

Building Engineering

2020-2021

information booklet master track



NB The official course and examination regulations are always decisive. These can be found on <https://www.tudelft.nl/en/student/faculties/ceg-student-portal/education/education-information/educational-rules-and-regulations/>

The online version of this booklet and errata can be found on <https://brightspace.tudelft.nl/d2l/le/content/43816/Home?itemIdentifier=D2L.LE.Content.ContentObject.ModuleCO-1889720>

Preface

This booklet is published by the MSc Building Engineering track of the Faculty of Civil Engineering and Geosciences of Delft University of Technology. It is meant to function as a guiding document for (future) Master students Building Engineering at this Faculty.

In this guiding document an overview is provided of the possibilities within the Master track. At the same time it helps the student in selecting courses and make a planning for the Master's phase.

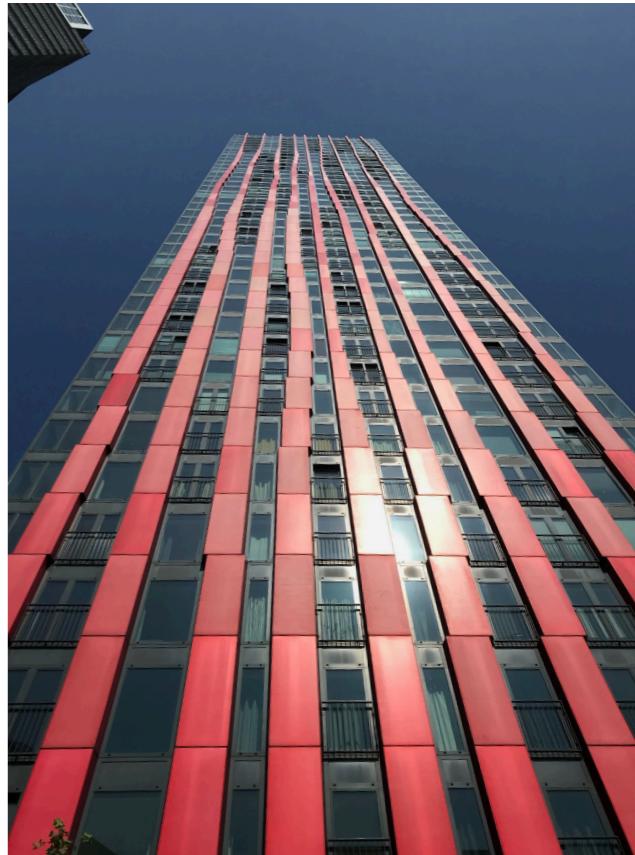
In addition to this information booklet it is advised to visit the website of Building Engineering: <https://www.tudelft.nl/en/education/programmes/masters/civil-engineering/msc-civil-engineering/msc-programme/track-building-engineering/>. This website publishes an overview of the courses and, when applicable, adjustments in the curriculum.

For information on the MSc thesis projects it is advised to visit: <https://brightspace.tudelft.nl/d2l/le/content/43816/Home?itemIdentifier=D2L.LE.Content.ContentObject.ModuleCO-523252>.

For actual information you are advised to enroll for the Master Building Engineering community on Brightspace.

On www.studyguide.tudelft.nl you can find more detailed information on courses.

July 2020



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Waterfront Building, Stockholm, Sweden (photo: B. Dorresteijn)

Introduction

Buildings are an important part of human society. From the moment that humans changed their lifestyle from nomadic to settling, buildings have become a necessity; a necessity that has been growing in complexity ever since.

Where the first human beings simply needed a roof over their head and relied on farm animals and fire to keep them warm, now the modern human requires light, space and climate control.

Furthermore, modern man requires a greater variety of buildings, from churches to football temples, from offices to train stations and so on. Buildings with ever increasing complexity and ever increasing scale.

This is where the Building Engineer comes into play. The Building Engineer plays a vital role in making a building work. The complexity of all the different functions that a building fulfils needs to be analysed and controlled. With a broad background followed by a specialisation as educational starting point, the Building Engineer can assume different roles such as structural engineer, façade engineer, building manager, building services engineer, etc.

This booklet is a guide for students interested or participating in the Building Engineering Master track.

Chapter 1 gives a short introduction into Building Engineering backgrounds and an overview of future possibilities.

Chapter 2 is a practical chapter with information on the curriculum of the Building Engineering Master track.

The two specialisations within the Building Engineering track are discussed in Chapter 3.

The curricular demands for all students are discussed in Chapter 4 and specific per specialisation in Chapter 5.

The practicalities surrounding the Master's thesis, which concludes the Master's education, are found in Chapter 6. In Chapter 7 an important institution related to the Building Engineering track at this faculty is introduced: the student's association U-base.

Chapter 8 discusses a number of Frequently asked questions from students and Chapter 9 concludes with useful addresses and telephone numbers.



Chapter 1: General information Building Engineering

1.1 The Dutch building industry

With 70 billion euros in 2018, approximately 10% of the gross national product, the turnover of the building industry is clearly an important part of the Dutch economy.

*Yearly turnover of the Dutch building industry in 2018:
(source: Verwachtingen bouwproductie en werkgelegenheid 2019, EIB)*

Housing	€ 21	billion
Utility buildings	€ 16	billion
Maintenance building	€ 11	billion
Civil structures and external contracting	€ 22	billion

Total:	€ 70	billion

Building Engineering students will usually work in the field of utility buildings. The domain of (utility) buildings can be subdivided into the following categories:

Relation with people:

- Offices
- Hospitals
- Schools
- Sports stadiums
- Shopping centres
- And so on

Relation with infrastructure:

- Stations
- Parking garages
- Airports
- Seaports
- Communication towers
- And so on

Relation with processes:

- Industrial buildings
- Clean room facilities
- Power plants
- Waste processing plants
- Aircraft hangars
- And so on



1.2 Roles

Building projects are becoming increasingly complex both in functions as in technology and process. The result is that an integral approach is desired more and more. The role of the Building Engineer in this process focusses on technology and process, while the architect is mostly focused on function and aesthetics. However, to create a successful building it is necessary to continuously use an integral approach and consideration.



1.3 Working field

Many of the Building Engineering graduates will start working in the construction industry or consultancy. Different roles can be assumed by building engineers in different parts of the building process as well as in different types of companies. After graduation both national and international career opportunities are available.

Possible working fields:

- Consultancies
 - Structural Design
 - Building Services
 - Façade Design
- Building contractors
- Architectural/ Engineering firms
- Construction firms of large companies and institutions
- Engineering services government
- Real estate developers
- Institutional investors

The Master of science also provides you with a good starting point for a job as a:

- Junior researcher (e.g. TNO, TU Delft)
- PhD-candidate (become Dr.)

Vodafone office, Lisbon Portugal

1.4 The Building Engineering Track: preparation for the working field

The Master of Science programme of Civil Engineering comprises the following eight tracks:

- Structural Engineering
- Building Engineering
- Hydraulic Engineering
- Water Management
- Transport and Planning
- Geo-Engineering
- Geoscience and remote sensing
- Environmental engineering

The MSc track 'Building Engineering' provides a broad curriculum. This includes all important aspects throughout the entire building cycle, from initial planning through the phase of use and onwards to redevelopment and demolition. The focus is on the technical and structural functions of buildings. However, the principles of architectural design are also examined. After all, in practice civil engineers will often cooperate with architects. It is therefore important for you to be familiar with each other's fields of expertise. If for instance a building's supporting structure is visible then together with an architect a solution needs to be found

which is attractive in both structural and architectural terms.

The main difference with the Master track Structural Engineering lies in this integral focus on the total building design, where Structural Engineering focuses more on particular materials and mechanics.

In order to make a useful contribution to the design of buildings, a building engineer must have knowledge that includes the following fields:

- Structural solutions
- Structural and building services engineering
- Materials
- Building physics
- Climate design
- Facade design
- Building organization and management
- Building costs

This knowledge is acquired in a two-year programme, designed to help you graduate as a highly educated expert engineer with a practical perspective. Following graduation your knowledge and experience will make you prepared for a wide range of professions.

Delft University of Technology 2020-2021



Chapter 2: Programme for the Building Engineering Track

2.1 General programme Civil Engineering Master

The official documents on regulations for exams and graduation give a general scheme applicable for all Master tracks. This scheme is shown on page 16. This is presented in a convenient arrangement on page 18.

a. In the scheme it is visible that all tracks of the Civil Engineering Master programme have one course in common. This is the course on ethics (WM0312CT) or its equivalent CIE4510.

b1. Both Building Engineering specialisations share a common compulsory block of 20 EC. This part consists of 5 courses, which can be found in the scheme on page 18.

b2 Then there is an compulsory part dependent on which specialisation is chosen. Within the Building Engineering Master Track two specialisations are offered:

- Structural Design
- Building Technology & Physics

The reason for using specialisations in the Building Engineering track is to improve the transparency within all possibilities to choose from. Furthermore it gives an identity in relation with graduation and future possibilities within the study programme which aids both students and external professionals. The layout of the specialisations can be found in Chapter 5.

The Executive Board (CvB) has decided to discontinue the issuance of annotation certificates as of 30 September 2022.

In addition to the general program of Building Engineering and its specialisation it is possible to acquire an annotation on Dynamics of Structures (<https://www.tudelft.nl/en/student/faculties/ceg-student-portal/education/master/annotations/dynamics-of-structures-annotation/>), Integral Design & Management (<https://www.tudelft.nl/en/ceg/about-faculty/departments/materials-mechanics-management-design-3md/sections-labs/integral-design-management/idm-annotation/>), Technology in Sustainable Development (tudelft.nl/tido) or Entrepreneurship (dce.tudelft.nl). Furthermore, an annotation on Urban Planning & Engineering is available (See TER for more information: <https://www.tudelft.nl/studenten/faculteiten/citg-studentenportal/onderwijs/onderwijsinformatie/educational-rules-and-regulations/>).

N.B. The program overview can also be obtained from www.studyguide.tudelft.nl

It is strongly advised to make a study-planning at the start of your master studies, and to discuss it with fellow MSc students (for instance from U-base). A helpful tool for making a planning is the study planner at <https://mystudyplanning.tudelft.nl/faculty/ceg>. Here you also should enter the specialisation you choose.

3.1 Introduction

As mentioned in Chapter 2, the Building Engineering Track has 2 different specialisations:

- Structural Design
- Building Technology & Physics

These specialisations will be discussed in this chapter. Each specialisation will be shortly introduced to clarify the differences.

The goals and main focus of each specialisation are explained here. Chapters 4 and 5 give the course schedule. In chapter 4 the general courses are outlined and in chapter 5 specialisation-linked courses.

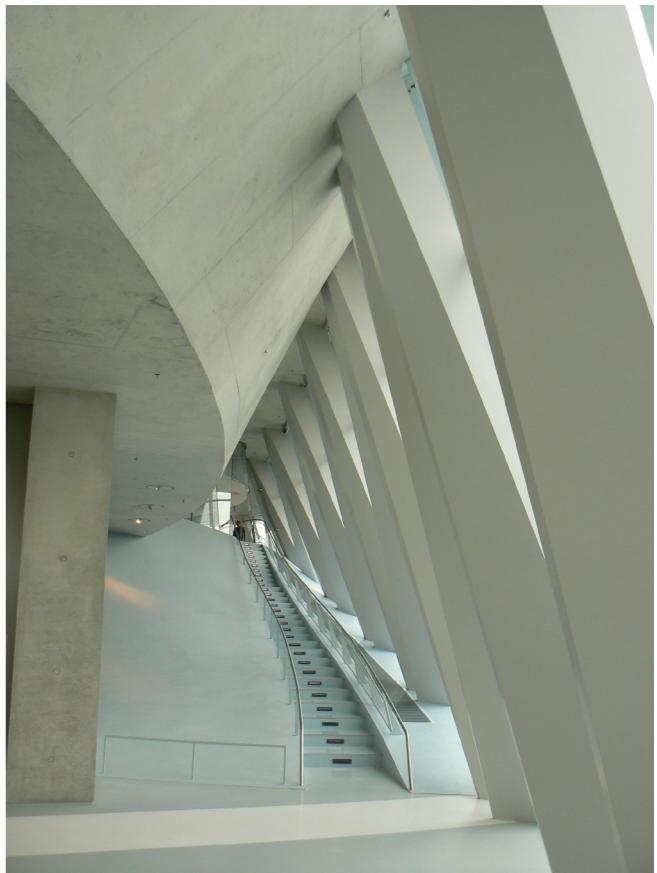
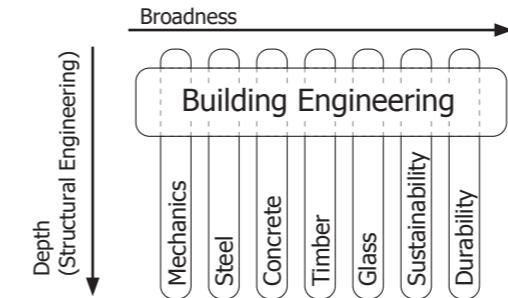


Harpa, Reykjavík

3.2 Structural Design

The design phase of buildings involves not only structural experts and architects but, increasingly, structural designers as well. These 'designing engineers' act as a bridge between architects and the structural experts who focus on verification of standards, dimensioning and detailing. The Structural Design specialisation has been created in response to this development.

The specialisation Structural Design from the Msc. track Building Engineering has a broader approach than the MSc track Structural Engineering. It integrates different disciplines such as building services, architecture, mechanics etc. For Structural Engineering the approach is more elementary on the principle of mechanics and knowledge of materials and therefore has an approach that is more in-depth.



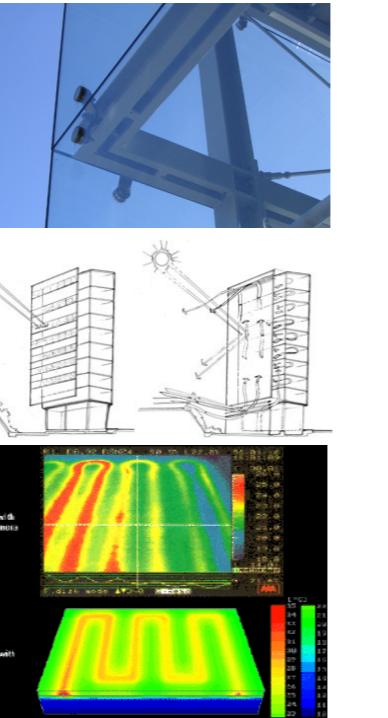
3.3 Building Technology & Physics

Even more than the load-bearing structure, the appearance and the interior climate define the way users enjoy the building. Global warming urges us to transform both existing stock and new design into zero-energy buildings, with a low environmental footprint. In the specialisation Building Technology & Physics you will gain insight in all techniques that contribute to this.

Building Technology allows an engineer to translate the wishes of the architect into reality. This means determining which materials will be used for the finishing of the building and also ensuring that a sustainable building is constructed. You need to know about building components, material properties, building physics, maintenance properties and the repairability of materials and of technical installations in buildings. Since the façade is one of the most technically demanding and challenging components of a building, the emphasis for a building technologist lies on façade design and construction.

Building Physics is the science that studies the laws of nature related to the built environment: light, sound, energy temperature, fluid and air flows, often in relation to human physiology.

By modelling and simulating the physics of the building, its performance is predicted and, if necessary, modified by adjusting the design.



4.1 General courses

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), the subject Climate Change: Science & Ethics (CIE4510-20). CIE4510 is obligated for Geoscience and Remote Sensing or Environmental Engineering students.

b. **56 credits:** track-linked subjects belonging to the chosen track. The track-linked subjects may be subdivided into those that are general track-linked subjects (the common compulsory block) and those that belong to a specialisation as stipulated in Articles 5 to 12 or a free specialisation. Track-linked credits, exceeding 56 credits, will be considered as credits achieved for electives mentioned under c.

c. **20 credits** as follows:

part 1: 10 credits

all subjects from the Civil Engineering MSc programme which may include only one of the following subjects:

- CIE5050-09 Additional Graduation Work, Research project
- CIE4040-09 Internship
- CIE4061-09 Multidisciplinary project, Civil Engineering Consultancy project

part 2: 10 credits electives from:

- other subjects from the Civil Engineering MSc programme with the exception of the three mentioned subjects above under part 1,
- all subjects offered in conjunction with other MSc degree courses at a Dutch University or at an international university with an exchange contract with TUD.
- the specialisation subjects included in the table 'Track linked BSc electives' ('keuzelijst specialisatievakken') as intended in Article 3 of the annex for the Bachelor's degree course in Civil Engineering at Delft University of Technology, as far as they are considered to be convergence subjects (CIE course codes, see list at end of annex),
- interfaculty Master's-level electives at Delft University of Technology with a "WM-code" to a maximum of 6 credits, however language, skills subjects and MOOCs are not allowed within the examination programme. Language, skills subjects and MOOCs can only be part of the extracurricular paragraph of the diploma supplement,

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

Note:

i) Building Engineering students are not allowed to take the Multidisciplinary Project CIE4061-09, Civil Engineering Consultancy project in c. part 1 of their programme (see Article 3 note i). Instead of CIE4061-09 Building Engineering, students are encouraged to take the course AR0139 MEGA (15 ECTS). It is highly recommended to take this subject in the c. part 1 block of the curriculum. The surplus of 5 ECTS above the required 10 ECTS can be transferred to the b. part 2 or c. part 2 elective free space.
j) If applicable also subjects from annotations can be selected.

d. **40 credits:** a track-linked Master Thesis Project (CIE5060-09). The Master Thesis Project consists of a final project, a thesis, a summary of the thesis and a final presentation. The project is subject to a strict planning and time table; specific dates and deadlines need to be set for the evaluation(s) and the final presentation of the project. The planning will be monitored by the graduation coordinator.

credits	course	[credits]	1 st year	2 nd year																																								
a. 4 ECTS	<i>Compulsory for all students</i> WM0312CIE Ethics or CIE4510 Climate Change: Science & Ethics WM0376TU Ethics of Technological Risks		q1 q2 q3 q4	q1 q2 q3 q4																																								
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b 56 ECTS	<i>b1. Compulsory for all BE students:</i> CIE4202 Architectural History of Buildings CIE5981 Forms of Collaboration in Civil Engineering CIE4240-19 Forensic Structural Engineering CIE4210 Parametric Design and Engineering CIE4220 Introduction to Building Physics and Façades	[4] [4] [3] [3] [6]	<table border="1"><tr><td>S</td><td></td><td></td><td>S</td></tr></table> <table border="1"><tr><td>S</td><td></td><td></td><td>S</td></tr></table> <table border="1"><tr><td>S</td><td></td><td></td><td>S</td></tr></table> <table border="1"><tr><td></td><td>S</td><td></td><td>S</td></tr></table> <table border="1"><tr><td>S</td><td></td><td></td><td>S</td></tr></table>	S			S	S			S	S			S		S		S	S			S	<table border="1"><tr><td></td><td></td><td>S</td><td></td></tr></table> <table border="1"><tr><td></td><td>S</td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td>S</td><td></td></tr></table> <table border="1"><tr><td></td><td>S</td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td>S</td><td></td></tr></table>			S			S					S			S					S	
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c. 20 ECTS	<i>Recommended for Building Engineering (for alternatives: see p.16)</i>																																											
	<i>c1. CIE4040-09 Internship or CIE5050-09 Additional graduation project or Additional electives</i>	[10] [10] [10] [15]	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td>S</td><td></td><td>S</td></tr></table>														S		S	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <table border="1"><tr><td></td><td></td><td>S</td><td>S</td></tr></table>															S	S								
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	<i>c2. AR0139 MEGA</i>																																											
d. 40 ECTS	<i>MSc Thesis (specialisation linked)</i>																																											
Σ	120 ECTS																																											

The layout of the Building Engineering Master's Track

4.2 Special courses for Building Engineering Students

Internship (c1)

One of the optional subjects in the MSc programme is the internship. The internship lasts for at least 8 weeks and is awarded 10 ECTS as standard. The aim is that in the course of your internship you become familiar with the technical, social and organisational aspects of civil engineering as a practical profession. All information can be found at the internship office at room 2.73 of Civil Engineering or at their website. You need to find and consult an academic supervisor for your internship in advance.

The multi-disciplinary project

In the Building Engineering programme it is highly recommended to follow the interfacultary project AR0139 - MEGA [15], see page 20. If you choose AR0139 you can not opt for the fourth year Master's project (CIE4061-09).



Enrolment courses at Faculty of Architecture and the Built Environment

For all courses at the faculty of Architecture (AR-code, including MEGA) students should register at <http://bis.bk.tudelft.nl>.

Deadlines are:

- beginning of June for period 1 and 2
- beginning of December for period 3 and 4

AR0139 - MEGA (c2)

This course runs for already over 25 years, and is regarded as one of the most demanding and exciting experiences during the master study. MEGA is organized in close cooperation between the faculties of Architecture and the Built Environment and Civil Engineering, deals with the specific management, architectural, economic and technical aspects accumulated in a MEGA Building. Therefore students join small multidisciplinary groups and design a complex building, for instance a high rise structure. By investigating the several disciplines and by integrating them in a collective design, students learn to work together in a group and learn to take and evaluate decisions to reach an optimized and integrated design. The target is to produce a collective concept acting as a professional multidisciplinary design team. A realistic program, situated on a plot will determine the design target.

During the course, consultants of each discipline support the groups. Furthermore, usually a well-known designer is invited to give a lecture about his or her own work in practice.

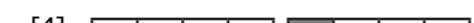
**Chapter 5: Specialisation Courses****5.1 Structural Design**

credits	course	[credits]							
		1 st year				2 nd year			
b2.	33 ECTS	q1	q2	q3	q4	q1	q2	q3	q4
	<i>specialisation linked courses,</i>								
	CIE4115 Steel Structures 2	[4]							
	CIE4190 Analysis of Slender Structures	[4]							
	CIE3109-09 Structural Mechanics 4	[4]							
	CIE3150 Concrete Structures 2	[4]							
	CIE5251-09 Structural Design, Special Structures	[5]							
	CIE4281 Building Structures 2	[4]							
	CIE4110 Timber Structures and Wood Technology	[4]							
	CIE4285-20 Structural Glass	[4]							
	<i>if one or more of the courses above has been done in BSc, they can be replaced by:</i>								
	CIE4030 Methodology for Scientific Research	[3]							
	CIE4120 Information Systems for the construction industry*	[4]							
	CIE4121 Steel Structures 3	[4]							
	CIE4125 Structural Design - Case Steel, Timber or FRP	[3]							
	CIE4140 Structural Dynamics	[4]							
	CIE4160 Prestressed Concrete	[4]							
	CIE4170 Construction Technology of CE Structures	[4]							
	CIE4362-20 Soil Structure Interaction	[4]							
	CIE4363 Deep Excavations	[4]							
	CIE4381 Engineering Asset Management	[4]							
	CIE4391 Quantitative Asset Modelling*	[4]							
	CIE4481 Systems Engineering Management	[4]							
	CIE5124 Biobased Structures and Materials	[4]							
	CIE5125 Steel Bridges	[4]							
	CIE5127 Concrete Bridges	[4]							
	CIE5131 Fire Safety Design	[3]							
	CIE5148 Computational modelling of structures	[4]							
	CIE5260 Structural Response to earthquakes	[4]							
	AR0028 Bridge Design*	[5]							
	3 ECTS free electives from the above courses.								

*Check with the lecturer.

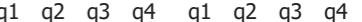
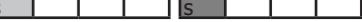
Legend
 recommended education period
 S start education education period

Example of a Possible Program for the Structural Design Specialisation

	Course	[credits]	1 st year	2 nd year
			q1 q2 q3 q4	q1 q2 q3 q4
CIE4202	Architectural History of Buildings	[4]		
CIE4240-19	Forensic Structural Engineering	[3]		
CIE5981	Forms of Collaboration in Civil Engineering	[4]		
CIE4190	Analysis of Slender Structures	[4]		
CIE4220	Introduction to Building Physics and Façades	[6]		
CIE4100	Materials and Ecological Engineering	[4]		
CIE4210	Parametric Design and Engineering	[3]		
CIE4281	Building structures 2	[4]		
CIE3109-09	Structural Mechanics 4	[4]		
CIE3150	Concrete Structures 2	[4]		
CIE5251-09	Structural Design, Special Structures	[5]		
CIE4285-20	Structural Glass	[4]		
AR0139	MEGA	[15]		
CIE4115	Steel Structures 2	[4]		
CIE4110	Timber Structures and Wood Technology	[4]		
CIE4160	Prestressed Concrete	[4]		
CIE4510	Climate Change: Science & Ethics Final Thesis	[4]		
CIE4145-09	Dynamics and Introduction to Continuum Mechanics*	[4]		

*The course provides international M.Sc. students with the required background for the mechanics and dynamics courses of the MSc program.

5.2 Building Technology & Physics

	credits	course	[credits]	1 st year	2 nd year
				q1 q2 q3 q4	q1 q2 q3 q4
b2.	21/23 ECTS	<i>specialisation linked courses.</i>			
		AR0134 Technoledge Façade Design	[5]		
		CIE4225 Advanced and Applied Building Physics	[6]		
		CIE4100 Materials and Ecological Engineering	[4]		
		CIE4030 Methodology for Scientific Research	[3]		
		<i>Choose one out of two:</i>			
		ME45110 Indoor Climate Control Fundamentals	[3]		
		AR0097 Climate proof sustainable renovation*	[5]		
	15/13 ECTS	<i>Free electives from the list at p. 21</i>			
		Possible electives for the Building Physics & Technology specialisation are:			
		CIE5100 Repair and Maintenance of Constructions	[4]		
		WM0939TU Engineering for Sustainable Development	[5]		

Legend

-  recommended education period
-  education period
-  start education

*When AR0097 has been completed in the minor, choose ME45110.

Example of a Possible Program for the Building Technology & Physics Specialisation

Course	[credits]	1st year	2nd year
CIE4202	Architectural History of Buildings	[4]	q1 q2 q3 q4
CIE4240-19	Forensic Structural Engineering	[3]	q1 q2 q3 q4
CIE5981	Forms of Collaboration in Civil Engineering	[4]	q1 q2 q3 q4
CIE4220	Introduction to Building Physics and Façades	[6]	q1 q2 q3 q4
CIE4100	Materials and Ecological Engineering	[4]	q1 q2 q3 q4
CIE4210	Parametric design and Engineering	[3]	q1 q2 q3 q4
AR0134	Technoledge Façade Design	[5]	q1 q2 q3 q4
CIE4225	Advanced and Applied Building Physics	[6]	q1 q2 q3 q4
CIE5131	Fire Safety Design	[3]	q1 q2 q3 q4
AR0139	MEGA	[15]	q1 q2 q3 q4
CIE4030	Methodology for Scientific Research	[3]	q1 q2 q3 q4
CIE4040-09	Internship*	[10]	q1 q2 q3 q4
ME45110	Indoor Climate Control Fundamentals	[3]	q1 q2 q3 q4
AR0097	Climate proof sustainable renovation: energy use, envir impact, health and comfort, life-cycle cost	[5]	q1 q2 q3 q4
CIE4510	Climate Change: Science & Ethics	[4]	q1 q2 q3 q4
	Final Thesis	[40]	q1 q2 q3 q4

*It is possible to do an internship partially during the summer

Right: Ciutat de les sciences, Valencia Spain



Introduction

The Master's thesis finalises the Master's study at the university. During the graduation period not only the graduation work itself is important, but also the organisation of the graduation as a whole.

The organisation of the Master's thesis is considered an important part of the graduation and is the sole responsibility of the student.

This chapter tries to give an overview of all the steps that need to be taken within the graduation period. The build-up of the chapter is related to the graduation scheme shown in Figure 6.1.

In addition, students are advised to consult the CIE-0 form, which provides information on the graduation procedure (studenten.tudelft.nl)



Uitkijktoren, Schovenhorst

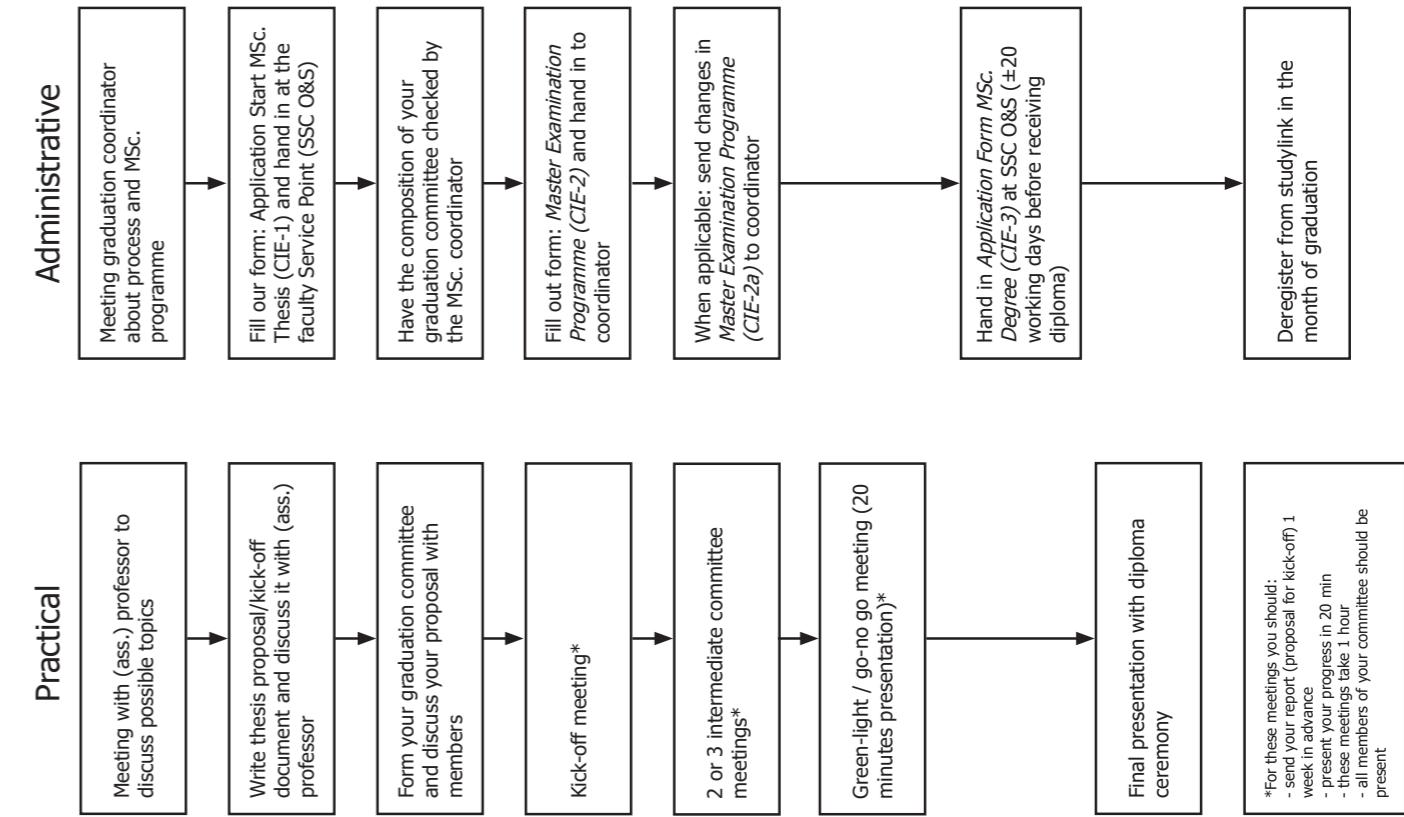


Figure 6.1: Flow chart for graduation at Building Engineering (see also form: CIE-0)

6.1 Start of the Master's thesis project

The first step in starting on the final project is to visit the graduation coordinator. For Building Engineering this is Dr. H.R. Schipper, room 6.48. Together the official part of the graduation will be set-up, this is the left hand column in Figure 6.1. One can start the MSc thesis as soon as the BSc and 65 ECTS in the MSc. are completed.

Finding a subject

At the same time a graduation subject needs to be found. Some inspiration can be found in the building engineering community at Brightspace. It is a good idea to discuss this with a number of lecturers and professors, where own input is very much appreciated. The graduation subject needs to be approved in concordance with the graduation committee chairman.

A graduation subject at Building Engineering can be:

- Research focussed
- Design focussed

In practice a combination of the two is most common.

To help the student to find a graduation subject it is advised to look at previous subjects at repository.tudelft.nl. Other important resources are PhD. students, fellow students. When searching for a subject take into account your interests, strengths/weaknesses and ideas about a future career.

Graduation project at company

Companies also often have interesting challenges for graduating students. In these cases it is common to have a person from the company to take place in the graduation committee.

Graduation committee

Chair of the committee is a professor, assistant professor or an associate professor from the chair Structural Design / Building Engineering, or, after approval, other Civil Engineering professors.

For students Building Technology and Physics some professors from the Faculty of Architecture and the Built Environment are also allowed:

- | | |
|---------------------------|------------------|
| - Prof. Bluyssen | - Prof. Itard |
| - Prof. Van den Dobbelaer | - Prof. Luscuere |
| - Prof. Knaack | - Prof. Overend |
| - Prof. Klein | |

The committee itself depends completely on the subject, but must consist of at least three TU Delft staff members. One of these three persons has to be from outside the Building Engineering chair.

Furthermore, one or two members from outside the university can be added. The composition of the committee is a combined task of the graduation committee chair and the student.

Checklist for graduation committee

Comply	Rule
<input type="radio"/>	At least three TU members (academic staff)
<input type="radio"/>	Chair full professor, associate prof or assistant prof*
<input type="radio"/>	At least two different sections (for independency)
<input type="radio"/>	At least two members with University Teaching Qualification or working on it**
<input type="radio"/>	At least two members are full professor, associate prof or assistant prof
Optional	One member can be PhD candidate if other members are a) from two sections b) PhD has completed teaching course
Optional	External experts can be added (companies or other TU staff)

*conditions apply - consult the MSc. coordinator

**conditions apply - ask the MSc. coordinator

Cooperation

It may be interesting to cooperate in one of the research fields (of the PhD students) of Building Engineering:

SAFE

- Structural design and safety/ Forensic Engineering

SMART

- Structural glass
- Free form concrete and High rise in prefabricated concrete
- Computational design (BEMnext)

SUSTAINABLE

- Reuse of existing buildings

Forms

All forms mentioned in Figure 6.1 can be found on the faculty website (studenten.tudelft.nl, go to CiTG, Forms) and at the Service Point of the faculty.

The following forms are available:

- CIE-0: 'Procedure Graduation'
- CIE-1: 'Application Start MSc. Thesis'
- CIE-2: 'Master Examination Programme'
- CIE-2a: 'Master Examination Programme-assessment committee' (use only to inform about changes in CIE-2)
- CIE-3: 'Application Form MSc Degree'
- CIE-4: 'Withdraw Form' (if applicable)

6.2 Course of the graduation project

The **Kick-off or start Meeting** is the first official meeting of the complete graduation committee. At this meeting the student presents a detailed work plan for the entire project.

The work plan is a result of preliminary research by the student into the chosen subject and is put down in concordance with the graduation professor.

Typically, the Start Meeting is followed by two **Interim Meetings** to monitor the progress of the project. The time between the meetings is approximately 2/3 months. Additional meetings can be set up when necessary. Obviously there is regular contact with individual committee members between meetings, for instance once per 2 weeks.

At the **Final Meeting** a green light is given to proceed to finishing the project. The date for the Final Presentation is set here as well. The **Judgement Meeting** takes place directly before the Final Presentation. At this meeting the student is absent and the committee will judge the project as a whole. After the following **Final Presentation** the final mark is established.

A graduation project usually takes 9 months. Make a clear planning in advance and keep track of your progress!



6.3 Finalizing the Master's Thesis

In order to graduate a number of aspects needs to be taken into account. First, there is a number of deliverables and second, the official judgement criteria that are used by the graduation committee.

Deliverables

The following deliverables are obligatory:

- Hard copy or PDF of the final report for each committee member (ask the members)
- A4 announcement/ invitation for presentation
- Upload full report to repository* in .pdf format
- TurnItIn check (<http://www.icto.tudelft.nl/tools/turnitin/>)

Judgement criteria

The Master's Thesis is judged on the following 5 aspects:

1. Scientific Approach (25%)

- Theoretical profundity
- State of the art description and literature study
- Scientific argumentation (hypothesis testing)
- Quality of experimental work or design
- Creativity: new ideas

2. Quality of result/product (25%)

- Scientific reflection and judgement
- Utilisation of result/product
- Extension/generation of methods
- Quality of abstract
- Amount of work

3. Behavioral competencies (20%)

- Initiative and/or own contribution
- Responsibility
- Communicative skills
- Independency

4. Quality of written presentation (15%)

- Structure and consistency
- Acknowledgement of sources/quotations
- English proficiency

5. Quality of oral presentation and defence (15%)

- Speaker quality
- Clarity and structure of presentation
- Quality of presentation material
- Answering of questions

U-base will announce various thesis presentations. It is strongly advised to visit some of these.

*For more information on this, see the building engineering website

U-BASE Association

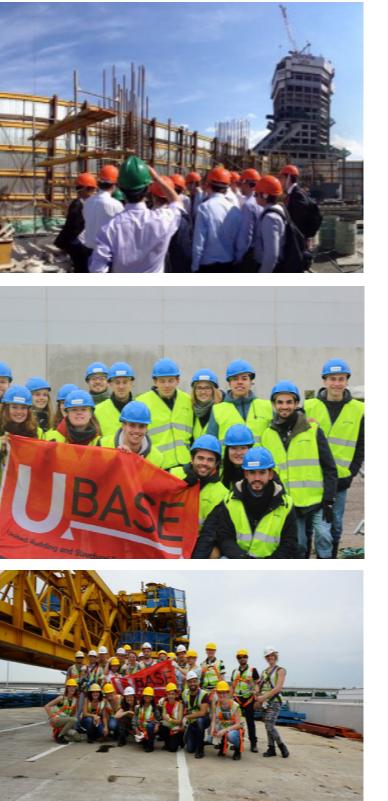
U-BASE association is the student association of Building Engineering and Structural Engineering.

The main objective of the U-BASE is to introduce students to the business environment of civil engineering and the building and structural engineering practice in particular. To achieve this, we create and stimulate relations between students, the university and the building industry by organizing several activities:

- Excursions to companies and interesting building projects several times a year;
- Study tours abroad once a year: the last few years the U-dispuut visited Moscow & St Petersburg, Shang Hai, New York, Hong Kong, Chicago, Tokyo and Singapore;
- Symposia, workshops and guest lectures;
- By publishing a magazine the 'U-profiel'.

For more information on the U-BASE visit us for a cup of coffee at room 1.35 Stevin II or go to:

www.u-base.org



Q1) *When/how do I have to choose a specialisation?*

A) When making your study planning (on <https://mystudyplanning.tudelft.nl/faculty/ceg>) you should give a preference for what specialisation you want to do.

Q2) *Can I switch to another specialisation?*

A) You can always switch to another specialisation as long as you follow all the required courses. Because the amount of different courses increases with time, it is advised to switch before the end of the second quarter at the latest.

Q3) *Can I combine the master track Structural Engineering and Building Engineering (Structural Design Specialisation)?*

A) Yes, Due to the large amount of overlapping courses the additional courses that must be followed (on top of 120 EC) is limited. In this case both tracks will be on your diploma.

Q4) *What courses are allowed to follow as an elective?*

A) See: Article 3-Section c; part 2 of the TER at page 16 of this booklet or for the latest version at: <https://www.tudelft.nl/en/student/faculties/ceg-student-portal/education/education-information/educational-rules-and-regulations/>

Q5) *Is it possible to attend two courses of another university in my MSc programme?*

A) Yes, this fits in part c2 of your programme. Please contact the MSc coordinator in advance, since rules apply.

Q6) *Can I do something extra to earn 4 EC instead of 3 EC for Parametric Design and Engineering?*

A) No, if you are short on credits you should follow an additional course.

Q7) *Can I do an internship instead of MEGA?*

A) No, an internship does not replace MEGA and it is possible to combine both in your programme.

Q8) *If I follow MEGA as c part 2 of my programme, where is the surplus of ECTS going (MEGA=12, c2=10 ECTS)?*

A) You can simply add all ECTS of your total MSc programme, which total need to be ≥ 120 ECTS; the 2 ECTS of MEGA can be used to cover a lack of points in another part of the programme.

Q9) *Why are my grades in Osiris not visible or "in progress"?*

A) Until the CIE-2 form (See chapter 6) is approved and signed by the MSc-coordinator and processed by the administration, this will be the case.

Q10) *I have a timetable conflict between two courses. What should I do?*

A) Please notify the lecturer and the MSc coordinator. In some cases Collegerama may offer a solution, in other cases the lecturers can allow you to miss some classes and catch up at home.

Q11) *I intend to graduate cum laude. What are the requirements?*

A) See: <https://www.tudelft.nl/en/student/faculties/ide/organisation/board-of-examiners/degrees-and-exams/>

9.1 Useful web addresses

Study guide Building Engineering

https://studiegids.tudelft.nl/a101_displayProgram.do?program_tree_id=23853

Official regulations

<https://www.tudelft.nl/studenten/faculteiten/citg-studentenportal/onderwijs/onderwijsinformatie/educational-rules-and-regulations/>

Brightspace Building Engineering

<https://brightspace.tudelft.nl/d2l/home/43816>

Building Engineering website

<https://www.tudelft.nl/onderwijs/opleidingen/masters/ce/msc-civil-engineering/msc-programme/track-building-engineering/>

U-BASE

<http://www.u-base.org/>

Contacts Building Engineering	Telephone	E-mail	Room
Graduation coordinator Structural Design and Building Technology & Physics	Dr. ir. H.R. Schipper	+31 (0)152789933	H.R.Schipper@tudelft.nl 6.48
Internship office		+31 (0)15 27 81174	stagebureau-citg@tudelft.nl HG 2.73
Secretariat	Iris Nederhof-van Woggelum	+31 (0)15 27 83332	I.J.Nederhof-vanWoggelum@tudelft.nl 6.47
U-BASE		+31 (0)15 27 83042	info@u-base.org Stevin II 1.35

For other Building Engineering members, see <https://brightspace.tudelft.nl/d2l/le/content/43816/Home>

Notes

Handwritten notes can be written here.

Building Engineering

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