

# **THE IMPLEMENTATION REGULATIONS**

**2014-2015**

**MASTER OF SCIENCE  
CIVIL ENGINEERING**

**DELFT UNIVERSITY OF TECHNOLOGY**

## Section 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 8 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:
  - Structural Engineering
  - Building Engineering
  - Hydraulic Engineering
  - Water Management
  - Transport and Planning
  - Geo-Engineering
  - Geoscience and Remote Sensing
  - the Erasmus Mundus programme: Coastal and Marine Engineering and Management
2. Within the tracks Structural Engineering, Building Engineering, Hydraulic Engineering and Water Management the student can choose the specialisations given in Articles 5, 6, 7 and 8.
3. Within a track or within a specialisation the student may opt for the following annotations mentioned in Articles 12A – 12E:
  - Technology in Sustainable Development
  - Entrepreneurship
  - Urban Planning and Engineering ("Stadsingenieur")
  - Infrastructure Planning and Environmental Engineering ("Infrastructuur en milieu")
  - Integral Design Management
4. The Erasmus Mundus MSc programme Coastal and Marine Engineering and Management is subject to the programme-specific "Education and Examination Guidelines CoMEM" and the connected "Implementations Regulations for the MSc Degree CoMEM". These guidelines and regulations replace the present Teaching and Education Regulations and Implementation Regulations for the MSc degree in Civil Engineering in the case of CoMEM only.

### Article 3 – The composition

1. The study programme tracks are compiled in the following way:
  - a. 4 credits: the subject Philosophy, Technology Assessment and Ethics for CT (WM0312CIE) or the subject Climate Change: Science & Ethics (CIE4510). Geoscience and Remote Sensing students do CIE4613<sup>1</sup> (5 credits), Climate Change: Science and Ethics, instead.
  - b. 56 credits<sup>2</sup>: track-linked subjects belonging to the chosen track. The track-linked subjects may be subdivided into those that are general track-linked subjects and those that belong to a specialisation as stipulated in Articles 5 to 11.  
Track-linked credits, exceeding 56 credits, will be considered as credits achieved for electives mentioned under c.
  - c. 20 credits as follows<sup>3</sup>:

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<sup>1</sup> Not combined with CIE4510

<sup>2</sup> Geoscience and Remote sensing students do 55 credits

<sup>3</sup> Not for Building Engineering students, see Article 6 subsection 1.

\* 20 credits electives. The student has to choose 10 credits offered in conjunction with the degree course. For the other credits the student may choose:

- all subjects offered in conjunction with the degree course,
- all subjects offered in conjunction with other Master's degree courses at a Dutch university,
- the specialisation subjects included in the list "keuzelijst specialisatievakken" as intended in Article 3 of the Implementation Regulations for the Bachelor's degree course in Civil Engineering at Delft University of Technology, as far as they are considered to be convergence subjects,
- interfaculty Master's-level electives at Delft University of Technology with a "WM-code" to a maximum of 6 credits.

Before any other subjects can be studied the approval of the board of examiners is required.

OR

\* two of the possibilities listed below:

- 10 credits: Internship (CIE4040-09)
- 10 credits: Multidisciplinary Project (CIE4061-09)
- 10 credits: electives. What is determined above for the other electives is similarly applicable.
- 10 credits: Additional Master Thesis Project (CIE5050-09). The Additional Master Thesis Project may or may not be related to the Master Thesis Project mentioned under d but it may, in any case, be separately distinguished.

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.

2. In Article 20 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, the Additional Master Thesis Project and the Master Thesis Project.

#### **Article 4 – Registering the tracks and compiling the examination programme**

1. When he/she commences his/her study the student must register himself/herself with the graduation coordinator as a prospective graduate of the track of his/her choice. After that the track-linked subjects of his/her examination programme will be determined in consultation with the coordinator.
2. In accordance with what is determined in subsection 1, but in any case before the Master Thesis Project or the Additional Master Thesis Project is started on, the student must draw up his/her entire examination programme before then presenting it – together with the assessment committee's compilation – to the board of examiners for approval.
3. Any amendments made to the approved examination programme or to the approved assessment committee should be presented to the board of examiners.
4. Students who opt for an annotation mentioned in Articles 12A – 12E must also have the discussion mentioned in subsection 1 with the referent, coordinator or programme director for the chosen annotation.

#### **Article 5 – The Structural Engineering track**

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

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

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

- Students with a relevant foreign Bachelor of Science degree will, if required by intake, do CIE4145-09 (Dynamics and Introduction to Continuum Mechanics) as a compulsory elective subject.

- Students who have not done CT3150 or CTB3335 (Concrete Structures 2) in the Bachelor's phase will have to do CIE3150 as a compulsory elective subject.
- Students who have not done CT3109-09 or CTB3330 (Structural Mechanics 4) in the Bachelor's phase are strongly advised to take CIE3109-09 as an elective subject.

2. Common compulsory block Structural Engineering

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4100	Materials and Ecological Engineering	4
CIE4110	Timber and Timber Structures 1	4
CIE4115	Steel Structures 2	4
CIE4121	Steel Structures 3	4
CIE4140	Structural Dynamics	4
CIE4160	Prestressed Concrete	4
CIE4180	Plates and Slabs	4
CIE4190	Analysis of Slender Structures	4

3. Additional block Structural Mechanics

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

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

4. Additional block Concrete Structures

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

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

5. Additional block Steel and Timber Construction

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

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

6. Additional block Materials and Environment

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4030	Methodology for Scientific Research	3
CIE5100	Repair and Maintenance of Construction Materials	4
CIE5102	Forensic Building Materials Engineering	3

CIE5110	Concrete – Science and Technology	4
CIE5126	Fatigue	3
CIE5130	Capita Selecta Concrete Structures	4
CIE5146	Micromechanics and Computational Modelling of Building Materials	3

7. Additional block Road and Railway Engineering

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

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

8. Additional block Hydraulic Structures

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3310-09 <sup>4</sup>	Open Channel Flow	4
CIE3330 <sup>5</sup>	Hydraulic Structures 1	4
CIE4130	Probabilistic Design and Risk Management	4
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE4310	Bed, Bank and Shoreline Protection	4
CIE4345 <sup>6</sup>	River Engineering	4

9. Structural Engineering electives

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4510	Climate Change: Science and Ethics	4

Of particular interest for Structural Mechanics students:

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

Of particular interest for Hydraulic Structures students:

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

For foreign students only:

CIE4145-09	Dynamics and Introduction to Continuum Mechanics	4
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## Article 6 – The Building Engineering track

- The Building Engineering track has three specialisations:
  - Building Technology and Physics
  - Structural Design
  - Design and Construction Processes

<sup>4</sup> Not if CT3310-09 has been completed in the Bachelor's phase

<sup>5</sup> Not if CT3330 has been completed in the Bachelor's phase

<sup>6</sup> Not if CT3340 or CIE4345MI has been completed in the Bachelor's phase

The compulsory programme for each specialisation consists of a common Building Engineering block of 23 credits and an additional block of 33 credits.

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

- Contrary to Article 3 subsection 1c Building Engineering students must follow AR2RP111 (Workshop High Rise Buildings, 12 credits) in collaboration with the Architectural department instead of CT4061-09 (Multidisciplinary Project).
- Students who have not done CT3221 (Building Physics and Building Technology) or CTB3345 (Building Physics and Facades) in the Bachelor's phase will have to do CIE3345 (Introduction Building Physics and Facades) as a compulsory elective subject.

2. Common compulsory block Building Engineering

All students opting for the track Structural Engineering must complete the following subjects adding up to 23 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4202	Architectural History of Buildings	4
CIE4215	Façade Design Plus	3
CIE5981	Forms of Collaboration in Civil Engineering	4
AR2AE010	Extreme	12

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 33 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4225	Advanced and Applied Building Physics	6
CIE5100	Repair and Maintenance of Construction Materials	4
CIE5131	Fire Safety Design	3
AR0115	Technoledge Façade Design	6
AR0532	Innovation and Sustainability (theory)	3
AR0533	Innovation and Sustainability (manual)	3
Extra electives, as mentioned in Article 3 subsection 1c		8

4. Additional block Structural Design

Students who have opted for the specialisation Structural Design must complete the following subjects adding up to 33 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3109-09 <sup>7</sup>	Structural Mechanics 4	4
CIE3150 <sup>8</sup>	Concrete Structures 2	4
CIE4115	Steel Structures 2	4
CIE4190	Analysis of Slender Structures	4
CIE4281	Building Structures 2	4
CIE5251-09	Structural Design, Special Structures	5
choose one out of:		
CIE4110	Timber and Timber Structures 1	4
CIE4180	Plates and Slabs	4
CIE4285	Structural Glass	3
Extra electives, from the list below		4 or 5

If one or more of the above-mentioned subjects CIE3109-09, CIE3150, CIE4115 and CIE4190 has been done in the Bachelor's phase, the student may choose from:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4121	Steel Structures 3	4
CIE4125	Structural Design - Case Study Steel, Timber or FRP	3
CIE4140	Structural Dynamics	4
CIE4160	Prestressed Concrete	4
CIE4362	Soil Structure Interaction	3
CIE4363	Foundations and Deep Excavations	4
CIE5124	Timber and Timber Structures 2	4

<sup>7</sup> Not if CT3109-09 has been completed in the Bachelor's phase

<sup>8</sup> Not if CT3150 has been completed in the Bachelor's phase

CIE5131	Fire Safety Design	3
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5. Additional block Design and Construction Processes

(not for students starting their Master's degree programme as of 1 September 2014)

Students who have opted for the specialisation Design and Construction Processes must complete the following subjects adding up to 33 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE5910	Functional Design and Methodology	4
CME1200	Collaborative Design and Engineering	7
CME2200	Dynamic Control of Projects	4
choose one out of:		
CIE4030	Methodology for Scientific Research	3
CIE4130	Probabilistic Design and Risk Management	4
CIE4920	Parametric Design Systems	4
CME2300	Financial Engineering	4
Extra electives, as mentioned in Article 3 subsection 1c		3

If CIE4920 has been done in the Bachelor's phase (as part of the minor "Management van Bouwprojecten"), the student may choose from:

- CIE4130 Probabilistic Design, 4 EC's and CME2300 Financial Engineering, 3 EC's
- CIE4030 Methodology for Scientific Research, 3 EC's

## Article 7 – The Hydraulic Engineering track

1. The Hydraulic Engineering track has five specialisations:

- Coastal Engineering
- Rivers, Ports and Waterways, with fields River Engineering, Dredging Engineering and Ports and Waterways
- Environmental Fluid Mechanics
- Hydraulic Structures and Flood Risk, with fields Hydraulic Structures and Flood Risk
- Water Management and Engineering

and one specialisation in a double degree programme with the National University of Singapore (NUS), mentioned in subsection 9:

- Hydraulic Engineering and Water Resources Management (the TUD-NUS specialisation)

The compulsory programme for each specialisation, except for the TUD-NUS specialisation, consists of a common Hydraulic Engineering block of 14 credits (10 credits if CT3340 or CIE4345MI has been completed in the Bachelor's phase), an additional specialisation block and Hydraulic Engineering electives adding up to a total of 56 track-linked credits.

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

- Students with a relevant foreign Bachelor of Science degree who opt for the field Hydraulic Structures of the specialisation Hydraulic Structures and Flood Risk, will, if required by intake, do CIE4145-09 (Dynamics and Introduction to Continuum Mechanics) as a compulsory elective subject.
- Students who have not done CT3310-09 or CTB3350 (Open Channel Flow) in the Bachelor's phase will have to do CIE3310-09 as a compulsory elective subject.
- Students who have not done CT3330 or CTB3355 (Hydraulic Structures 1) in the Bachelor's phase will have to do CIE3330 as a compulsory elective subject.

2. Common compulsory block Hydraulic Engineering

All students opting for the track Hydraulic Engineering must complete the following subjects adding up to 14 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4130	Probabilistic Design and Risk Management	4
CIE4305	Coastal Dynamics 1	6
CIE4345 <sup>9</sup>	River Engineering	4

3. Additional block Coastal Engineering

<sup>9</sup> Not if CT3340 or CIE4345MI has been completed in the Bachelor's phase

Students who have opted for the specialisation Coastal Engineering must complete the following subjects adding up to 27 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4309	Coastal Dynamics 2	5
CIE4310	Introduction to Bed, Bank and Shoreline Protection	4
CIE4325	Ocean Waves	6
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE5308	Breakwaters and Closure Dams	4

4. Additional block Rivers, Ports and Waterways

Students who have opted for the specialisation Rivers, Ports and Waterways must complete the following subjects adding up to 30 credits (field River Engineering 29 credits):

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4310	Introduction to Bed, Bank and Shoreline Protection	4
CIE4325	Ocean Waves	6
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE5300	Dredging Technology	4
CIE5311	River Dynamics	4

and choose one field:

field River Engineering:

CIE5315	Computational Hydraulics	3
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field Dredging Engineering:

OE4626	Dredging Processes	4
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field Ports and Waterways:

CIE5306	Ports and Waterways 2	4
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5. Additional block Environmental Fluid Mechanics

Students who have opted for the specialisation Environmental Fluid Mechanics must complete the following subjects adding up to 27 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4310	Introduction to Bed, Bank and Shoreline Protection	4
CIE4325	Ocean Waves	6
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE5302	Stratified Flows	3
CIE5312	Turbulence in Hydraulics	3
CIE5315	Computational Hydraulics	3

6. Additional block Hydraulic Structures and Flood Risk

Students who have opted for the specialisation Hydraulic Structures and Flood Risk must complete the following subjects adding up to 31 credits (field Hydraulic Structures 33 credits):

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE4310	Introduction to Bed, Bank and Shoreline Protection	4
CIE4325	Ocean Waves	6
CIE5313	Hydraulic Structures 2	3
and choose one field :		
field Hydraulic Structures :		
CIE3109-09 <sup>10</sup>	Structural Mechanics 4	4
CIE3150 <sup>11</sup>	Concrete Structures 2	4
CIE4140	Structural Dynamics	4
CIE4160	Prestressed Concrete	4
field Flood Risk:		
CIE3325 <sup>12</sup>	Mechanics and Transport by Flow in porous Media	4

<sup>10</sup> Not if CT3109-09 has been completed in the Bachelor's phase

<sup>11</sup> Not if CT3150 has been completed in the Bachelor's phase

<sup>12</sup> Not if CTB3390 has been completed in the Bachelor's phase



CIE4367	Embankments and Geo-synthetics	4
CIE5310	Probabilistic Design in Hydraulic Engineering	3
CIE5314	Flood Defences	3

7. Additional block Water Management and Engineering

Students who have opted for the specialisation Water Management and Engineering must complete the following subjects adding up to 33 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4330	Ports and Waterways 1	4
CIE4410	Water Systems, People and Society	4
CIE4450	Integrated Water Management	4
CIE4760	Infrastructure Projects: Assessment and Planning	6
CIE5314	Flood Defences	3
CIE5450	Hydrology of Catchments, Rivers and Deltas	4
CIE5510	Urban Water Management	4

8. Hydraulic Engineering electives

Apart from what is stipulated in subsections 2 to 7, Hydraulic Engineering students should make sure they get - depending on their specialisation and in consultation with the graduation professor - a total of 56 track-linked credits by choosing from the above listed subjects or from the list below:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3310-09 <sup>13</sup>	Open Channel Flow	4
CIE3330 <sup>14</sup>	Hydraulic Structures 1	4
CIE3365-13	Coupled Processes in Subsurface	6
CIE3410-09 <sup>15</sup>	Water Control	4
CIE3420	Introduction to Water Treatment	4
CIE4030	Methodology for Scientific Research	3
CIE4115 <sup>16</sup>	Steel Structures 2	4
CIE4145-09 <sup>17</sup>	Dynamics and Introduction to Continuum Mechanics	4
CIE4180	Plates and Slabs	4
CIE4190 <sup>18</sup>	Analysis of Slender Structures	4
CIE4308	Sediment Dynamics	3
CIE4361	Behaviour of Soils and Rocks	6
CIE4362	Soil-Structure Interaction	3
CIE4363	Foundation and Deep Excavations	4
CIE4366	Numerical Modelling in Geo-Engineering	6
CIE4400	Water Quality Modelling	4
CIE4420 <sup>19</sup>	Geohydrology 1	4
CIE4431	Hydrologic Models	4
CIE4440	Hydrological Measurements	4
CIE4460	Polders and Flood Control	4
CIE4491	Urban Drainage and Water Management	4
CIE4495-13	Fundamentals of Water Treatment	4
CIE4780	Trending Topics in Geo-Engineering	4
CIE5304	Waterpower Engineering	3
CIE5305	Bored and Immersed Tunnels	4
CIE5307	Coastal Zone Management	3
CIE5317	Physical Oceanography	3
CIE5318	Fieldwork Hydraulic Engineering	4
CIE5320	Site Characterisation, Testing and Physical Model	6
CIE5340	Soil Dynamics	3
CIE5401	Spatial Tools in Water Resources Management	3
CIE5421	Water and Health	4

<sup>13</sup> Not if CT3310-09 has been completed in the Bachelor's phase

<sup>14</sup> Not if CT3330 has been completed in the Bachelor's phase

<sup>15</sup> Not if CT3410-09 has been completed in the Bachelor's phase

<sup>16</sup> Not if CT3121 has been completed in the Bachelor's phase

<sup>17</sup> For foreign students only

<sup>18</sup> Not if CT3110 has been completed in the Bachelor's phase

<sup>19</sup> Not combined with CIE3325

CIE5440	Geohydrology 2	2
CIE5471	Hydrological and Ecological Fieldwork in River Systems	4
CIE5490	Operational Water Management	4
CIE5500	Water Law and Organisation	4
CIE5541	Urban Drainage Monitoring and Modelling	3
CIE5560	Civil Engineering in Developing Countries	4
CIE5580	Ecology and Geomorphology	5
CIE5741	Trenchless Technologies	4
CIE5981	Forms of Collaboration in Civil Engineering	4
CE5307NUS	Wave Hydrodynamics and Physical Oceanography (NUS)	6
CE5308NUS	Coastal Processes and Sediment Transport (NUS)	6
CE5310NUS	Hydro Informatics (NUS)	6
CE5311NUS	Environmental Modelling with Computers (NUS)	6
CE5312NUS	River Mechanics (NUS, not combined with CIE4345)	6
CE5603NUS	Engineering Economics and Project Evaluation (NUS)	6
CE5710NUS	Design of Floating Structures (NUS)	6
CE5711NUS	Offshore Moorings and Risers (NUS)	6
AES1630	Engineering Geology	4
AES1730 <sup>20</sup>	Introduction to Geotechnical Engineering	3
AES1750-09	Geology for Engineers	4
CME2300	Financial Engineering	4
EPA1113	Principles of Policy Analysis	5
EPA1123	Policy Analysis of Multi-Actor Systems	5
EPA1131	Technology Dynamics and Impact Assessment	5
EPA1132	Technology Development and Impact Assessment	5
EPA1423	Decision Making in Networks	5
ESE4001	Basic Environmental Science and Engineering (NUS)	6
ESE5402	Water Treatment Processes (NUS)	6
ESE5601	Environmental Risk Assessment (NUS)	6
ESE5602	Environmental Management System (NUS)	6
IE5303	Decision Analysis (NUS)	6
OE4624	Offshore Soil Mechanics	3
OE4625	Dredge Pumps and Slurry Transport	4

#### 9. Hydraulic Engineering and Water Resources Management (the TUD-NUS HE programme)

The Hydraulic Engineering and Water Resources Management programme holds a mixture of subjects of Delft University of Technology (TUD) and the National University of Singapore (NUS).

The TUD-NUS HE programme consists of a common compulsory block of 44 credits (46 credits if CE5312 is taken instead of CIE4345; 40 credits if CT3364 or CT3340 or CIE4345MI has been completed in the Bachelor's phase) and electives adding up to a total of 56 track-linked credits.

##### Common compulsory block TUD-NUS HE programme

All students opting for the TUD-NUS HE programme must complete the following subjects adding up to 40, 44 or 46 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4130	Probabilistic Design and Risk Management	4
CIE4310	Introduction to Bed, Bank and Shoreline Protection	4
CIE4330	Ports and Waterways 1	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE4345 <sup>21</sup>	River Engineering	4
CE5307NUS	Wave Hydrodynamics and Physical Oceanography	6
CE5308NUS	Coastal Processes and Sediment Transport	6
CE5310NUS	Hydro Informatics	6
CE5311NUS	Environmental Modelling with Computers	6
CE5312NUS <sup>22</sup>	River Mechanics	6

##### TUD-NUS HE programme electives

<sup>20</sup> Not for students who completed a soil mechanics subject in their Bachelor's degree course.

<sup>21</sup> Not if CT3364 or CT3340 or CIE4345MI has been completed in the Bachelor's phase

<sup>22</sup> Not combined with CIE4345

TUD-NUS HE programme students should make sure they get a total of 56 track-linked credits by choosing from the above in subsections 3 to 8 listed subjects or from the list below:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CE5603NUS	Engineering Economics and Project Evaluation	6
CE5710NUS	Design of Floating Structures	6
CE5711NUS	Offshore Moorings and Risers	6
ESE4001 (NUS)	Basic Environmental Science and Engineering	6
ESE5402 (NUS)	Water Treatment Processes	6
ESE5601 (NUS)	Environmental Risk Assessment	6
ESE5602 (NUS)	Environmental Management System	6
ESE5901 (NUS)	Environmental Technology	6
IE5303 (NUS)	Decision Analysis	6

## Article 8 – The Water Management track

- The Water Management track has four specialisations:
  - Hydrology
  - Water Resources Management
  - Sanitary Engineering
  - Water Management and Engineering

The Water Management track is a Campus degree programme as well as an online degree programme. Each online course is given parallel to the Campus course, within the same period, ending with exams together with Campus students.

The compulsory programme for each specialisation consists of a common compulsory Water Management block of 16 credits and 40 credits Water Management specialisation electives. Students however who opt for the Water Management and Engineering specialisation must complete a compulsory block of 43 credits instead.

Students with a Dutch higher vocational institute Bachelor degree ("HBO") must complete CIE3410-09, Water Control, 4 ECs as a Water Management specialisation elective and AES1730, Introduction to geotechnical Engineering, 3 ECs, as a free elective.

- Common compulsory block Water Management  
All students opting for the track Water Management, except for the Water Management and Engineering specialisation, must complete the following subjects adding up to 20 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4440	Hydrological Processes and Measurements	4
CIE4450	Integrated Water Management	4
CIE4491	Urban Drainage and Water Management	4
CIE4495-13	Fundamentals of Water Treatment	4

- Water Management specialisation electives  
Depending on their specialisation and in consultation with their graduation professor Water Management students are required to complete a selection of the following subjects adding up to 40 credits.

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3310-09 <sup>23</sup>	Open Channel Flow	4
CIE3365 <sup>24</sup>	Introduction in Water Treatment	4
CIE3410-09 <sup>25</sup>	Water Control	4
CIE4340	Computational Modelling of Flow and Transport	4
CIE4400	Water Quality Modelling	4
CIE4410	Water Systems, People and Society	4
CIE4420	Geohydrology 1	4
CIE4415	Design of Drinking Water and Wastewater Treatment Plants	5

<sup>23</sup> Not if equivalent subject has been completed in the Bachelor's phase

<sup>24</sup> idem

<sup>25</sup> idem

CIE4431	Hydrological Models	4
CIE4460	Polders and Flood Control	4
CIE4475	Drinking Water Treatment	5
CIE4485	Wastewater Treatment	5
CIE5401	Spatial Tools in Water Management	3
CIE5421	Water and Health	4
CIE5440	Geohydrology 2	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	Urban Water Management	4
CIE5541	Urban Drainage Monitoring and Modelling	3
CIE5550	Pumping Stations and Transport Pipelines	4
CIE5560	Civil Engineering in Developing Countries	4
CIE5580	Ecology and Geomorphology	5
BK7250	Sustainable Urbanism	3
AR1U130	Sustainable Urban Engineering of Territory	3

#### 4. Water Management and Engineering

Students who have opted for the specialisation Water Management and Engineering must complete the following compulsory subjects adding up to 43 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4130	Probabilistic Design and Risk Management	4
CIE4305	Coastal Dynamics 1	6
CIE4330	Ports and Waterways 1	4
CIE4345 <sup>26</sup>	River Engineering	4
CIE4410	Water Systems, People and Society	4
CIE4450	Integrated Water Management	4
CIE4760	Infrastructure Projects: Assessment and Planning	6
CIE5314	Flood Defences	3
CIE5450	Hydrology of Catchments, Rivers and Deltas	4
CIE5510	Urban Water Management	4

In addition students opting for the specialisation Water Management and Engineering select 13 credits specialisation electives from Hydraulic Engineering subjects mentioned in Article 7, and/or from Water Management subjects listed in subsections 2 and 3. These elective are chosen in consultation with the graduation professor.

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

The Hydraulic Engineering and Water Resources Management programme holds a mixture of subjects of Delft University of Technology (TUD) and the National University of Singapore (NUS).

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

##### Common compulsory block TUD-NUS programme

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

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

and choose four out of:

CE5307NUS	Wave Hydrodynamics and Physical Oceanography	6
CE5308NUS	Coastal Engineering and Sediment Transport	6

<sup>26</sup> Not if CT3340 or CIE4345MI has been completed in the Bachelor's phase

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 above in subsections 2 to 4 listed Water Management subjects.

TUD-NUS WM programme electives

TUD-NUS WM programme students select for 24 credits from select 13 credits electives from Hydraulic Engineering subjects mentioned in Article 7, and/or from Water Management specialisation electives listed in subsection 3. These specialisation elective are chosen in consultation with the graduation professor.

**Article 9 – The Transport and Planning track**

Common compulsory block Transport and Planning

All students opting for the track Transport and Planning must complete the following subjects adding up to 56 credits:

code	subject	ECs
CIE4760	Infrastructure Projects: Assessment and Planning	6
CIE4801	Transport and Spatial Modelling	6
CIE4811-09	Design and Control of Public Transport Systems	6
CIE4821-09	Traffic Flow Theory and Simulation	6
CIE4822-09	Traffic Management and Control	6
CIE4831-09	Empirical Analysis for Transport and Planning	6
CIE4840	Freight Transportation Systems: Analysis and Modelling	4
CIE5730	Spatial and Transport Economics	4
CIE5810-09	Traffic Safety	4

and choose two out of:

CIE5750	Transport and Spatial Planning for urbanised regions	4
CIE5802-09	Advanced Transportation Modelling	4
CIE5803-09	Railway Traffic Management	4
CIE5804-09	Innovations in Dynamic Traffic Management	4
CIE5805	Intelligent Vehicles	4
CIE5811 <sup>27</sup>	Transport Safety	4

**Article 10 – The Geo-Engineering track**

1. The compulsory programme for the Geo-Engineering track consists of a common compulsory Geo-Engineering block of 32 credits and Geo-Engineering electives adding 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 done CT3300-09 or CTB3385 (Use of Underground Space) in the Bachelor's phase will have to do CIE3300-09 as a compulsory elective subject.
- Students who have not done CT3325 or CTB3390 (Mechanics and Flow in Porous Media) in the Bachelor's phase will have to do CIE3325 as a compulsory elective subject.

2. Common compulsory block Geo-Engineering

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

code	subject	ECs
CIE4361	Behaviour of Soils and Rocks	6
CIE4365-13	Coupled Processes in Subsurface	6
CIE4366	Numerical Modelling in Geo-Engineering	6
CIE4395	Risk and Variability in Geo-Engineering	4
CIE5320	Site Characterisation, Testing and Physical Modelling	6
AES1630	Engineering Geology	4

<sup>27</sup> as of 1 September 2015

3. Geo-Engineering electives

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
AES1730	Introduction to Geotechnical Engineering	4
CIE4420	Geohydrology	4

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

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4353	Continuum Mechanics	6
CIE4362	Soil-structure Interaction	3
CIE4363	Foundation and Deep Excavations	4
CIE4367	Embankments and Geosynthetics	4
CIE4390	Geo-risk Management	3
CIE4780	Trending Topics in Geo-Engineering	4
CIE5305	Bored and Immersed Tunnels	4
CIE5340	Soil Dynamics	3
CIE5741	Trenchless Technologies	4
OE4624	Offshore Soil Mechanics	4
AES1501	Methods of Exploration Geophysics	4
AES1640-11	Environmental Geotechnics	4
AES1720-11	Rock Mechanics Applications	5
AESM2901	Geoscience and Engineering Fieldwork	6

**Article 11 – The Geoscience and Remote Sensing track**

1. The compulsory programme for the Geoscience and Remote Sensing track consists of a common compulsory Geoscience and Remote Sensing block of 28 credits and Geoscience and Remote Sensing electives adding up to a total of 55 track-linked credits.

2. Common compulsory block Geoscience and Remote Sensing

All students opting for the track Geoscience and Remote Sensing must complete the following subjects adding up to 28 credits:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4601	Physics of the Earth and Atmosphere	5
CIE4603	Geo-signal Analysis	5
CIE4604	Simulation and Visualization	5
CIE4606	Geodesy and Remote Sensing	5
CIE4611	Geo-measurement Processing	5
CIE4615	GRS Fieldwork	3

3. Geoscience and Remote Sensing electives

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

Choose at least 12 credits out of:

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4602	Observation of Land-surface Processes	4
CIE4605	Atmospheric Science	4
CIE4607	Oceans, Sea-level and Bathymetry	4
CIE4608	Atmospheric Observation	4
CIE4609	Geodesy and Natural Hazards	4
CIE4610	Mass Transport in the Earth's System	4
CIE4614	Land Surveying and Civil Infrastructure	4

and choose adding up to a total of 27 credits 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

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

## Section 2 – Annotations and Honours Programme

### Article 12A – The Technology in Sustainable Development annotation

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 12B – Entrepreneurship annotation

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 12C – The Urban Planning and Engineering annotation (“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 12D – The Infrastructure Planning and Environmental Engineering annotation (“Infrastructuur en milieu”)**

1. The examination programme for students who have opted for the annotation Infrastructure Planning and Environmental 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:
    - Infrastructure Planning
    - Regional Planning
    - Environmental Engineering
    - Cost Benefit Analysis
    - Risk Analysis
    - Financial Engineering
    - Policy and Decision Making
    - Project and Process Management.
  - 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 Infrastructure Planning and Environmental 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 Infrastructure Planning and Environmental Engineering with their degree certificate.

**Article 12E – The Integral Design Management annotation**

1. The examination programme for students who have opted for the annotation Integral Design 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 (4 credits if CTB3380 has been completed in the Bachelor’s phase):
 

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE3380	Infrastructure Asset Management	4
CIE4480	Integral Design and Management	4
  - b. subjects from the list below within or outside the compulsory or elective subjects of the chosen track and/or specialisation adding up to a total of at least 6 credits (10 credits if CTB3380 has been completed in the Bachelor’s phase):
 

<u>code</u>	<u>subject</u>	<u>ECs</u>
CIE4130	Probabilistic Design and Risk Management	4
CIE4170	Construction Technology of Civil Engineering Structures	4
CIE4760	Infrastructure Projects: Assessment and Planning	6
CIE5981	Collaboration Forms	4
CIE4120 <sup>28</sup>	Information Systems for Infrastructures and Buildings	4
CME2300	Financial Engineering	4
AR0028	Design of Infrastructural Artefacts	6
EPA1322	Continuous Systems Modelling	5
SPM8000	Project Management (various possibilities)	3 – 7
4413UEINFY	Urban Environments and Infrastructures	6
  - c. a Multidisciplinary Project (CIE4061-09) carrying 10 credits as mentioned in Article 3 subsection 1 clause c. The Multidisciplinary Project must 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 management issues have been integrated into the project.

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<sup>28</sup> as of 1 September 2015



- 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 management issues have been integrated into the project.
2. Students who complete the annotation successfully, receive an annotation Integral Design Management with their degree certificate.

### Article 13 – Honours Programme Master

1. Motivated students who have finished their Bachelor's degree course with a weighed averaged mark of 7.5 or higher, and students who have excelled during the first semester (no fails and a weighed average of 7.5 or higher) are eligible for a special individual programme of 20 credits on top of the Master's degree course: the Honours Programme Master.
2. The content of the Honours Programme Master should be thematically consistent. The subject WM0355HT, Critical Reflection on Technology, 5 credits, is compulsory to the Honours Programme Master.
3. Students who fulfil, or will fulfil, the requirements laid down in subsection 1, and are interested in the Honours Programme Master can send their application to the programme coordinator together with an essay in English, containing their motivation and a proposal for the programme. The programme has to be approved by a scientific staff member and the programme coordinator.
4. The Honours Programme Master has to be completed during the course of the student's Master's programme. None of the results may be lower than 6,0.
5. The various parts of the programme will be assessed by the respective examiner(s). The fulfilment of all criteria to the Honours Programme Master will be assessed by the board of examiners.
6. Students who have successfully completed the Honours Programme Master will receive a special certificate from the university with their degree certificate.

## Section 3 – Transitional programme

### Article 14 – 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 29 credits and an additional track-linked block of 12 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.

2. Common deficiency block

<u>code</u>	<u>subject</u>	<u>ECs</u>
CTB2001HBO	Computer Programming HBO	3
CTB1210	Dynamics and Modelling	5
WI2031TH	Probability Theory and Statistics	3
WI1708TH1	Analysis 1	3
WI1708TH2	Analysis 2	3
WI1708TH3	Analysis 3	3
WI1807TH1	Linear Algebra 1	3
WI1909TH	Differential Equations	3
CTB2400	Numerical Methods for differential Equations	3

3. Additional track-linked block

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

In case the track Structural Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs (total 29 + 15)</u>
CTB2210	Structural Mechanics 3	5

CTB2300	Dynamics of Systems	3
CTB3330	Structural Mechanics 4	4
CT1730HBO	Introduction to geotechnical Engineering	3

In case the track Building Engineering has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 15)
CTB2210	Structural Mechanics 3	5
CTB2300	Dynamics of Systems	3
CTB3340	Building Structures 1	4
CT1730HBO	Introduction to geotechnical Engineering	3

In case the track Hydraulic Engineering has been chosen:

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

In case the track Water Management has been chosen:

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

In case the track Transport and Planning has been chosen:

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 15)
CTB3370	Geometrical Design of Roads and Railways	4
CTB3380	Infrastructure Management	4
CTB3420	Integral Design of Infrastructure	4
CT1730HBO	Introduction to geotechnical Engineering	3

In case the track Geo-Engineering has been chosen:

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

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

<u>code</u>	<u>subject</u>	<u>ECs</u> (total 29 + 12)
CTB2300	Dynamics of Systems	3
CTB3310	Surveying and Mapping	4
TA2601	Practical Matlab	2
WI1807TH2	Linear Algebra 2	3

## Section 4 – Deviate from examination programme

### Article 15 – 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 16 – Deviate from the examination programme**

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

### **Section 5 – Examinations and practicals**

#### **Article 17 – Practical**

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

#### **Article 18 – 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 19 – 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. Practical may be completed in the way laid down in the relevant timetables.

### **Section 6 – Access to Master Thesis Project**

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

1. Students may embark on the Final Thesis only when they have no more than 15 credits of uncompleted subjects of the Master's degree course from all their other subjects of the course.
2. Students are only allowed to present their Final Thesis if they have successfully completed all other obligations.

### **Section 7 – Transition Rulings**

#### **Article 21 – The transition ruling 1 September 2009**

1. Students who have already received a passing mark in one or more of their Master's degree programme subjects before the start of the 2009-2010 academic year must complete the Master's programme in accordance with the study programme applicable for the academic year in which they began the degree programme (the old programme).
2. In the event that a subject that was offered in the old programme is no longer offered, students must instead take the corresponding subject in the 2009-2010 Master's programme (the new programme) or take a resit of one of the examinations that is still being offered. Consult the [appendix](#) for a list of equivalent subjects in the old and new programmes. Students will be able to complete the subjects from the old programme on this list until 1 September 2010.

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

## APPENDIX: EQUIVALENTS

### OLD PROGRAMME

### NEW PROGRAMME

<b>Structural Engineering</b>					
Code	Subject	EC	Code	Subject	EC
CT3110	Analysis of Slender Structures	4	CIE4190	Analysis of Slender Structures	4
CT3121	Steel Structures 2	4	CIE4115	Steel Structures 2	4
CT4145	Dynamics and Introduction to Continuum Mechn	6	CIE4145-09	Dynamics and Introduction to Continuum Mechn	4

<b>Building Engineering</b>					
Code	Subject	EC	Code	Subject	EC
CT5230	Technical Building Services	3	CIE5230-09	Technical Building Services**	4
CT5241	Applied Building Physics	3	CIE4290	Applied Building Physics**	4
CT5940	Advanced Design Systems	6	CIE5940-09	Advanced Design Systems**	8
CT4211	Façades	4	CIE4215	Façade Design Plus	3
CT4221	Advanced Building Physics	4	CIE4225	Advanced and Applied Building Physics	6
CT4290	Applied Building Physics	4	CIE4225	Advanced and Applied Building Physics	6
CIE4201	Architecture and Building Engineering	4	CIE4202	Architectural History of Buildings	4

*\*\*Courses removed from curriculum in 2011-2012, contact the student counsellor*

<b>Hydraulic Engineering</b>					
Code	Subject	EC	Code	Subject	EC
CT3340	River Engineering	4	CIE4345	River Engineering	4
<b>Cluster*</b>					
CT4300 + CT4306	Introduction to Coastal Engineering + Update Introduction Coastal Engineering ot Coastal Dynamics 1	4 + 2	CIE4305	Coastal Dynamics 1	6
CT5303	Coastal Inlets and Tidal Basins	3			
CT5309	Coastal Morphology and Coastal Protection	4			
CT4320 + CT5316	Short Waves + Wind Waves	4 + 3	CIE4325	Ocean Waves	6

\* Hydraulic Engineering cluster, Coastal Engineering specialisation:

- If the student has not completed any old programme subjects, then all new subjects
- If the student has already completed CT4300 and either CT5303 or CT5309, then the remaining subject also from the old programme
- If the student has already completed CT4300 but not CT5303 and CT5309, there are two options:
  1. the student takes the remaining subjects from the old programme or
  2. the student takes the temporary transfer subject CT4306, Update Introduction Coastal Engineering to Coastal Dynamics 1, 2 EC, plus CT4305, Coastal Dynamics 2
- Contact the coordinator where necessary.

<b>Water Management</b>					
Code	Subject	EC	Code	Subject	EC
CT4490	Sewerage 1	4	CIE4491	Fundamentals of Urban Drainage	4
CT5540	Sewerage 2	3	CT5541	Urban Drainage Monitoring and Modelling	3
CT5570	Biogeomorphology	3	CIE5580	Ecology and Geomorphology, deel Biomorphology	3
<b>Cluster*</b>			<b>Cluster*</b>		
CT4471	Drinking Water Treatment 1	7	CIE4495	Fundamentals of Drinking Water and Water Treatment	5
CT4481	Wastewater Treatment 1	6	CIE4475	Drinking Water Treatment	5
CT5520	Drinking Water Treatment 2	3	CIE4485	Wastewater Treatment	5
CT5531	Wastewater Treatment 2	4	CIE4415	Design of Drinking Water and Wastewater Treatment Plants	5

<b>Water Management overgangsregeling vanaf 2013</b>					
Code	Subject	EC	Code	Subject	EC
CIE4440	Hydrological Measurements	4	CIE4440	Hydrological Processes & Measurements	4
CIE4491	Fundamentals of Urban Drainage	4	CIE4491	Urban Drainage and Watermanagement	4
CIE4495	Fundamentals of Drinking Water and Water Treatment	5	CIE4495-13	Fundamentals of Water Treatment+ extra assignment	4+1
CIE4410	Irrigation and Drainage	4	CIE4410	Water Systems, People and Society	4
CIE5420	Public Hygiene & Epidemiology	3	CIE5421	Water and Health	4

<b>Transport and Planning</b>					
Code	Subject	EC	Code	Subject	EC
CT3751	Stadsontwikkeling, vervoernetwerken en verkeerssystemen	3	CIE4751	Urban Planning and Transport Networks	4
CT4701 + CT4740	Infrastructure Planning & Plan and Project Evaluation	4 + 4	CIE4760	Infrastructure Projects: Assessment and Planning	6
CT4811	Design and Control of Public Transport Systems	4	CIE4811-09	Design and Control of Public Transport Systems	6
CT4821	Traffic Flow Theory and Simulation	4	CIE4821-09	Traffic Flow Theory and Simulation	6
CT4822	Dynamic Traffic Management I: Traffic Control	4	CIE4822-09	Traffic Management and Control	6
CT4831	Data Collection and Analysis	4	CIE4831-09	Empirical Analysis for Transport & Planning	6
CT5810	Traffic Safety	3	CIE5810-09	Traffic Safety	4
CT5750	Planning: Policy, Methods and Institutions	4	CIE5750	Spatial Planning for the Metropolis	4
CT5802	Advanced Transport Modelling and Network Design	3	CIE5802-09	Advanced Transportation Modelling	4
CT5803	Rail Traffic Management and Delay Propagation	3	CIE5803-09	Railway Traffic Management	4

\* Water Management cluster:

- If the student has not completed any old subjects, then all new subjects.
- If the student has already completed CT4471 and CT4481 and CT5531, then only add CT4415 (or CT5520).
- In all other cases subjects are to be determined in consultation with the coordinator.

CT5804	Dynamic Traffic Management II: Intelligent Transport Services	3	CIE5804-09	Innovations in Dynamic Traffic Management	4
CT5820	Sociology and Psychology in Transport	3	CIE4820	Sociology and Psychology in Transport	4
SPM9402	Transport Policy: Special Topics	3	SPM9403	Transport Policy: Special Topics	4
WB3420-03	Introduction Transport Engineering and Logistics	5	WB3410	Large Scale Transport Systems	3
WB3410	Large Scale Transport Systems	3	CIE4840	Freight Transportation Systems: Analysis and Modelling	4

<b>Geo-Engineering</b>					
Code	Subject	EC	Code	Subject	EC
TA3750	Geology for Engineers	4	AES1750	Geology for Engineers	4
CT3320	Fund. of Groundwatermechanics and Geohydrology	4	CIE3325	Mechanics and Transport by Flow in porous Media (or CIE4315)	4
CT3350	Embankments and deep excavations	4	CIE4355	Embankments and deep excavations	4
CT4316 or CT4355	Deep Excavations	3	CIE4362	Soil-structure Interaction	3
CIE4316	Deep Excavations	3	CIE5330	Foundations and Deep Excavations	4
CT4350 and CT4380	Numerical Soil Mechanics and Numerical Modelling of Geotechnical Problems	3 4	CIE4366	Numerical Modelling in Geo-Engineering	6
CT4360	Material Models for Soil and Rock	4	CIE4361	Behaviour of Soils and Rocks	6
CIE4390	Geo Risk Management	3	CIE4395	Risk and Variability in Geo-Engineering	4
CT5301	Theory of Consolidation	3	CIE4315	Theory of Consolidation and Embankments	4

<b>General subjects</b>					
Code	Subject	EC	Code	Subject	EC
CT4040	Internship	11	CIE4040-09	Internship	10
CT4061	Multidisciplinary Project	11	CIE4061-09	Multidisciplinary Project	10
CT5050	Additional Master Thesis Project	11	CIE5050-09	Additional Master Thesis Project	10
CT5060	Master Thesis Project	42	CIE5060-09	Master Thesis Project	40
WI2254HCT	Differential Equations and Linear Algebra	6	WI1807TH1 +	Linear Algebra 1	3
			WI1909TH	Differential Equations	3
WI1265HCT	Analysis WI1265HCT-2 WI1265HCT-3 WI1265HCT-4	12	WI1708TH	Analysis WI1708TH-1 WI1708TH-2 WI1708TH-3	9