

Students at the UT have to choose at least 30 EC in specialisation courses (from table b.3).

It is allowed to compose the programme of specialisms from courses from different institutions.

## c. Organisation of practical exercises:

The following study components include practical exercises in the sense of Article 1.1, in the format indicated:

Cornerstone	Format
Legal and Governance	Virtual lectures
Project Management	Lectures, project
Process Management	Assignments and lectures
Collaborative Design and Engineering	Project work, lectures and workshops

## d. Study load of the degree programme and of each of the study components it comprises:

The study load of the programme is 120 credits. Of these 120 EC no EC may be part of what belongs to a previously passed bachelor's examination. The study load of the study component is indicated under respectively a, b and j.

**e. Number and frequency of the examinations and practical exercises:**

1. Written and oral (interim) examinations are taken immediately following the teaching period in which the education is provided.
2. At least one repeat opportunity is offered for each written (interim) examination. A timetable of these repeat examinations is published at the beginning of the study year.
3. Practicals can be done in agreement with the relevant timetables.

**f. Form of the degree programme**

The programme may be followed full time.

**g. Format of examinations:**

1. The (interim) examinations are taken in the manner prescribed for the relevant course in the study guide.
2. (Interim) examinations of courses which are given by another programme to the CME programme are taken in the manner determined in or in accordance with the Education and Examination Regulations for CME.

**h. Conditions for admission to the examinations**

Students may only take part in the examinations listed below after they have passed the corresponding examinations listed under respectively a, b and j.

For TUD:

- CME2000 Thesis
- CME2001 Preparation

The means that the graduation work may only be started when the student:

- has rounded off all general components of the examination programme,
- has rounded off the preparatory programme in the case where this has to be done as stated in appendix 1,
- has passed, where relevant, the bachelor's examination as stated in article 4 of the Education and Examinations Regulations (OER).

For TU/e:

- 7CC10 Research Proposal
- 7CC30 Graduation Project CME

Students are allowed to start the M3 project (7CS25) if the M1 (1ZS01, 1ZS02 en 1ZM75) and M2 (7CS15) projects are achieved.

Students are allowed to start their final thesis (7CC30) if they have passed the general Master's projects, the cornerstones and the research proposal (7CC10).

For the UT:

- Students are allowed to start the Preparation Master Thesis course (195889000), if they have passed all other parts of the Master's programme, except from a maximum of 7,5EC.
- Students are allowed to start their final thesis (195899999) if they have passed the Preparation Master Thesis (195889000) course.

**i. Participation in practical exercises:**

The educational programme Civil Engineering and Management consists a number of practical exercises in the form of design projects. Practical exercises can also be a part of a course which is completed with a written exam. More information about these practical exercises can be found in the course descriptions. For the accomplishment of the master thesis, there is a guide available.

# 3 TU.

Usually the opportunity to participate in a project or practical is offered only once per year. If – for reasons beyond his control – a student has not been able to participate in a project or practical in accordance with the regular schedule, the Examination Board will try – to the best of its ability – to enable the student still to carry out the project or practical.

**j. The elective study components from which students must choose for the elective parts of their degree programmes:**

1. Depending on the further filling in of his programme, the student can fill in 4 – 15 EC of the programme with optional courses. For this purpose the optional courses in the list given below are automatically allowed. The agreement of the examination committee and the education management is required for other optional courses.

**Offered at Delft University of Technology:**

Course code	Course	EC
AE4456	Safety of Transportation	3 EC
AE4451	Network and Fleet Planning	3 EC
AR0880	Real estate valuation	7 EC
AR01R25	Real Estate Management	7 EC
AR1R050	Real estate economics, finance and planning	4 EC
CIE4010	Economics	4 EC
CME2210	Open Design and Construction Management – An Operations Research Approach	4 EC
CIE4100	Materials and Ecological Engineering	4 EC
CIE4170	Construction Technology of Civil Engineering Structures	4 EC
CIE4310	Introduction to bed, bank and shore protection	4 EC
CIE5201	Building Component and Material Specification	4 EC
CIE5500	Water Laws and Organisation	3 EC
CIE5720	Environmental Impact Assessment	4 EC
CIE5750	Planning: Policy, methods and institutions	4 EC
CIE5910	Functional design	4 EC
CIE5930	System dynamics	4 EC
CIE5981	Forms of collaboration in Civil Engineering	4 EC
EPA1123	Policy analysis of Multi-Actor systems	5 EC
EPA1232	Economics of infrastructures	6 EC
EPA1422	Inter-organizational decision making	6 EC
OE4606	Introduction to offshore engineering	3 EC
OE4607	Introduction to Dredging Engineering	3 EC
SPM4110	Designing multi-actor systems	6 EC
SPM4416	Strategic management of large engineering projects	6 EC
SPM4530	Agent Based Modelling of complex Networks	4 EC
SPM4710	Design of Urban Concepts	4 EC
SPM4720	Design of Housing Programs	5 EC
SPM4730	Strategies in Urban Restructuring	4 EC
SPM6300	Introduction risk management	3 EC
SPM9155	Advanced System Dynamics	4 EC
SPM9431	Public private partnership	6 EC
SPM9537	Integrated Plant Management	5 EC
WM0943TU	Sustainable Business Game	5 EC
CIE4061	Multidisciplinary project	10 EC*
CME2100	Internship	10 EC*

\* only one of these courses is permitted as elective course

**Offered at Eindhoven University of Technology (for filling in the I&O package):**

Course code	Course	EC
7M860	Urban systems: Analyses & Modeling	5 EC
7M900	Fundamentals in Building Information Modeling	5 EC
0A150	Social Entrepreneurship	3 EC
7N108	Management and organization (organization study trip)*	1 EC
7N208	Management and organization (boardmember study association Of CoUrsE!)*	3 EC
0C900	Technology and sustainability	3 EC
0C903	Energy and consumer	3 EC
3P250	Energy and sustainability	3 EC
7M860	Urban systems: Analyses & Modeling	5 EC
0EM72	Energy and economy	3 EC
7S815	Design of sustainable energy systems for the built environment	3 EC
0E501	Construction law for MSc	6 EC
7M840	Decision support for planning and design	3 EC
7U995	Urban Strategies and Finance	3 EC
7CM40	Career Development	3 EC
1ZS21	Entrepreneurial Finance; Introduction	3 EC
0AM05	Business Law	3 EC
0ZS01	Entrepreneurship and corporate social responsibility	3 EC
1ZM80	New media, entrepreneurship and innovation	3 EC
1ZS20	Corporate entrepreneurship	3 EC
7S620	Sustainable Building 2	3 EC
7U991	Capita Selecta Real Estate Management & Development	3 EC
7Y700	Sustainable building and systems modeling	3 EC
0C940	System innovations and strategic niche management	3 EC

\*Just one of these courses is allowed as an elective course

**Offered at the University of Twente:**

Course code	Course	EC
195410300	Hydraulic Engineering	7,5 EC
195420800	Sustainable Transport	7,5 EC
195421200	Public Transport	7,5 EC
201000025	Land Use and Transport Interactions	7,5 EC
201100005	Traffic Operations	7,5 EC
201100006	Traffic Management	7,5 EC
201100007	Transport Policy	7,5 EC
201100008	Transport Modelling	7,5 EC
201100009	Transport Research Project	7,5 EC
201100010	Intelligent Transport Systems	7,5 EC
201100011	Intelligent Transport Systems Project	7,5 EC
201100013	Rail Transport	7,5 EC
201100012	Mathematical Optimization in Transport	7,5 EC
195400100	Hydrology	7,5 EC
201300077	Water systems	7,5 EC
195400300	Integrated Water Management	7,5 EC
195400400	River Dynamics	7,5 EC
195400500	Design Project Water II	7,5 EC
195400600	Tools for Water Policy Analysis	7,5 EC
201400010	Water Footprint Assessment	7,5 EC
195410100	Data analysis in Water Engineering & Management	7,5 EC
195410200	Morphology*	7,5 EC
195400800	Marine Dynamics	7,5 EC
195400900	Mathematical Physics of Water Systems	7,5 EC

\*For the course in Morphology students need to do the course in Mathematical physics of water

systems at first

2. Where the previous education of a student admitted to the programme does not completely match the programme, the admissions committee can specify additional courses with a total of at most 10 EC which replace one or more optional courses stated in paragraph 1.

In accordance with this article paragraph 2 for TUD students, the following additional courses can be dedicated to students with a bachelor:

BSc Civil Engineering, Delft

Course code	Course	EC
WI1708TH1	Analyse 1	3
WI1708TH2	Analyse 2	3
WI1708TH3	Analyse 3	3

BSc Technology, Policy and Management, Delft

Course code	Course	EC
CTB2410	Waterbouw	5

BSc Civil Engineering and Geosciences, Delft

Course code	Course	EC
WM0201TU	Technical writing	2
EPA1123	Policy Analysis of Multi-Actor Systems	5

BSc other technical programmes Delft

Course code	Course	EC
CT-MI-174-13	Project Management: from Nano to Mega (minor)	30

For the deficiency courses Analysis 1, 2 and 3, the average in proportion to the study load (3 EC) should be at least 6.0, in which for each part at least a 5. There is opportunity to do a re-examination.

#### k. Admission requirements for issuing proof of admission

The admission requirements for the Master's degree programme correspond to the qualities regarding the knowledge, insight and skills that students obtained at the time of finishing their Bachelor's degree programme.

Admission of international students:

1) Command of English: following the introduction of teaching in English, students must have an IELTS or comparable total score of at least 6.5, in which all parts should be assessed with "sufficient".

Comparable scores are:

- TOEFL internet-based: 90
- Cambridge certificate: CPE-C or CAE-C

2) The level of education in the country in which the student has completed his/her pre-university education: this must be more or less comparable with that in the Netherlands.

3) Level of knowledge: the student must also have accumulated sufficient knowledge on the basis of the subjects he/she has studied abroad. It must be at a level comparable to that of Dutch students who are admitted to the Master's programme.

#### i. Bachelor's degree certificates that provide direct access to the Master's programme

The following Bachelor's degree certificates from the institutions for higher education indicated below provide direct access to the Master's programme:

- bachelor programmes Architecture (TUD, TU/e)
- bachelor programmes Civil Engineering (TUD, UT)
- bachelor programmes Technische Bedrijfskunde (TU/e, UT)
- bachelor programme Systems Engineering, Policy Analysis & Management (TUD)
- bachelor programme Technical Innovation Sciences (TU/e)

UT Students with a BSc in Technische Bedrijfskunde are allowed, but have to do the master deficiencies in Construction.

In this, following deficiency courses can be mandatory according to j. 2

# 3 TU.

## **m. Transitional regulations**

In cohort 2010-2011,

the course Planning & Development is ceases to exist and will be substituted by the new course Procurement Strategies & Tendering (20100095). It is not possible to have both courses in your study programme. Examination for the course Planning & Development will not take place anymore.

Since the academic year 2012-2013, I&O will not be offered as a cornerstone anymore at UT.

Examination for this course in Integration & Orientation will not take place anymore.

For cohorts, starting from 2012, the course in Research Methodology and Academic Skills is mandatory (unless it was part of the Pre-Master's programme). Besides, students have to do at least 4 specialisations from the UT-courses as mentioned in article b of the Implementation Regulation.



## Appendix 1

### ***The business of passing the master's examination according to the regulations (from the Rules and guidelines of the examination committee)***

1. The student has passed the master's examination when he has gained a mark  $\geq 6$  for all components of the examination programme.
2. The examination committee can declare students who have not satisfied the requirement for the master's examination as mentioned in paragraph 1 as having passed, when in its opinion the student has clearly shown that he satisfies to a sufficient extent the objectives of the programme.

#### ***Cum Laude:***

- The weighted means of the marks, achieved for parts of the final exam excluding the final mark for the graduation work, are at least 8.0, not taken into account are the 'passed' (voldoendes, v) and exemptions (vrijstellingen, vr)
- The fraction of classes with the mark V or VR cannot exceed more than one-third of the total classes
- No mark below 7.0 is allowed
- The master project should have a mark of at least 8.0 (8.5 at TUD)
- At Delft, there also a limitation of study duration of 2.5 years

### ***The business of passing the preparatory programme according to the regulations for students with a bachelor's degree from a Dutch university of professional education (from the Rules and guidelines of the examination committee)***

The student has passed the preparatory programme when he has gained a mark  $\geq 6$  for all components of that programme. In relation to this the following additional rules apply per institution:

#### **For Delft University of Technology**

The opportunity to re-take examinations is offered.

HBO students are allowed to start the second master's year only if they passed their preparatory programme before the application deadline for the second year's master courses.

For the courses Analysis 1, 2 and 3 pertain the proportion to the average course load (3 EC) must be at minimum a 6, in which for each part at least a 5 must be obtained. There is opportunity to do an re-examination in the 1st semester.

Students may begin their final thesis when they have passed the general master's projects and the cornerstones.

#### **For Eindhoven University of Technology:**

Students are allowed to start the M3 project (7CS25) if the M1 (1ZS01, 1ZS02 en 1ZS03) and M2 (7CS15) projects are achieved.

Students may begin their final thesis when they have passed the general Master's projects, the cornerstones and the research proposal.

#### **For the University of Twente**

1. For HBO students in Civil Engineering or comparable education, the pre-master's programme consists of:

First quarter	Second quarter
Calculus A (4 EC)	Calculus B (3 EC) Kansrekening & Statistiek (3 EC)
Research skills and Academic skills for pre-master students (3 EC)	Research skills and Academic skills for pre-master students (4 EC)
Project B3 (integraal ontwerpproject) (8 EC)	Water & Stromingsleer (5 EC)

# 3 TU.

2. The student is permissible only if the full pre-master programme is completed in 1 year.

*For WO side inflow:*

1. WO side inflow who have not more than 15 EC in deficiencies, are directly admitted to the master programme and can realise the removal of these deficiencies within the CEM programme.
2. WO side inflow who have more than 15 EC in deficiencies, are not allowed directly to the CEM program.

*Final provision*

If in the opinion of the Examination Committee there is a talk of circumstances, they can – for the student favourable sense – vary from the abovementioned provisions. The student needs to report these conditions as soon as they occur to the academic advisor.

## Appendix 2 - Final attainment level (programme objectives) of the CME Master's programme

In this section we will describe the skills and knowledge of a graduate in Construction Management & Engineering and provide an indication of his or her general academic level.

### 2.1 Domain-specific requirements

The 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':

<b>3TU Academic Criteria</b>	<b>Description of the Learning Outcomes</b>
1. Competent in one or more scientific disciplines	<ul style="list-style-type: none"> <li>▪ 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).               <ul style="list-style-type: none"> <li>○ Project and Process management in the field of Construction Engineering (i.e. complex constructions, large-scale infrastructure, urban developments)</li> <li>○ Legal and Governance aspects in the field of Construction Engineering</li> <li>○ Markets and organisations in the field of Construction Engineering</li> <li>○ Innovations and Integral Design in Construction Engineering</li> </ul> </li> <li>▪ 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.</li> </ul>
2. Competent in doing research	<ul style="list-style-type: none"> <li>▪ The graduate has the competence to acquire new scientific knowledge through research or systematic reflection.</li> <li>▪ He understands the potential benefits of research and is able to understand and incorporate the results of research into his own work.</li> </ul>
3. Competent in designing	<ul style="list-style-type: none"> <li>▪ The graduate is able to               <ul style="list-style-type: none"> <li>○ Contribute to a functional design of complex constructions or</li> <li>○ Design management processes in the field of Construction Engineering</li> </ul> </li> </ul> <p>This means that:</p> <ul style="list-style-type: none"> <li>▪ The graduate has creativity and synthetic skills with respect to design projects</li> <li>▪ The graduate is application-oriented towards the construction industry when designing constructions or management processes</li> <li>▪ The graduate is able to translate technological concepts and developments into appropriate process innovations for construction.</li> <li>▪ 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</li> </ul>
4. A scientific approach	<ul style="list-style-type: none"> <li>▪ The graduate has the habit of reflecting upon his own work and continuously uses relevant information to improve his capabilities.</li> <li>▪ The graduate has the attitude to endorse his personal development and enhancing his expertise.</li> <li>▪ The graduate knows that models only approximate reality and is able to develop and use them adequately whenever this is beneficial</li> <li>▪ The graduate makes decisions based on calculated risks, costs, time, quality, stakeholders' participation, value creation, legislation and is able to evaluate these decisions</li> <li>▪ 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</li> </ul>

<b>3TU Academic Criteria</b>	<b>Description of the Learning Outcomes</b>
5. Basic intellectual skills	<ul style="list-style-type: none"> <li>▪ The graduate is able to work independently</li> <li>▪ The graduate is able to work systematically and methodically</li> <li>▪ The graduate is able to reflect on the complete scope of Construction Management and Engineering issues, to critically analyse and to generate novel ideas.</li> <li>▪ The graduate is able to invent his own tools, theories and techniques if these are not available</li> </ul>
6. Competent in cooperating and communicating.	<ul style="list-style-type: none"> <li>▪ 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, i.e. can take up responsibility as a member and/or as a project leader.</li> <li>▪ The graduate knows the importance of oral and written communication, in particular in English, and can make effective use of these, this means that:               <ul style="list-style-type: none"> <li>○ 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.</li> <li>○ The graduate is competent in reasoning</li> <li>○ The graduate adheres to existing academic conventions, such as giving proper credit and referencing.</li> </ul> </li> </ul>
7. Takes account of the temporal and societal context	<ul style="list-style-type: none"> <li>▪ The graduate is able to form an opinion or judgement and contribute to discussions about complex matters related to Construction Management and Engineering</li> <li>▪ The graduate knows that compromises are unavoidable and is able to effectively deal with these.</li> <li>▪ 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.</li> </ul>

## Appendix 3 – Regular CME programme at the three locations

Course code	Course	EC	Quartile	Total EC
<b>1st semester 1.1</b>				
AR8002	Legal and Governance	7	1	
CIE4130	Probabilistic Design	4*	1,2	
SPM8000	Project Management	7	2	
SPM8001	Process Management	7	2	
				21-25
<b>2nd semester 1.2</b>				
CIE4010	Economics	4*	2	
AE4-230	Risk Management	3	3	
CME1200	Collaborative Design and Engineering	7	3	
CIE4760	Infrastructure Projects; Assessment and Planning	6	2	
CIE4030	Methodology for Scientific Research	3	4	
WM0312CT	Philosophy, Technology Assessment and Ethics	4	4	
Elective courses (*) 8 EC out of 16 EC				27-31
<b>1st semester 2.1</b>				
CME2200	Dynamic Control of Projects	4	1	
EPA1432	Cross-cultural Management	6	1	
CME2300	Financial Engineering	4	1	
-	Free elective courses	12**	-	
CIE4040	Traineeship	10**		
** traineeship or free elective courses				24-26
<b>2nd semester 2.2</b>				
CME2000	Master Thesis	32	1, 2, 3,4	
CME2001	Master Thesis preparation	4	1, 2, 3, 4	
				36
<b>1st and 2nd year of master programme</b>				
CME1210	Integration and orientation	7	2	
				7
Totaal Master CME				120

## Regular programme Master CME TU/e 2014-2015, Year 1 (cohort 2014)

Course code	Course	EC	Quartile	Total EC
<b>First year, semester A</b>				
1ZM65	System Dynamics	5	1,2	
1CM90	Project Management	3	2	
1ZS01	Entrepreneurship: Literature	3	1	
1ZS02	Entrepreneurship: Business Plan Development	3	1,2	
1ZM75	Entrepreneurial Marketing	3	1	
7C800	Legal and Governance Aspects	8	1	
	Individual course choice	5	1,2,3,4	
				<b>30</b>
Course code	Course	EC	Quartile	Total EC
<b>First year, semester B</b>				
7CS15	Research approaches for Construction Management & Urban Development	14	3,4	
7C510	Process management in urban planning & development	8	3	
7M885	Collaborative design and engineering	8	3	
				<b>30</b>

## Regular programme Master CME TU/e 2014-2015, Year 2 (cohort 2014)

Course code	Course	EC	Quartile	Total EC
<b>Second year, semester A</b>				
7CS25	Special subjects for Construction management & Urban Development	14	1,2	
7CC10	Research proposal	10	1	
7CM01	Essay Integration & Orientation	1	1	
	Individual course choice	5	1,2,3,4	
				<b>30</b>
Course code	Course	EC	Quartile	Total EC
<b>Second year, semester B</b>				
7CC30	Graduation project CME	30	3,4	
				<b>30</b>
	TOTAL EC			<b>120</b>

## CME programme UT 2014-2015

Course code	Course	EC	Total EC
<b>Quartile 1.1</b>			
195800100	Legal & Governance Aspects (cornerstone)	7,5	
195800300	Process Management (cornerstone)	7,5	
			15
<b>Quartile 1.2</b>			
195820400	Research Methodology & Academic skills (verplicht vak)	7,5	
195800200	Project Management (cornerstone)	7,5	
			15
<b>Quartile 1.3</b>			
201000095	Procurement Strategies and Tendering (spec.)	7,5	
19580040	Collaborative design and engineering (cornerstone)	7,5	
201400012	Building Information Modeling and 5D Planning (spec.)	7,5	
	Or		
19581060	Project Control & Risk Management (spec.)	7,5	
			15
<b>Quartile 1.4</b>			
19581031	Industrialization & Innovation in Construction (spec.)	7,5	
195820500	Infrastructure Management (spec.)	7,5	
	Keuzevak	7,5	
			7,5
<b>Quartile 2.1</b>			
19581040	Sustainable Building (spec)	7,5	
	and/or		
19581020	Supply chain management & ITC (spec)	7,5	
			15
<b>Quartile 2.2</b>			
195889000	Preparation Master Thesis	7,5	
19581010	Markets, Organization and Innovation (spec.)	7,5	
			15
<b>Quartile 2.3 and 2.4</b>			
195899999	CME Master thesis	30	
			30
<b>Total EC</b>			<b>120</b>

## Appendix 4 – Pre-Master's programmes

### Pre-master programme Master CME, TU Delft

Vakcode	Vak	EC	Kwartiel	Totaal EC
<b>1st semester 1.1</b>				
WI1265TH	Analyse , deel 1, 2 en 3	9	1,2	
WI1807TH	Lineaire Algebra	3	1	
CTB2200	Kansrekening en statistiek	3	2	
CTB3380	Infrastructuur Management	4	3	
				18
<b>2nd semester 1.2</b>				
SPM2120	Wetenschaps- en argumentatieleer	3	3	
CTB2410	Waterbouw	5	4	
CTB3420	Integraal ontwerp infrastructuur	4	4	
				12
Total premaster CME				30

### Pre-master programme Master CME, TU Eindhoven

Vakcode	Vak	EC	Kwartiel	Totaal EC
<b>Semester A</b>				
2DB03	Calculus	3	1	
7U9X0	Research and Statistics	5	2	
7XX11	Introductory course architecture	2	1	
7CM10	Entry project CME	10	1,2	
7UUUX0	Housing and Residential Real Estate	5	2	
7W7X0	Urban planning	5	1	
				30

### Pre-master programme Master CME, UT

Vakcode	Vak	EC
191512001	Calculus A	4 EC
191512021	Calculus B	3 EC
195820400	Research Skill and Academic Skills for Pre-Master Students	7 EC
191530082	Kansrekening & Statistiek	3 EC
192211351	Project B3 (integraal ontwerpproject)	8 EC
201400199	Water & Stromingsleer	5 EC
Totaal		30 EC