CME Information Package
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Introduction

The CME information package includes information about the CME Master program needed to prepare yourself for your new Master at the Eindhoven University of Technology. For graduation a separate document is available entitled ‘CME graduation guide’. This information package is prepared for your convenience, however the most up-to-date information can only be found at the university website. Thus no obligations can be derived from this document.

The most important web links where you can find the up-to-date information are:

CME Master program (extranet)
http://www.tue.nl/cme

CME Master program (intranet, TU/e account needed)
https://studiegids.tue.nl/opleidingen/graduate-school/masters-programs/construction-management-and-engineering/

TU/e course system
http://oase.tue.nl/ as from 1 March 2017 http://canvas.tue.nl

4TU-CME program, including the 4TU-CME study guide:
https://www.4tu.nl/cme/en/

In the Chapter CME Course planning you find guidelines how to plan your individual two year CME Master program dedicated to your personal career and ambitions. These guidelines will also be helpful for filling in your personal study program requested by the TU/e Graduate School.

The CME Information package, the CME graduation guide, and all other information about the CME master program can be obtained through the CME secretariat:

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Tel: +31(0)402472373
Email: i.m.dekkers@tue.nl
Room: VRT 9.H13
CME Master program and Course list

The CME Master program contains 120 ECTS and consists of:
30 Ects Core Courses
35 Ects Specialization Electives
15 Ects Free Electives
40 Ects Graduation

The table shows the relevance of each CME course for the TU/e Strategic Research Areas and the Department of the Built Environment themes.

<table>
<thead>
<tr>
<th>CME</th>
<th>TU/e Strategic Research Area</th>
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CME graduation tracks

For your convenience CME has configured 3 tracks related to the research expertise of the TU/e-CME staff members that are involved in the research program DDSS (dep. Built Environment) or BETA (dep. Industrial Engineering & Innovation Sciences). These tracks serve as a starting point for your personal planning which is explained in more detail in the chapter CME course planning.

Track: Energy Neutral Cities
Cities are responsible for a significant part of greenhouse gas emissions as they generate emissions and use fossil fuel based energies. Therefore, cities should be seen as a significant means for climate change mitigation. This can be done by considering alternative methods to generate, consume, store and distribute energy however these methods are limitedly investigated in cities. The research in ISBE group focuses on these alternative methods by making the connection between technology, people and urban environment. Thus, our aim is to contribute to more reliable and comprehensive models to reduce energy demand, to generate renewable energy and efficient use of available resources by using static and dynamic data.

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Track: Urban Management
Cities are inherently complex and dynamic systems with many different stakeholders and long term policies. Nevertheless, the fast pace of urbanization causes burden on stakeholders and policy makers that are responsible for urban management. The research in urban management focuses on understanding dynamic urban processes and formulating policies on the development of sustainable and resilient cities. Urban management research contributes to socio-economic models that are needed to manage urban systems and forecast spatial effects and financial risks of policy measures by considering the emerging area of urban informatics (i.e. using sensors, gps, apps, location-based social network data for urban systems). Urban informatics utilizes urban Big Data to improve strategies for dynamic urban resource management, to gain insights on urban patterns and processes, to support and make innovations for urban management, public participation and policy analysis.
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**Track: Building Information Management**

Building Information Modelling (BIM) entails methods and data structures over the whole lifecycle of the building including the construction phase to facilitate efficient and accurate exchange and processing of all information related to the built environment. Information management is crucial for improving the effectiveness and efficiency of the Architecture, Engineering and Construction processes. The lack of integration and co-ordination between actors is a major factor for poor project performance and the overall low productivity index of the whole sector. Standardization of data structures and communication protocols in building modelling and city modelling are needed and should also integrate advanced communication and BIG data mining. A special focus among the on-going research in ISBE lies on how building related data can be connected across knowledge domains both within AEC and its neighboring fields using Linked Data and Semantic Web technologies, information models and structures to allow greater levels of information access and cross-domain interoperability.

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CME Course descriptions

1CM900 - Project Management

Learning objectives

- Being able to characterize a project aiming at the realization of a physical product in terms of the
dynamics, the variability and the stochasticity of the project targets, the activities be performed and
their precedence relationships. The available resources and the time cost budget constraints.
- Being able to analyze the possible result of a project as function of its targets, its activities and the
deployment of resources over time.
- Being able to evaluate the possible contribution of advanced decision making methods to improvements
in project performance.

Contents

Planning work activities, costs and budgets, activity scheduling (PERT/CPM), resource allocation, and
project execution (information requirements and control).

1ZM65 - System Dynamics

Learning objectives

Accelerating economic, technological, social, and environmental change challenge managers and policy
makers to learn at increasing rates, while at the same time the complexity of the systems in which we live
is growing. Many of the problems we now face arise as unanticipated side effects of our own past actions.
All too often the policies we implement to solve important problems fail, make the problem worse, or
create new problems. Effective decision making and learning in a world of growing dynamic complexity
requires us to become system thinkers to expand the boundaries of our mental models and develop tools to
understand how the structure of complex systems creates their behavior.
This course introduces you to system dynamics as a tool for analyzing and modeling complex business
problems and strategies. System dynamics is a perspective and a set of conceptual tools that enable us to
understand the structure and dynamics of complex systems. System dynamics is also a rigorous modeling
method that enables us to build formal computer simulations of complex systems and use them to design
more effective policies and organizations. Together, these tools allow us to create management flight
simulators microworlds where space and time can be compressed and slowed so we can experience the
long-term side effects of decisions, speed learning, develop our understanding of complex systems, and
design structures and strategies for greater success. (Sterman, 2000, pp. vii)

After taking the course students are able to:

- Create awareness of how the structure of business systems creates their behavior and performance;
- Understand how well-meant policies often inadvertently create business performance issues, rather than
  solve them;
- Develop simulation models of business systems;
• Calculate behavior of basic systems.
  - Create awareness of how the structure of business systems creates their behavior and performance;
  - Understand how well-meant policies often inadvertently create business performance issues, rather than solve them;
  - Develop simulation models of business systems;
  - Calculate behavior of basic systems.

Contents
In the first lectures of the course we will deal with a variety of subjects related to systems thinking, like: policy resistance, positive and negative feedback, bounded rationality, misperceptions of feedback, fundamental modes of dynamic behavior (exponential growth, oscillation) and causal loop diagramming. Then, we will focus on system dynamics modeling, by dealing with stocks and flows diagramming, the mathematical relation between stocks and flows (integration and differentiation), delays, modeling human behavior and modeling supply chains.
Also, students will perform a group assignment in which a system dynamics model is developed based on a case description of business processes. With this model, students will replicate the behavior of the business processes, understand the causes of this behavior, and simulate scenarios to improve the performance of these processes.

7ZM8M0 - Collaborative design

Learning objectives
After the course a student:
• Understands the different roles in a building project
• Can write a project management plan using SE
• Can monitor a collaborative design process
• Can evaluate the product and process performance in a collaborative design project
• Understands group dynamics and knows how to act
• Knows how to use his/her expertise in a collaborative design project
• Knows how to use Design and Engineering tools in a collaborative design project
• Can reflect upon scientific challenges in collaborative design
• Can use SE and BIM management tools in a collaborative design project

Contents
The objective of this course is to gain insight in the problem domain of Collaborative Design with special attention to Systems Engineering (SE) and Building Information Models (BIM).
A consortium of companies will work on a design assignment for one semester. A student is member on one of the following companies: Architects, Urban designers, and Engineers. A company consists of 4 persons with one person as Chief Executive Officer (CEO), one Systems Engineering Officer (SEO) and the other two as domain experts. The consortium management consist of all CEOs and SEOs from all companies. CEO and SEO will swap roles with the two other persons halfway the project. The project start with writing a project management plan. Following the design is created between the companies while monitoring and evaluating the progress. In this process the application of SE and BIM techniques and tools is compulsory. Consortium management is tutored by the teachers in weekly sessions. Finally the design is presented and reports are written about the design product and process.
**7ZM3M0 - Case study process modeling**

**Learning objectives**
After the project, the student is able to:

- Identify the involved stakeholders’ interests
- Specify the process phases
- Apply appropriate qualitative methods for analysis (e.g., Isikawa diagram, stakeholder power/interest grid, SWOT, creating action plan, etc.)
- Identify strengths and weaknesses of the process
- Provide recommendations for process improvement
- Write an academic report

**Contents**
Executing analysis for the process of a complex development project in the context of Construction Management and Engineering.
At first a real complex development project challenge is identified. This project can be an international well known project, e.g., an olympic stadium. Students are required to search all the necessary information online and use appropriate methods for analysis. The case study focuses more on the soft side of the process in terms of understanding the nature of interaction between involved stakeholders and decision making on projects within an uncertain and dynamic social, political and physical environment.

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**7ZM5M0 - Process modeling and information management**

**Learning objectives**
The student will learn how to construct mathematic models to model and analyze the problems in the development projects, and optimize the process and manage the information flow.

**Contents**
Understand and apply the analysis method for process modeling and information management in the context of urban development.
The following topics will be dealt with:

- Process management
- Process modeling
- Agent based models
- Qualitative methods (e.g., SWOT, ISHIKAWA, etc.)
- Linear optimization models
- Discrete optimization models
- Network optimization models
- Measuring Stakeholders’ Interests and Actions
7ZM9M0 - Systems engineering

Learning objectives
After the course a student:
• Understands the basic Systems Engineering principles
• Can apply SE principles to building projects
• Can relate SE and BIM.

Contents
The objective of this course is to gain insight in the problem domain of Collaborative Design with special attention to Systems Engineering (SE) and Building Information Models (BIM).
A consortium of companies will work on a design assignment for one semester. A student is member on one of the following companies: Architects, Urban designers, and Engineers. A company consists of 4 persons with one person as Chief Executive Officer (CEO), one Systems Engineering Officer (SEO) and the other two as domain experts. The consortium management consist of all CEOs and SEOs from all companies. CEO and SEO will swap roles with the two other persons halfway the project. The project start with writing a project management plan. Following the design is created between the companies while monitoring and evaluating the progress. In this process the application of SE and BIM techniques and tools is compulsory. Consortium management is tutored by the teachers in weekly sessions. Finally the design is presented and reports are written about the design product and process.

7ZM6M0 - Legal and governance

Learning objectives
• Recognize important aspects of the institutional framework of the construction process and the governance modes that develop within this framework
• Recognize relevant legal aspects (within different phases) of the construction process and analyze these in the context of public and private institutional frameworks
• Estimate the weight and complexity of these aspects
• Develop ideas to deal with these aspects and provide solutions for problems or conflicts resulting from these aspects in accordance with the fundamental positions of the public and private sectors
• Understand options and solutions presented by legal experts.

Contents
The course consists of a legal & governance part. The legal part is divided into a private and public law part. The public law part concentrates on principles of spatial regulation on national, provincial and municipal level. Specific attention will be paid to the relationship with relevant property rights and with the major legal instruments and issues, such as spatial planning and licensing procedures, legal protection against public authorities and legal enforcement. The private law part concentrates on procurement proceedings, contracting and responsibility and assurance matters in the field of the construction industry. The governance part concentrates on describing and analysing markets, hierarchies and networks as governance modes in the construction sector. Special attention is given to the relations between governmental actors and the actors in the construction sector.
7ZW7M0 - Urban research methods

Learning objectives
- Students know how to develop a conceptual model for a given research problem
- Students understand the principles of state-of-the-art models and techniques for urban research and know when and how to apply them. The techniques considered include non-parametric methods, advanced regression analysis, discrete choice modeling, stated choice experiments, multi-criteria analysis techniques and urban survey methodologies.

Contents
In this course students learn core research and evaluation methods for urban planning/management. The focus is on quantitative methods and evaluation techniques. The following topics are covered:
- Decision processes in urban planning and management
- Developing a conceptual model for a research problem
- Data analysis and modeling techniques
- Regression analysis
- Discrete choice modeling (incl. stated choice experiments)
- Evaluation techniques for decision making
- Survey methodologies.

Research methods are relevant in the first stages of the decision process where the aim is to generate knowledge about a problem or possible actions. Evaluation techniques are relevant in the last stage where the aim is to determine a preference ranking of action alternatives. The techniques are explicitly positioned in a decision process model.

The course consist of a series of lectures and literature study. Each lecture is complementary to the literature studied and accompanied by a practical where the students apply the theory to a case.

1ZM20 - Technology entrepreneurship

Learning objectives
The aim of this course is to develop your awareness, understanding and application of flexible and adaptive decision-making approaches along with more familiar prediction and planning-based methods for decision making in the face of uncertainty in new business development based on new technology.

Consequently, at the end of this course you should be able:
- To distinguish flexible and adaptive decision-making logics as used by expert entrepreneurs from the prediction and planning-based approaches (i.e. traditionally accepted business management practices) and argue their application under different contingencies.
- To master the techniques that enable you to spot or create new business ideas.
- To validate and adjust a new business idea in the market (i.e. is an idea a real opportunity?) by assessing and incorporating the feedback from different stakeholders.
- To use flexible and adaptive (i.e., action-based) approaches to new business development.
- To assess yourself with respect to flexible and adaptive decision-making logics as opposed to prediction and planning-based approaches and reflect what factors helped or hindered you in flexible and adaptive approaches.
Contents
Entrepreneurship is a unique type of creative problem solving process that transforms an idea into an enduring and effective institution in the real world (either on your own or as part of an existing organization). Entrepreneurs not only bring together products and markets, but often also create the products and markets as part of the new business development process. Throughout this course, you will learn to apply flexible and adaptive approaches towards decision making in new business development along with more familiar planning and prediction-based approaches. Using adaptive and flexible approaches (like effectuation), entrepreneurs take small organic steps during their decision making process and apply validated learning approaches as a way to deal with uncertainty. Accordingly, the intellectual content of the course is centered on the notion of “Validated Learning”, defined as an iterative learning process of trying out an initial idea, measuring it to validate the effect and incorporating the lessons learned into the succeeding test (Ries, 2012). The main deliverables in the course are focused on identifying and testing the key factors that help you decide if a (technology based) idea is a real opportunity and validate and adjust the idea in the market. Therefore, identifying, defining, and understanding the market and all relevant stakeholders is a cornerstone of the course. Equally important, however, is investigating whether the idea is an opportunity for you. To answer that, you need to understand who you are and what you want, particularly in relation to the idea and the decision making process needed to further develop this idea. This course is designed to help you do that through a thoughtful and active exploration of the decisions you will make and the experiences you will encounter in pursuing an idea to its fulfillment.

1ZM120 - Entrepreneurial marketing

Learning objectives
To provide students with knowledge of how to bridge the marketing discipline and the entrepreneurial field. To provide guidelines and tools to deal with entrepreneurial side of marketing:
• conjoining and coping with market and technology uncertainty
• network effects
• assuming calculated risks
• being proactive
• offering attractive innovations relative to competitors
To provide guidelines and tools to deal with the marketing side of entrepreneurship:
• lack of economies of scale
• limited resources
• limited market presence and brand image
• decision making with limited information

Contents
Lectures and topics (see study guide for final programme)
• Introduction to marketing-entrepreneurship interface
• The technology adoption life cycle (TALC)
• The entrepreneurial marketing plan
7ZW4M0 - Built environment and smart mobility

Learning objectives
After successfully completing this course, students are able to apply:
• the four-step model of travel demand
• activity-based models of travel demand
• traffic flow simulation models
• walkability and accessibility indices.
Furthermore, students have knowledge of empirical studies on:
• the environmental impact of mobility and quality of life
• the effects of smart mobility on activity-travel patterns

Contents
This course deals with analyzing the interdependencies between transportation and various aspects and components of urban systems. Application of models to support transport-related design and decision processes in urban design, planning, real estate and transportation, considering:
• The complex interdependencies involved
• Effects on the environment, functioning of the system and quality of life
• Uncertainties in model applications, data and scenarios.
The following topics will be dealt with:
• Built Environment and Transportation: relations between transportation, land use, urban design and real estate; activity-based analysis as integrated framework.
• Real estate, accessibility and transportation: concepts of destination and reach; measurement of accessibility; cumulative opportunities; gravity measures; space time prisms; consumer surplus; empirical studies on impact of accessibility on land and property values and the impact of parking in office and shopping centre developments.
• Urban form and travel: Space Syntax; models of pedestrian flows; walkability indices.
• Transportation, environment and quality of life: activity travel patterns and energy consumption, emissions and exposure; mobility; well-being.
• Models of transport demand: the 4 step model; activity-based models (constrained based models, utility-maximizing models, computational process models).
• Albatross: theory; formalism of decision tables; process; example of policy application.
• Models of traffic flows: principles of traffic flow models; fundamental diagram; bottlenecks; queuing theory.
• Smart mobility: more capacity vs. better use; developments in travel information; effects of travel information on activity travel patterns; new technology and smart grids.

7ZM1M0 - Research and development project

Learning objectives
At the end of the project, the student is able to:
• Identify a research challenge
• Specify a research goal
• Select the appropriate state-of-the-art methods or techniques
• Execute a method or implement a technique
• Evaluate the results
• Write a scientific report

Contents
Executing an Research and Development project for a specific case in the context of Construction Management and Engineering and/or Design Systems.

At first a research challenge is identified. These research challenges can follow from on-going research in the DDSS (Design and Decision Support Systems) research program, but also from society or industry. Given the time frame the research goals and criteria are specified. To reach the goal, research and development methods/techniques are selected that are not yet known by the student, but are relevant for the student’s education. These methods/techniques are state-of-the-art in DDSS research. Design Systems Lab facilities are available to support experiments. With support from the staff these new methods/techniques are learned by doing. The results are tested against the predefined criteria. Finally a scientific report is written that reflects upon the achieved results.

7ZW5M0 - Smart urban environments

Learning objectives
After finalising this course, students:
• have insights in current threats and opportunities in urban systems regarding energy, health, mobility and quality of life
• are able to identify and analyse the potential of ICT in solutions for urban systems
• are able to identify and analyse the potential of integrated land-use and transport planning
• have insight in the mechanisms and consequences of bounded rationality of users in adopting new technologies / smart solutions
• know how to apply AI and data mining techniques to extract patterns from (big) data for policy analysis.

Contents
Cities are booming and constitute the heart of economic and cultural developments. At the same, threats of the quality of living environments ask for smart solutions in areas such as mobility, health and energy. In this course, new perspectives offered by emerging technologies and research are addressed. The course considers current issues in urban development (smart cities, healthy cities, smart grids) and links these issues to new approaches in urban analysis and decision support (AI, big data).

The course consists of a series of lectures. Each lecture addresses a particular topic and is accompanied by a practical where the students apply the theory to a case. The following topics are addressed:
• Current issues in urban planning and the need for smart solutions (health, social, mobility, energy)
• The need of integrated land-use and transport planning and creating benefits by synchronizing networks
• Applications and potential of integrating ICT in urban infrastructure and personal information systems
• Techniques and applications of data mining to extract information from big data
• Techniques and applications of knowledge-based systems for urban planning
• Bounded rationality of users in adopting new technologies / solutions and lessons learned for effective policy making.
7ZW1MO - Big data and experiments for urban analysis

Learning objectives
After completion of the project the student is able to:
• Formulate a research question for a problem in urban planning
• Identify a suitable analysis technique for the research question concerned
• Carry out all the steps involved in the chosen methodology
• Assess various future planning scenarios and identify implications for planning
• Judge the limitations of the carried out research and identify remaining problems for future research.

Contents
To find good solutions one need to have a good understanding of the problem. This holds true also for the problems urban planners are facing in areas such as mobility (congestion and accessibility), health (air pollution, passive life styles), energy (smart grids and transformation to renewable sources of energy) and ageing (social exclusion, social satisfaction). In this project you consider a planning problem of your choice and apply one of the following approaches to better understand the problem and evaluate scenarios.

The first method (A) is the stated preference/choice approach and can be used for measuring individuals’ preference and choice behaviour for new, not yet existing, alternatives. Respondents in choice experiments are invited to provide some type of response to new choice options (hypothetical alternatives) that are generated according to the principles underlying the design of statistical experiments. For example, the stated choice approach may be used to evaluate residential preferences for new housing plans, or to describe and predict consumer choices for various tourist attractions in a city. During the project the following steps will be carried out: specification of influential attributes and their levels, choice of measurement task, selection of experimental design, construction of a questionnaire, data collection, analysing the results by advanced discrete choice models (e.g., MNL model, Mixed logit, latent class model), and finally various future planning scenarios are assessed.

The second approach (B) uses information from a big database such as GPS data or one of the large national surveys, such as OVIN and WOON. These databases provide rich information on micro-level of individuals. In this approach an existing database is analysed to achieve a better understanding of behaviour of individuals with regard to the planning problem considered. During the project the following steps will be carried out: formulation of a research question; specification of a conceptual model; identification of relevant variables; preparation of the data; performing the analysis and interpreting the results. The analysis technique and database used will be chosen depending on the research question. The emphasis is on advanced techniques from the field of either regression modelling (e.g., path analysis) or data mining (e.g., Bayesian network learning).

7M900 - Fundamentals of building information modeling

Learning objectives
At the end of the course:
• Students can apply the basics of the standardized general purpose visual modelling language UML, particularly Use Case diagrams, Class diagrams, Activity diagrams, Sequence diagrams and UML Profile for databases.
• Students can describe and interpret the structure and details of existing standards used in BIM (Building Information Model) like IFC, XML, XML Schema, GML, CityGML, Express, Express-G diagrams, and Semantic Web by building Smart standards.

Contents
This course is of importance to everyone using building information. BIM is becoming generally accepted in the construction industry, but also civil engineering and building services adopt BIM. The emphasis is no longer on the building itself but on the building process and also in urban areas. There is a need for a universal database: the Building Information Model (BIM). A wide range of applications - such as CAD, construction specifications software, budgeting software and the like get their information from this building information model. The student learns to model with the visual modeling language UML (Unified Modelling Language). UML is used as the “stepping stone” to translate data models created by other diagram techniques. This is important because standards for information exchange play a major role. The student learns to read and to interpret the models created with different diagram techniques. Topics will be discussed about Express and Express-G diagram technique used to describe IFC classes, XML and XML Schema, GML and CityGML for representing geographic information. The student also learns to read models created with some outdated diagram techniques as a basis for new insights. In addition, up-to-date BIM developments will be discussed.

7ZW3MO - Urban planning II

Learning objectives
After completing the course, students are able to assess the qualify and viability of retail facilities and public services in an existing urban area. In addition, students will be able to suggest how to improve the situation. Furthermore, students will know how to forecast population and quantitative housing demand and they will have knowledge about models describing the development of urban areas. Finally, students will have basic knowledge about the organisation of spatial planning in the Netherlands and other countries.

Contents
This course is about planning of retail and public facilities in urban areas. It also deals with population and housing demand forecasting and predicting the development of urban areas.

The course starts with a short introduction into spatial planning in the Netherlands and Europe. Small groups of students compare planning systems in different countries. The next part deals with planning retail facilities and public facilities, both in terms of supply and demand. Retail facilities will be discussed at the level of urban areas and at the level of shopping centres. Small groups of students compare and assess facilities in different urban areas. The last part of the course is about predicting the development of urban areas. Methods to predict the size and composition of the future population and the corresponding housing demand, as well as so called land use models are introduced. Students will gain experience with such methods and models.
# CME Course roster

<table>
<thead>
<tr>
<th>CODE</th>
<th>Q1</th>
<th>ECTS</th>
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<td>1CM900</td>
<td>Project management</td>
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<td>Case study process modelling</td>
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<td>7ZW5M0</td>
<td>Smart urban environments</td>
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<td>Legal and governance</td>
<td>7.5</td>
<td>7M900</td>
<td>Fundamentals in BIM</td>
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<td>1ZM20</td>
<td>Technology Entrepreneurship</td>
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<td>1ZM120</td>
<td>Entrepreneurial marketing</td>
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<td>7ZM5M0</td>
<td>Process modeling and information management</td>
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<td>1ZM65</td>
<td>System dynamics</td>
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<td>Built Environment and Smart Mobility</td>
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<td>Graduation</td>
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**Core course**

**Specialization elective
CME Course planning

In general the priority in which you make your individual CME course planning is:
1. Core courses (at the TU/e)
2. Specialization electives (from the TU/e, TUD, or UT)
3. Free electives (from the TU/e, TUD, or UT)
4. Academic skills (at the TU/e)
5. Graduation (at the TU/e)
6. Internationalization (outside the Netherlands)
7. Internship (inside or outside the Netherlands)

The core courses are followed at the Graduate School of the TU/e. If you choose from the specialization electives of the CME course list (35 out of 55) then your individual CME course program will receive positive advice from your mentor by default. You can also select Specialization elective courses from the other – non-CME – Master programs at the Eindhoven University (TU/e) and from the 4TU-CME Master programs of Delft University (TUD) or University Twente (UT) (see 4TU-CME study guide, or ask a copy at our CME secretariat). In the latter case you need advice from your mentor because he/she will maintain coherence in your individual CME course program. The same non-CME TU/e and 4TU-CME TUD/UT Master programs are available for the Free elective courses but for these courses you don’t need your mentors’ advise. If you want to follow courses at TUD or UT, you need to be enrolled in their program as well. Ask our CME secretariat for help if needed. Obviously if you follow courses at TUD or UT this usually involves travelling or moving temporarily. Therefore you need to make your own arrangements. Language courses are only allowed at level C as Free elective course at a maximum total of 5 ECTS (see Center for Languages and Intercultural Communication (CLIC), stu.clic@tue.nl). In all cases your individual CME program needs finally to be approved by the Examination Committee of the Department of the Built Environment.

From experience we know that dependent on their prior Bachelor, students might face a lack of academic skills, especially scientific writing. We advise you to overcome this legacy as soon as possible, because writing scientific reports comes back in many CME courses and is often also part of the grading. There is no regular course on scientific writing, however the TU/e offers the SkillsLab (https://skillslab.tue.nl/guided-learning-academic-writing-skills) with on-line courses that you need to follow in your own time.

We strongly advise you to at least follow the modules: Guided learning for Argumentation, Guided learning for thesis writing, and Guided learning for organization and structure at section level. Secondly, students sometime also lack basic research skills. In the CME program you will learn advanced research methods and techniques, but you can only understand these, if you already know the basics. For a good introduction into the basic research skills for CME, the 4TU prepared a series of on-line movies: https://vimeo.com/channels/rmas/videos. We advise you to watch these movies at an early stage of your CME master program.

CME Graduation consists of two parts: (1) Research proposal, and (2) Graduation project. Normally speaking, if you aim to complete your Master study in two years, you will register for your Graduation at the beginning of the second year of your CME Master. Graduation can be started every Quartile. For more information about your Graduation please refer to the ‘CME Graduation guide’. Your individual CME course program should constitute a coherent Master program that is in line with the CME Master learning goals. Therefore you should start by determining your personal ambitions. Ask yourself what type of career you want to pursue. With that in mind you can determine the subject of your
graduation project and the courses you need to follow to be prepared. Because these are complex but
nevertheless important decisions you get help from your CME mentor. Your mentor might advise negatively
about a specific course if it does not fit the TU/e-CME expertise Construction Management and Urban
Development. To learn more about the TU/e CME Graduation topics, you can check the CME graduation
guide. You will be appointed a mentor after you entered the CME program. If you want contact with a CME
mentor before you start, then ask the CME secretariat to arrange an appointment.

The career perspectives for a CME student are very wide, and were very good right from the start. First
of all you must decide if you want to pursue an academic or professional career. Students that pursue an
academic career will opt for a PhD position at any university around the world, with a suitable research
topic. Students that pursue a professional career, typically find jobs at the following companies (with Dutch
examples):

Engineering Consultancy offices: HaskoningDHV, Witteveen+Bos, Arcadis,
Governmental institutes: RWS, Ministries, Municipalities,
Start-Ups: Roots, ARCHIDIMEX, EcoVat, …
Contractors: BAM, Ballast-Nedam, Heijmans,

The TU/e Graduate School strongly promotes Internationalization, but this does not apply to foreign
students since they already have international experience. For Dutch CME students this usually means that
you will visit a foreign university for two Quartiles and follow at a total of minimal 15 ECTS courses that
you will count as Free electives in your individual CME course program. Contact our student exchange officer
Mrs. Houben (h.a.m.houben@tue.nl, VRT 2.105) for a list of universities that you potentially can visit.
Whether you can actually go depends on many factors such as: available seats, available courses relevant
to CME, etc. Because of the complexity you need to make arrangements already halfway the first year of
your CME Master. Usually while following courses at another university you will also write your Research
Proposal for your Graduation project. You will do that together with your anticipated first supervisor (see
CME Graduation guide for more details). When you return back to TU/e after two Quartiles, you have two
Quartiles left to complete your Graduation project. For help in organizing your internationalization you can
contact your CME mentor.

One of the (non-CME) courses you can follow as a Free elective is an internship, but it depends on your
personal ambitions if this should be part of your CME program. On top of the conditions that are set by
the Department of the Built Environment (see separate document), the CME Master program imposes the
following conditions:

Dutch student:
5 ECTS nationally allowed; no special approval needed
15 ECTS nationally is not allowed
5 ECTS abroad is allowed; no special approval needed
15 ECTS abroad is allowed, but should have a strong academic research and development component;
approval needed upfront by your mentor
Foreign student:
5 ECTS is nationally allowed; no special approval needed
15 ECTS nationally is allowed, but should have a strong academic research and development component; approval needed upfront by your mentor
5 ECTS abroad is allowed; no special approval needed
15 ECTS abroad is not allowed

Internship as part of your Graduation should be described in your Research proposal (but is not graded separately). Conversely if you want your Internship rewarded with ECTS you should choose one of the other options presented above.

Make a course planning for the whole 2-year’s CME Master before you start. You should plan minimum 15 ECTS per Quartile, but it is better to keep a safety margin (2.5-5 ECTS more) in case you fail for a course.

Finally fill in your individual CME course program in the Study plan form of the Department of the Built Environment (see Department website). Discuss this Study plan with your mentor before submitting to the Department Education office in the first Quartile of the first year of your CME Master. Changes in the Study plan are possible at any time until your Graduation starts.
Certificate programs

The Department of the Built Environment offers two certificate programs: ‘Construction Technology’ and ‘Building Design & Technology’. These certificates are supplementary to the regular CME master program.

Both certificate programs have an extent of 15 ECTS, 5 ECTS will come on the top of the regular master program. The extent of the subjects that can be used in the elective course space in the regular CME master program is 10 ECTS. Additional courses are entered as Free elective course space. A project of 5 ECTS will be part of the program.

For more information, see:

The department of Industrial Engineering & Innovation Sciences in collaboration with the TU/e Innovation Lab offers the certificate program ‘Technology Entrepreneurship’.

The certificate program has two variants: (1) broad and (2) in-depth, both to the extent of 15 ECTS. Some courses in this certificate program are also offered in the elective course space of regular CME program. Additional courses are entered as Free elective course space.

For more information, see:
Additional documents

The following documents are available on request through the CME secretariat or through the TU/e CME website (See Introduction for the contact data and weblinks).

- CME graduation guide
- Internship Department of the Built Environment (options)
- Study semester abroad
- Internships (How to)
- 4TU-CME study guide
- Personal study program (Graduate School)