

Construction Management and Engineering

**3TU.Federation (Delft University
of Technology, Eindhoven University
of Technology, University of Twente)**

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This report was finalized on 15 December 2011.

Report on the master's programme Construction Management and Engineering offered by the 3TU.Federation (Delft University of Technology, Eindhoven University of Technology, University of Twente)

This report takes the NVAO's Assessment Framework for Limited Programme Assessments as a starting point.

Administrative data regarding the programme

Master's programme Construction Management and Engineering

Name of the programme:	Construction Management and Engineering
CROHO number:	60337
Level of the programme:	master
Orientation of the programme:	academic
Number of credits:	120 EC
Specializations or tracks:	
Location(s):	Delft, Eindhoven, Enschede
Mode(s) of study:	full-time
Expiration of accreditation:	24-01-2013

The visit of the assessment committee Construction Management and Engineering to the 3TU.Federation (Delft University of Technology, Eindhoven University of Technology, University of Twente) took place on 6 and 7 October 2011.

Administrative data regarding the institution

Name of the institution:	3TU.Federation (Delft University of Technology, Eindhoven University of Technology, University of Twente)
Status of the institution:	publicly funded institution
Result institutional assessment:	TUD has passed the institutional assessment. At TU/e and UT the result is pending.

Quantitative data regarding the programme

The required quantitative data regarding the programme are included in Appendix 4.

Composition of the assessment committee

The committee that assessed the master's programme Construction Management and Engineering consisted of:

- Prof. ir. K. (Kees) d'Angremond (chair), emeritus professor of coastal engineering at Delft University of Technology;

- Prof. dr. M. (Mike) Kagioglou, professor of Process Management and Head of School of the School of Built Environment at the University of Salford (UK);
- Prof. dr. E.J.M.M. (Jos) Arts, professor of Environmental and Infrastructure Planning at the University of Groningen and strategic advisor Infrastructure and Environment for the Dutch Ministry of Transport, Public Works & Water Management (Rijkswaterstaat);
- Ir. C.J. (Kees) Vriesman, former Director-general of Physical Planning of the Dutch Ministry of Housing and Physical Planning;
- N. (Nicolien) van Eeden BSc, student of the master's degree Urban and Regional Planning at the University of Amsterdam.

The committee was supported by Melissa Frederik and Floor Meijer, who acted as secretaries.

Appendix 1 contains the curricula vitae of the members of the committee.

All members of the committee and the project leaders signed a declaration of independence as required by the NVAO protocol to ensure that the committee members judge without bias, personal preference or personal interest, and the judgement is made without undue influence from the institute, the programme or other stakeholders (see Appendix 7).

Working method of the assessment committee

Preparations for the site visit

QANU received the self-evaluation report of the master's programme Construction Management and Engineering on 24 June 2011. After having established that the report fulfilled the criteria of relevance and completeness, the project leader distributed the self-evaluation reports and the additional information among the members of the assessment committee. The committee members were asked to phrase their remarks, comments and questions regarding the self-evaluation report and the additional documents prior to the site visit.

In addition to the self-assessment report, each committee member received six recent theses of the three locations (Delft, Eindhoven and Twente). In consultation with the chair of the committee it was decided that the selection of theses should cover the full range of marks given. Furthermore, it was agreed upon that each thesis should be assessed by two members of the committee. Together with the selection of theses appointed to them, the committee members received QANU's checklist for the assessment of theses to ensure that their assessments were comparable. Since the committee had to evaluate a programme leading to a scientific degree (MSc), it gave specific attention to the scientific level of the theses, the requirements, carefulness of judgement by the reviewer of the programme and the assessment procedure used.

Before the site visit, the project leader drafted a programme for the site visit. This draft programme was discussed with the chair of the committee and the coordinator of the programme. As requested by QANU, the coordinator of the programme carefully composed and selected representative panels. Before the site visit both staff members and students were informed about the opportunity to speak to the committee confidentially during the 'consultation hour'. No requests were received for the consultation hour.

The site visit

The site visit took place on 6 and 7 October 2011. It started with a preparatory committee meeting, in which the committee members discussed their findings based on the self-evaluation report they had received prior to the site visit. The committee also discussed its task, working methods and the questions and issues to be raised in the interviews with representatives of the programme and other stakeholders.

During the site visit the committee conducted interviews with the programme management, students, staff members, graduates, members of the Education Committee, the Board of Examiners and student advisor. In addition, the members of the committee studied further materials made available by the programme, including study books, written exams, assignments and other assessments.

After the concluding meeting with the management on the final day of the site visit, the members of the committee extensively discussed their assessment of the programme and prepared a preliminary presentation of the findings. The site visit concluded with a presentation of the preliminary findings by the chairman. This presentation consisted of a general assessment and several specific findings and impressions of the programme, as well as some recommendations. A schedule of the site visit is included in appendix 2.

After the site visit

After the site visit, the secretaries produced a draft version of the report on the programme that had been assessed and presented it to the members of the committee. Subsequently, the secretaries processed corrections, remarks and suggestions for improvement provided by the committee members and thus produced the first final draft report. This was then sent to the 3TU.Federation to check for factual errors, inaccuracies and inconsistencies. Comments and suggestions provided by the Faculty were discussed with the chair of the assessment committee, and, where necessary, with the other committee members. Based on the committee's decisions to incorporate or ignore comments and suggestions, the secretaries compiled the final version of the programme report.

Formally, the master's programmes in CME at the three locations are independent programmes with a high level of collaboration. At present, every location has its own Examination Committee, Admissions Committee, Education Committee and student association. These committees are either exclusively for CME or cover more or all programmes of the faculty that CME belongs to. Thus far it has been possible for students to follow the complete programme at a single university. The committee assessed the master's programmes in CME during one site visit and presents its results in a single report. Still, the committee assessment of each standard is valid for the three individual programmes. If any differences between the locations were observed, this is mentioned in the report.

Explanation of the definitions used for the assessment

In accordance with the NVAO's Assessment Framework for Limited Programme Assessments, the committee used the following definitions for the assessment of both the standards and the programme as a whole.

Generic quality

The quality that can reasonably be expected in an international perspective from a higher education bachelor's or master's programme.

Unsatisfactory

The programme does not meet the current generic quality standards and shows serious shortcomings in several areas.

Satisfactory

The programme meets the current generic quality standards and shows an acceptable level across its entire spectrum.

Good

The programme systematically surpasses the current generic quality standards across its entire spectrum.

Excellent

The programme systematically well surpasses the current generic quality standards across its entire spectrum and is regarded as an (inter) national example.

The default assessment is 'satisfactory', i.e. the programme complies adequately with the criteria.

Summary judgement regarding the quality of the master's programme Construction Management and Engineering

This report reflects the assessment committee's findings and considerations on the 3TU.Federation's master's programme in Construction Management and Engineering (CME) at Delft University of Technology (TUD), Eindhoven University of Technology (TU/e) and the University of Twente (UT). The 3TU programme in CME focuses on the integration of management and technology in order to produce innovative solutions for the field of Construction Engineering.

Formally, the three local varieties of the master's programme in CME are independent programmes with a high level of collaboration. Examples of this cooperation include mutual (international) marketing and recruitment, joint development of educational elements, combined teaching efforts and the exchange of knowledge between staff members and students of the three locations.

Within the 3TU CME framework, each location has its own specialisation. In Delft the CME-programme expands upon the TUD's long history in Civil Engineering. In Eindhoven the programme reflects TU/e's experience in Urban Development and in Twente the programme features UT's characteristic combination of Engineering and Behavioural Sciences.

The evaluation of the committee is based on information provided in the self-evaluation report, the selected theses, additional documentation provided during the site visit and interviews conducted with staff, students and graduates of the programme. During its assessment, the committee observed positive aspects as well as aspects which could be amended. Taking these aspects into consideration, the committee decided that the programme in CME fulfils the requirements set by the NVAO for accreditation.

Standard 1: Intended learning outcomes

The overall goal of the programme in CME is to integrate technological knowledge and management theories. By doing so, the programme aims to deliver engineers who not only feel confident in a technical surrounding, but are also able to deal with political, economical and societal factors. Moreover, these new engineers should be well equipped for a professional field that is increasingly international in orientation. The intended learning outcomes of the programme have been designed to match this overall goal. Like the other 3TU master's degree programmes, the programme in CME use the seven 3TU.Federation competence areas (also known as the 'Meijers' Criteria') as a domain specific framework. The 22 intended learning outcomes have been subdivided along the lines of these seven Meijers' Criteria.

The committee has studied the aims and learning outcomes in relation to the domain-specific requirements. It concludes that the aim of the CME programme holds significant social relevance, as it addresses a need for a new type of engineer that is clearly felt within the (inter) national construction industry and society at large. The intended learning outcomes have been discussed with the professional field and surveys have pointed out that companies generally value the broad scope of CME-engineers. Graduates of the programme easily find employment at the desired level.

The committee generally deems the learning outcomes to be of an appropriate academic nature and level, although the phrasing in which they are put could be refined. By making the

intended learning outcomes more specific for the domain of Construction Management and Engineering, the committee feels that the learning outcomes would also become more applicable. Overall, the end qualifications correspond with general, internationally accepted descriptions of a master's programme and thus they fulfil the descriptions of CME as a scientific, university-level and research-oriented master's programme.

The committee assesses this standard as good.

Standard 2: Teaching-learning environment

The master's programme in CME consists of four main building blocks, i.e.: 1.) the five obligatory courses known as the 'cornerstones', which form the common core of the curriculum, 2.) a selection of specialisation courses that varies across the different locations and reflects each university's own specialty, 3.) a selection of, also variable, elective courses and 4.) the master's thesis. As the committee's task was to assess the three local varieties of the programme as one single degree programme, it mostly studied the mutual elements in the programme, i.e. the 'cornerstone' courses.

For these common courses the committee assessed whether their content and structure leads to realization of the learning outcomes. With regards to the content of the cornerstones, the committee is largely satisfied. It considers the cornerstones as solid courses that match the interdisciplinary aims of the programme. In order to assert the academic nature of the programme in CME, the core curriculum could, according to the committee, do with an extra dose of methodology. At present, this subject is only dealt with by local specialisation- and elective courses.

Concerning the structure of the curriculum, the committee notes that progress has been made over the past few years. A further streamlining of the different components is, however, advisable. The joint curriculum would benefit from an increased exchange of best practices between staff members at different locations. Also, a better alignment of the contents of different courses would increase students' comprehension of the curriculum and their willingness to take courses at different locations.

When it assessed the teaching-learning environment, the committee found some contradictory evidence with regards to the aim of internationalization. Course material is not always provided in English and many of the case studies used reflect the Dutch context. Furthermore, the level of English of the teaching staff is not always up to standard.

From the information gathered during the assessment, the committee established that the study load is feasible and completion rates (as far as these can be judged for such a relatively new programme) are acceptable. Also, it found that the facilities, the range of different educational formats and the commitment of tutors are well suited to the intended learning outcomes.

The committee assesses this standard as satisfactory.

Standard 3: Assessment and achieved learning outcomes

The committee established that an appropriate mix of evaluations, tests and examinations is used to assess whether the intended learning outcomes are achieved. Students are evaluated in a number of different ways to test knowledge and skills, the application of knowledge and

skills, and professional behaviour, depending on the educational mode. Different instruments are implemented to guarantee the quality of the examinations; students rate the quality of the assessment and have sufficient possibilities to submit complaints.

At present, there is no joint 3TU Examination Committee, each location has its own Examination Committee and therefore its own closed system of assessment and quality control. Although the committee does not question the functioning of these individual systems, it does advocate further homogenization of assessment criteria and procedures. This especially holds true for the criteria for and evaluation of theses. The introduction of a consistent system of cross-referencing would, according to the committee, imply an important step towards further integration of the three local varieties of the programme.

Judging by the overall level of the thesis work, the committee feels that the intended learning outcomes are achieved. After graduation, students are prepared for independent professional practice and research. This conclusion is supported by alumni- and employer satisfaction surveys, which illustrate that the achieved level of graduates provides for a good start on the labour market.

The committee assesses this standard as satisfactory.

The committee assesses the standards from the Assessment framework for limited programme assessments in the following way:

Standard 1: Intended learning outcomes	good
Standard 2: Teaching-learning environment	satisfactory
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	satisfactory

The chair and the secretary of the committee hereby declare that all members of the committee have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

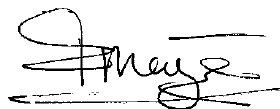
Date: 15 December 2011



Prof. ir. Kees d'Angremond, Chair



Drs. Melissa Frederik, secretary



Dr. Floor Meijer, secretary

Description of the standards of the assessment framework for limited programme assessments

Organizational setting

In 2003 the Delft University of Technology (TUD), Eindhoven University of Technology (TU/e) and the University of Twente (UT) joined forces in the 3TU-Federation. This federation was aimed at maximising innovation by combining and concentrating the three universities' strengths in research, education and knowledge transfer. As a result five joint master's programmes were proposed. The master's programme in Construction Management and Engineering (CME) is one of them.

The master's programme in CME was designed to combine the best of three worlds. It expands upon TUD's long history in Civil Engineering, TU/e's experience in Urban Development and UT's characteristic combination of Engineering and Behavioural Sciences. The current programme bears similarities to master's programmes already in existence at the individual universities at the time the CME programmes were created. The UT master's programme in *Civil Engineering and Management* (CEM) included a specialization track in *Construction Process Management* (CPM) and at TU/e the master's programme in *Architecture, Building and Planning* (ABP) contained a specialization track in *Construction Management and Urban Development* (CMUD). Only the TUD had no similar programme.

The master's programme in CME is an interdisciplinary programme offered at each of the three locations since 2007. Because there are three local varieties of the programme, the remainder of this report uses the plural to indicate the programmes. At TUD the programme in CME is an interfaculty programme coordinated by the Faculty of Civil Engineering and Geosciences. At TU/e it is an interfaculty programme coordinated by the Department of Architecture, Building and Planning. At UT, the different disciplines are integrated within the CME-Department of the Faculty of Engineering Technology. All supporting services are provided by staff members within the three main (coordinating) faculties. Operational responsibility for the implementation of the programme lies with the respective Programme Directors at each of the three faculties.

As mentioned above, interuniversity collaboration is an important characteristic of the programme in CME. Examples of cooperation include international marketing and the recruitment of prospective students, the joint development of expensive teaching elements (e.g. the simulation game used in one of the joint courses), the exchange of knowledge and course material between the academic staff and joint teaching efforts. A joint research programme to accompany the master's programme is currently in development.

According to the self-evaluation report the obvious next step for the 3TU programmes in CME would be to formalize the existing collaboration by applying for a joint degree license at the NVAO. During the site visit the committee learned that recent developments have complicated this course of action. After having consulted the Dutch Ministry of Education, the NVAO recently informed the programme management of the specific conditions that apply for recognition as a joint degree. These conditions include the establishment of a single Examination Board as well as the guarantee that every student in the joint degree programme takes courses at one or both of the other participating universities.

In their present form, the programmes in CME do not meet these conditions. During the site visit the programme management presented the committee with several scenarios for future

collaboration, which range from giving up on its ambition of a joint degree altogether, to re-designing the current curricula and organizational structures of the different programmes so that they do qualify for a joint degree. Because of the very recent character of these developments, the programme management has, to date, not been able to fully weigh the consequences of these scenarios and decide on a future course.

Standard 1: Intended learning outcomes

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Explanation:

As for level and orientation (bachelor's or master's; professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme.

1.1. Findings

1.1.1. Mission of the programmes

According to the self-evaluation report, the 3TU master's programmes in CME anticipate a growing need for change within the rapidly changing construction industry. Today's complex, innovative and multidisciplinary projects demand a new type of professional who is competent in both engineering and organizational skills. In order to develop workable solutions for the construction industry 3TU has developed interdisciplinary programmes based on process, design and project.

The self-evaluation report states that the objective of the master's programmes in CME is to improve the performance of the construction industry and to deliver solutions to societal problems. The programmes therefore endeavour to educate engineers who are able to integrate innovative technical knowledge with up-to-date process management theories. To this end, the curriculum focuses on the integration of governance issues, social trends, management methodologies and innovative technology.

More specifically, the self-evaluation lists the programme goals as follows:

- To produce good engineers with a wide range of competencies: The competencies (knowledge, skills and attitude) ensure that the students possess current knowledge, that they are able to use state-of-the-art methods, techniques and tools, and that they will develop a professional attitude that will allow them to perform at the highest level;
- To educate students as critical professionals who are able to serve as and collaborate with professionals in various national and international settings;
- To provide a stimulating and supportive environment in which students can learn the competencies that will be expected of the managers of tomorrow;
- To realise regular involvement with the national and international construction industry at all levels;
- To offer education in which students are able to integrate technical and management issues.

The self-evaluation report also mentions internationalization as an important goal for the 3TU cooperation. The 3TU.Federation aims to keep pace with the international competition and to stimulate innovation by combining and concentrating the strengths of the three universities in the areas of research, education and knowledge transfer.

According to the self-evaluation the same holds true for the interuniversity cooperation in the programmes in Construction Management and Engineering. The CME programmes aim to prepare students for an international career market by presenting them with international case studies, the option of internships abroad and an increasingly foreign academic staff. Also, a joint effort is made to attract international students, in part through the website www.cme-master.nl. As the programme management explained during the site visit, the uncommon multidisciplinary approach of the CME programmes combined with the interuniversity cooperation forms a major attraction for foreign students.

1.1.2. Educational objectives

The learning outcomes specify the knowledge, skills and attitudes that students should have acquired upon completing the programme. Like all 3TU programmes the programmes in CME have arranged their 22 learning outcomes along the lines of the seven 3TU.Federation competence areas, also known as the Meijers' Criteria. These criteria for Academic Bachelor's and Master's Curricula, which were approved by the NVAO in 2006, cover the Dublin descriptors in a more detailed way and therefore constitute a domain-specific reference framework which is equivalent to the Dutch Qualification Framework (NLQF).

The seven broad competences are:

1. Competent in one or more scientific disciplines
2. Competent in conducting research
3. Competent in designing
4. Scientific approach
5. Basic intellectual skills
6. Competent in cooperating and communicating
7. Consideration of the temporal and social context

Table 1 (derived from the self-evaluation report) translates the Meijers' criteria into final qualifications or learning outcomes. Where applicable, the Meijers' criteria have been specified for the domain of Construction Management and Engineering.

3TU Academic Criteria	Description of Learning Outcomes
1. Competent in one or more scientific disciplines	<p>Graduates have knowledge in the following sub-areas of Construction Management and Engineering, are experts in at least one of these areas and are able to maintain and expand their expertise in the field of Construction Management and Engineering (e.g. by consulting relevant literature or searching for connections).</p> <ul style="list-style-type: none"> o Project and Process management in the field of Construction Engineering (i.e. complex constructions, large-scale infrastructure, urban development) o Legal and Governance aspects in the field of Construction Engineering o Markets and organizations in the field of Construction Engineering o Innovations and Integral Design in Construction Engineering. <p>Graduates are able to combine management theory and technical knowledge. This ability covers the knowledge and application of technical process management and innovation regarding construction and engineering processes in the sub-areas listed above.</p>

2. Competent in conducting research	<p>Graduates are competent in acquiring new scientific knowledge through research or systematic reflection.</p> <p>Graduates understand the potential benefits of research, and they are able to understand and incorporate the results of research into their own work.</p>
3. Competent in designing	<p>Graduates are able to:</p> <ul style="list-style-type: none"> o Contribute to a functional design of complex constructions or o Design management processes in the field of Construction Engineering <p>This means that:</p> <p>Graduates have creativity and synthetic skills with respect to design projects.</p> <p>Graduates are application-oriented with regard to the construction industry when designing constructions or management processes.</p> <p>Graduates are able to translate technological concepts and developments into appropriate process innovations for construction.</p> <p>Graduates are able to find a balance between possible solutions of complex requirements, technical possibilities, genuine interests of the parties involved and justified value creation on the scientific and operational level.</p>
4. Scientific approach	<p>Graduates have the habit of reflecting upon their own work, and they continuously use relevant information to improve their capabilities.</p> <p>Graduates have an attitude that endorses their personal development and enhances their expertise.</p> <p>Graduates know that models only approximate reality, and they are able to develop and use them adequately whenever it is beneficial to do so.</p> <p>Graduates make decisions based on calculated risks, costs, time, quality, stakeholders' participation, value creation and legislation, and they are able to evaluate these decisions.</p> <p>The scientific attitude of graduates is not restricted to the boundaries of Construction Management and Engineering; they are able to cross these boundaries wherever and whenever necessary.</p>
5. Basic intellectual skills	<p>Graduates are able to work independently.</p> <p>Graduates are able to work systematically and methodically.</p> <p>Graduates are able to reflect on the complete scope of Construction Management and Engineering issues, to analyse critically and to generate novel ideas.</p> <p>Graduates are able to invent their own tools, theories and techniques if they are not available.</p>
6. Competent in cooperating and communicating	<p>Graduates are able to work effectively in the context of a multidisciplinary environment; they are able to manage complex assignments, and they can act in different roles, depending upon the situation (i.e. can assume responsibility as members and/or as project leaders).</p> <p>Graduates know the importance of oral and written communication, particularly in English, and they can make effective use of these skills. This means that:</p> <ul style="list-style-type: none"> o Graduates are skilled in the proper documentation and presentation of the results of scientific and design work, including the underlying knowledge, choices and considerations, to colleagues and to a broader public. o Graduates are competent in reasoning. o Graduates adhere to existing academic conventions (e.g. giving proper credit and referencing).
7. Considers the temporal and societal context	<p>Graduates are able to form opinions or judgements and to contribute to discussions about complex matters related to Construction Management and Engineering.</p> <p>Graduates know that compromises are inevitable, and they are able to cope with them effectively.</p> <p>Graduates are aware of the societal disadvantages of certain decisions, and they can communicate them to the relevant parties (stakeholders). Graduates are capable of considering the purpose of the design and its context.</p>

According to the self-evaluation report these domain-specific requirements were designed to meet the demands of the construction industry and have therefore been discussed with the OCIB (*Stichting Universitair Onderwijs Civiel-Ingenieurs voor Bedrijfsleven en Overheid*, Foundation for University Education in Civil Engineering for Industry and Public Organizations) in 2006 and again in 2011.

Another objective that was taken into account while developing the domain-specific requirements was that they should respond to the ongoing process of social and technical development and innovation. Students should, in other words, become familiar with the management of transition processes and organizational changes in the construction industry.

During the site visit the committee found that students and alumni are generally very enthusiastic about the aim of the programmes. They feel that the combination of engineering and management gives them something 'extra'. The typical CME-student wants more than calculations and designing, he or she also embraces the 'softer skills', keeps an open mind and likes to communicate. In a general sense, the CME-engineer is able to function as a bridge between steel and human interests. Furthermore, he or she focuses on the process side of the challenge and is results-oriented.

Students are positive about their chances on the labour market. They feel that within the industry there is a clear demand for a new type of engineer. Alumni confirmed that after graduation they quickly found employment at the desired level. They feel that because of their broad view of the construction and engineering spectrum they can help their companies to innovate.

Surveys studied during the site visit evoke the impression that the programmes in CME could further enhance their visibility within the field of construction. Because the programmes are relatively new and have not produced many graduates, they are not yet widely known in the industry. Companies that have had experiences with interns from the CME-programmes are usually positive. They value CME-students as generalists, who not only speak the language of technical specialists, but also have a keen eye for policy, financial, legal and societal aspects.

1.1.3. Level of the programmes

The self-evaluation describes the 3TU programmes in CME as research-driven science and engineering degree programmes that provide students with a firm foundation of academic knowledge and skills. Upon completion of the programme, graduates will have mastered complex levels of knowledge that enable the development of in-depth and original responses to complicated and unpredictable problems and situations. Graduates of the CME-programmes have a conceptual focus on practical issues. They realise that science and technology are not isolated, but exist within a temporal and social context. Furthermore, they are able to integrate these insights into their scientific work. This end-level corresponds with qualification level 7 of the Meijers' Criteria.

1.1.4. Benchmarking of the programmes

According to the self-evaluation report, a benchmark study conducted among a number of leading universities in the USA, UK and Germany disclosed that the programmes in CME are unique in their kind. While most universities have developed their programmes either according to the traditional approach of management or according to the operational

implementation of technological aspects in construction management, the 3TU programmes in CME combine a technical and a management perspective.

1.2. Considerations

1.2.1. Aim of the programmes

The committee has established that the aim of the CME programmes reveals that the participating universities are well aware of current developments in the field of construction management and engineering and of the position of the programme within the field. The research-driven, multidisciplinary, international approach offered by the CME programmes corresponds well with the multifaceted challenges faced by today's construction industry. The committee is fully convinced of the added value of integrating technical knowledge and management theories. It feels that, by supplying engineers with a broad scope and strong problem solving skills, the CME programmes clearly meet the demands of the labour market.

Regardless of this overall positive impression of the aim of the programmes, the committee believes that the style in which it is presented in the self-evaluation leaves room for improvement. Splitting up the mission into five different goals (as was done in the self-evaluation report) gives the impression of a lack of prioritization and focus. In the opinion of the committee, the programme management should formulate one overall goal that accentuates the interdisciplinary character of the programmes, i.e. the exchange between technique and managerial skills provided by the programmes.

As was made clear by both students and alumni during the site visit, the integration of 'hard' engineering and 'softer' management skills can rightfully be considered the unique selling point of the programmes. The enthusiasm of students and graduates convinced the committee that the programmes in CME cover a valuable niche from both an academic-educational and a professional practice perspective.

1.2.2. Intended learning outcomes

The committee established that the learning outcomes meet the demands of the relevant professional domain, the (inter) national construction industry, which was consulted in the process of formulating the end qualifications and seems keen on employing CME-graduates. Furthermore, the committee feels that the intended learning outcomes are tailored to meet the standards of an increasingly international context.

Like all other 3TU programmes, the CME programmes use the so-called Meijer's Criteria as their domain-specific framework of reference. Because these criteria are inevitably very general, the committee feels that it is highly important to translate this domain-specific framework into workable end qualifications that match the specific CME context. After having studied different versions of the intended learning outcomes provided by the programme management, the committee was convinced of recent progress in this area. The newly revised Rules & Regulations for Education and Examination (OER) contain a set of end qualifications that is much more clearly defined than the one in the previous OER.

The committee has established that the revised intended learning outcomes are clearly related to and derived from the domain-specific framework. They refer to the relevant discipline-specific knowledge, understanding and skills that are described in the domain-specific framework. One aspect that could, according to the committee, be given more emphasis

within the curriculum and the learning outcomes is methodology. In the opinion of the committee, practical skills should never outweigh scientific competencies. Generally, the committee is pleased with the formulated learning outcomes. They lead to graduates who have technical knowledge on the one hand and management skills and understanding of societal issues on the other.

Regardless of the recent progress made in redefining the intended learning outcomes, the committee wishes to stress that this should be considered as merely a step in a continuous process of making the programme goals more specific and therefore more applicable. A programme as socially relevant as CME must keep constant pace with developments within society.

Regarding the 3TU goals, the committee is sympathetic towards the difficult situation that the programme management is in, now that a joint degree programme seems – for the time being – off the table. However, the committee is convinced that the only way forward at this point, is to increase (not decrease) the level of cooperation between the different locations. From the start, the 3TU collaboration has offered both staff and students a valuable opportunity to sample the best of three worlds. The present challenge for the programme management is to gradually combine these three distinct flavours into one distinctive essence.

Overall, the committee has established that the level of the intended learning outcomes of the 3TU programmes in CME matches the master's degree level. Moreover, it applauds the ambition of the CME programmes and the social relevance of their aims. It therefore assesses the first standard as 'good'.

1.3. Conclusion

Master's programme Construction Management and Engineering: the committee assesses Standard 1 as **good**.

Standard 2: Teaching-learning environment

The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

Explanation:

The contents and structure of the curriculum enable the students admitted to achieve the intended learning outcomes. The quality of the staff and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

2.1. Findings

2.1.1. The curriculum of the programmes

According to the self-evaluation, the curricula of the programmes in CME aim to realise the integration of science, engineering and management by combining design-driven and research-based courses. The CME programmes adopted a pedagogic philosophy designed to meet the needs of business and industry. They offer a competence-based approach in which students govern their own learning process. Competencies are developed through writing papers, literature reviews, problem-oriented learning, project-based learning and research assignments (group and individual).

The curricula have a workload of 120 ECTS and are cumulative: in the first year, students follow the core programme, which is essentially the same at each participating university and provides students with the main disciplinary building blocks of Construction Management and Engineering. In addition to the core-programme, students choose specialization courses and electives. The second year consists of further specialization and elective courses, an optional internship and the master's thesis. Table 2 is derived from the self-evaluation report and presents the outline of the CME curricula.

University	TUD	TU/e	UT
Core Programme	36 ECTS	39 ECTS	37.5 ECTS
Specialisation courses	31 ECTS	30-40 ECTS	30-40 ECTS
Electives	17 ECTS	5-15 ECTS	5-15 ECTS
Master's thesis	36 ECTS	32-40 ECTS	37.5 ECTS
Total ECTS	120	120	120

Table 2: structure of the master's programmes in CME 2010-2011

2.1.2. Components of the curriculum

The self-evaluation report contains a table (included in Appendix 4) that summarizes the contribution that each course component makes to the achievement of the intended learning outcomes. As the table shows, many components contribute to several intended learning outcomes. This reflects the fact that the intended learning outcomes refer to different dimensions of academic work, and are not cumulative themselves. The self-evaluation report concludes that the core programme, the specialization courses and the master's thesis cover the domain-specific requirements. The learning outcomes are formally specified in the course descriptions contained in the study guides and on the websites of the universities. Below, a short description of the various programme components is provided.

Core programme (36-39 ECTS)

The CME core programme forms the basis of the management education that is integrated with the technical knowledge foundation that the students acquired during their bachelor's degree programmes. It consists of five obligatory courses known as 'cornerstones'. These are: (1) Legal and Governance aspects, (2) Process Management, (3) Project Management, (4) Collaborative Design and Engineering and (5) Integration and Orientation. These courses consist partly of theoretical lectures and partly of practical exercises.

Specialization Courses (30-40 ECTS)

While the core programme is essentially the same at the three universities, specialisations vary across the three locations. They reflect the particular specialisations of the participating universities: UT focuses on management of design and construction processes, TUD deals with process and system innovation in the building industry and TU/e specializes in construction management & urban development. Students can sign up for specialization courses at any of the locations, thereby tailoring the programme to their personal needs and preferences. The self-evaluation report provides an overview of the specialization courses (included in Appendix 4). TUD offers a total of 8 specialization blocks, with credits ranging from 3 to 6 ECTS. TU/e has 3 small blocks centred on Technology Entrepreneurship (3 ECTS each) and two larger blocks (14 ECTS each). UT offers 7 specialization blocks of 7,5 ECTS each.

Electives (4-15 ECTS)

Depending on the further composition of their programme, students can choose 4-15 ECTS of electives. When their selection includes other courses than the ones listed (e.g. courses offered by other/foreign universities), the approval of the examination committee is required. The self-evaluation report provides an overview of the electives (included in Appendix 4). TUD offers 8 electives, with credits ranging from 3 to 10 ECTS. TU/e has 3 electives (3-4 ECTS each) and UT has 5 of them (7,5 ECTS each).

Master's thesis (32-40 ECTS, including 4-10 ECTS for the research proposal)

The master's thesis is problem-oriented and takes the form of an in-depth research or design assignment. According to the self-evaluation students are expected to demonstrate that their academic knowledge, understanding and skills enable them to develop in-depth and original responses to complicated and unpredictable problems and situations in the domain of construction management and engineering (i.e. civil engineering, architecture or construction engineering, in combination with particular sub-domains of business administration and public administration). This level of knowledge and skills equals level 7 of the Meijers' Criteria and the Dutch Qualification Framework (NLQF) and qualifies graduates for independent professional practice and research.

During the site visit, the committee studied the course material. It particularly focused on the cornerstones, as these form the common core of the joint 3TU programme in CME. After having revised the course descriptions, case studies, assignments and examinations of the five cornerstones, the committee concluded that there is quite some local variation in the course material.

At present only two of the five cornerstones have achieved a high level of cooperation between the participating universities. 'Legal & Governance Aspects' is a completely integrated core course. Students at the three locations participate in this course together through live video lectures. Because of the specializations at the locations, the 'legal' part is provided by TUD, whereas UT provides the 'governance' part. The core course in 'Integration & Orientation' (I&O) focuses particularly on integration with the other universities. During this course, students and teaching staff from the three universities meet at the office of a large construction company in Utrecht.

The remaining cornerstones, ie. 'Project Management', 'Process Management' and 'Collaborative Design & Engineering,' are much less aligned. As a result, each location uses its own literature, assignments and examinations. Although English is the official working language of the programmes, not all study materials are currently in English. The committee also found assignments, articles and study books written in Dutch.¹

Generally, the committee was satisfied with the quality of the course material. It did conclude that, because of the wide range of subjects dealt with in the curricula, most courses are introductory courses rather than specialist courses. As a result of this wide spectrum, the committee also noted a certain fragmentation within the curricula.

A specific remark could be made about the balance between practice and science, which in some courses seems to tip to the former. The committee found that methodology is generally absent in the cornerstones. From the interviews with staff members and students, it learned

¹ In response to this issue, the 3TU.Federation has indicated that only at TU/e study materials in Dutch are used.

that this subject is dealt with in local courses, particularly in courses that prepare students for the master's thesis.

2.1.3. Cohesion of the programmes

The self-evaluation report states that the cohesion of the programmes could be assessed from two perspectives: (I) the overall programme and (II) the student's individual study programme (ISP). Viewed from the first perspective, the programme consists of a core programme, specialization courses, electives and the master's thesis. According to the self-evaluation report, this gives structural coherence to the programme. The core programme provides the overall basic competences (knowledge, skills and attitude) that each student should have, while the specialization courses allow students to extend their competencies in specific directions as a further preparation for the master's thesis and their later professions. The local Programme Directors are responsible for the overall coherence of the programme. The local Education Committees have an advisory role on the programmes.

To guarantee the coherence of the ISP, students contact the master's coordinator or the academic counsellor as early as the first quarter of their enrolment to select a research group in which they will conduct their master's theses. They discuss this specialization and the appropriate specialization courses and electives for that specialization. To ensure that individual programmes are appropriate to the specializations in question, students contact their professors or the intended master's thesis supervisors in order to discuss their individual programmes. The master's coordinator or academic counsellor inspects the ISP and sends it for approval to the Examination Committee. Explicit approval by the Examination Committee is required for ISPs that deviate from the CME programme.

An important focal point for the committee was to determine whether the CME-programmes are not only coherent at the local level, but also at the 3TU level. Here the committee found a certain measure of discrepancy. At the local level staff members regularly discuss the content and intercommunication of courses. At 3TU level such dialogue on the cohesion of the programme is less common. During the site visit, the committee found that formal meetings and discussions between members of the teaching staff, intended to acquaint them with one another's research specialties and educational practices, have been introduced only this year. Thus far, in 2011 two meetings have taken place. Content wise, the overarching 3TU programme therefore seems less aligned than the local varieties.

During the site visit, the committee concluded that the relative unfamiliarity with the courses taught at the other participating universities that was observed at the staff level, logically extends to the student level. The self-evaluation report mentions various sources of information on the overall structure of the programmes and various specializations available to the students (i.e. academic counsellors, the CME website, brochures and study guides). Nevertheless, the interviewed students informed the committee that students do not necessarily realise which courses are on offer at other locations and how they interrelate with other curriculum components.

During the site visit the programme management confirmed that, in practice, only few students make use of the opportunity to compile an Individual Study Programme that includes courses provided by all three universities. To enhance the mutual knowledge of students and staff the joint cornerstone course I&O was introduced. Although initial organizational difficulties seem to have been overcome, to date this course has not succeeded

in drastically improving student mobility. Most students follow the I&O course in the second year of their master, when they have already formalised their ISP.

Another thing that, according to the committee, could be improved is the balance of the programmes. Students indicated that between courses the workload varies largely. Also, the study load is not evenly spread over the academic year. Some quartiles are much more labour-intensive than others. The particular structure of the programmes can also hinder the Individual Study Programmes of students. For example: different universities use different credit systems, so that different electives and specializations are not exchangeable. Within the programmes, the cornerstones and electives/specialization courses are not always carefully paired, which leaves limited room to manoeuvre. Because most electives are offered late in the programme, students are forced to make choices or consciously opt for delay.

According to the self-evaluation report, the three universities are still in the process of clarifying and optimising their cooperation where it comes to the contents of the curriculum. This is reflected by the fact that most of the cornerstones, which form the mutual foundation of the separate programmes, exhibit considerable variety in course material, educational concepts and examination forms used. Even though these core courses were designed from a joint 3TU template, local staff has substantial freedom in their interpretation of the course template.

The interview with the teaching staff confirmed that streamlining of the course content is an ongoing process. Although the level of contact between staff members is increasing, they do seem somewhat hesitant to give up their local autonomy in order to build a completely uniform core programme.

Students displayed similar feelings. They told the committee that in principle they are willing to travel to other locations, but only for courses that have added value over locally taught courses. For most of the interviewed students cooperation with fellow students from other disciplinary or cultural backgrounds certainly counts as added value. Interuniversity group assignments were mentioned as a very useful preparation for future working environments – provided that the gap between specialities present is not too large.

Students were generally positive about the joint 3TU courses, i.e. Legal & Governance and Integration & Orientation. The newly introduced ‘CME introduction day’ was also considered a success, as it provided a useful opportunity to meet the students and staff members of other locations.

2.1.4. Feasibility

The curriculum of the master’s programme in CME has a study load of 120 EC, which students have to complete within a two-year period. The self-evaluation report indicates that the master’s degree programmes in CME are feasible. Although average completion rates at the moment are far below the targets (60% of the cohort should finish the programme within two years, 80% of the cohort should finish the programme within three years, 100% of the cohort should finish within four years), according to the report this should not be taken as an indication that completion within two years is not feasible.

To get a cleaner impression of the feasibility of the programme, the self-evaluation report suggests to focus at the results of international students. This group is usually bound to a limited stay in the Netherlands and employs less side-activities than Dutch students. As a

result, international students finish the programmes within 24 months, thereby proving the feasibility of the programmes.

During the site visit, the committee requested additional data on the influx and completion rates of students, which were provided by the management. After having studied these data, the committee concluded that it is too early to draw conclusions, since the first students only graduated in 2009 and the total group of graduates is still small. The data provided by the site management are included in Appendix 5.

According to the self-evaluation report, the outcomes of student evaluations underpin its above mentioned assertion that the programme is feasible. The interview with students conducted during the site visit confirmed this conclusion. Students informed the committee that it is possible to graduate within two years. When delays do occur, this is usually in the graduation phase, when a large amount of independence is expected. According to the interviewed students, closer supervision in this phase could help students graduate faster. The committee observes, however, that dealing with delays is also part of the learning process of students.

An issue addressed by both the self-evaluation report and the staff- and student interviews, is the dissimilarity of the students entering the programme. Formally, admission to the programme is open to graduates who have obtained a specific BSc degree from one of the participating universities. All other candidates (graduates of other national or international BSc or BEng+-degree programmes) are subject to an admission procedure.

Because of students entering from different preliminary phases, large differences in both cultural and disciplinary backgrounds exist within the student population of the CME-programmes. While this undoubtedly has advantages (students learn to function in a truly multidisciplinary, diverse environment), it also entails logistical challenges. To prevent large study delays, deficiencies have to be dealt with quickly. In cases where a newly admitted student's prior education does not fully meet the prerequisites of the programme, the admissions committee can specify additional courses up to a total of 10 ECTS in lieu of one or more electives. The committee found it difficult to assess whether this practice influences the achieved end level in a negative way.

The number of students registering for the CME-programmes has gradually risen over the years, especially in Delft, where students from three different bachelor's programmes can enter. A gradual increase of the influx has also taken place at UT. At TU/e the influx appears to be more stable. To prevent an imbalance between the three locations, the programme management has taken steps to stimulate cooperation concerning the admissions procedure.

2.1.5. Programme-specific facilities

At each of the 3TU locations different spaces are allocated for teaching, self-study, practical work and group assignments. Amongst the various facilities are lecture halls, computer facilities, study rooms, ICT facilities and libraries which are pooled, i.e. different faculties make use of the facilities. The self-evaluation report describes these facilities in detail. During the site visit the committee was given a tour of the facilities at UT. It also watched digital presentations of the facilities at the other locations and experienced a lecture through videoconference.

An important facility for the 3TU programmes is the virtual classroom that has been realised in 2009/2010. It enables a single lecturer to provide lectures to students in different physical locations, thereby eliminating scheduling issues. During the site visit, the students indicated that they are positive about the quality of images and sound within the 3TU Virtual Classroom. On the other hand, they mentioned that class participation during video lectures is inevitably smaller than during regular classes.

Site-specific facilities include the office spaces at TUD, which the faculty of CiTG provides especially for CME students. These spaces are furnished with desks, computers and printing facilities (10 places). In addition to the special project rooms, the CME Dispuut study association has its own space for facilitating the CME student community. At TU/e, there is office space for the CME students within the department of Architecture, Building & Planning. The student union and the study-tour foundation also have their own space within the department. The building is equipped with a network for notebooks, and there are printing facilities. At UT CME and CEM students share eight project rooms for group work.

Overall, students seem content with these facilities. At UT and TU/e students experience some trouble finding an available work place, especially for group assignments. At TU/e students have complained about limited printing facilities, lack of sockets and limited notebook support.

In addition to the physical facilities, TUD and TU/e maintain a buddy system, devised to encourage the integration of foreign students.

Currently there is no 3TU CME study association, individual locations have their own study associations. At TUD, the CME Dispuut is the study association for students, TU/e features a study association for CME students known as 'of CoUrsEI'. At UT, 'ConcepT' is the study association for programmes related to civil engineering within the University of Twente. The study associations mentioned aim to represent the interests of the students and to bring companies, students and universities closer together. All study associations organize leisure and educational activities.

In order to inform students and staff of the three locations about each other's current events, a CME newsletter is issued twice a year. Typical subjects include specializations at each location, profiles of staff members of the various locations, results of the annual student evaluations, descriptions of new courses and interviews with alumni.

2.1.6. Academic staff

The teaching staffs of the programmes in CME consist of lecturers, full professors, associate professors and assistant professors from various faculties at the three participating universities. One of the annexes to the self-evaluation report contains a list of all academic staff members involved in the CME programmes. According to the self-evaluation, most members of the staff are highly respected researchers involved in various national and international professional networks.

The CME teaching staff is strongly embedded within research groups that cover a variety of topics, that range from civil engineering to architecture and management and governance. According to the self-evaluation, students of the CME programmes are exposed to contemporary, relevant research questions on a daily basis. The courses that were designed specifically for the programmes in CME reflect the research activities of the scientific staff

involved. Technology is always present, even in management courses. The mix of specialties present amongst the staff guarantees that courses fit the typical, multidisciplinary CME approach.

The self-evaluation report sums up efforts that have been made to maintain and improve the didactic abilities of the staff. In 2009, a 3TU project group was formed in order to harmonise efforts with respect to the basic teaching qualification (in Dutch: *Basiskwalificatie Onderwijs*, or BKO). This teaching qualification was subjected to an external audit on 9 November 2010, with favourable results.

The self-evaluation report indicates that the time that staff members spend on teaching, assessing and supervising students varies between the different universities. The same goes for the staff-student ratio, which is approximately 1:14 at TUD, 1:12 at TU/e and 1:11 at UT. This relatively low staff-student ratio leaves ample room for support of individual students. Even if student numbers continue to rise, the student-staff ratio should not pose any serious problems, according to the self-evaluation report.

The self-evaluation report mentions that faculty members are required to spend 10% of their available working hours on management support tasks. This ensures that they participate in and contribute to quality improvement and organizational development projects and committees. Specifically, employees serve on the Education Committee, the Faculty/Department Council and the University Council, with the goal of improving the quality of study programmes and administrative processes. According to the self-evaluation, the CME programmes benefit from this high level of faculty involvement.

During the site visit students indicated the quality of the teaching staff as generally good. Many of the staff members are specialists in their field. Students especially appreciate staff members who successfully link academic knowledge to practical experience. Guest lecturers from the industry itself are also highly valued. Students were less positive about the English skills of some lecturers.

2.1.7. Course evaluations

According to the self-evaluation, student courses are regularly evaluated using a standard questionnaire that can be adapted to each specific course. Topics addressed in the questionnaire include the feasibility of study in the individual course as well as its relevance, quality of education, coordination and planning, examination and assignments, and overall appreciation. In general, students observe that the assessments are well designed and that they measure the right competencies.

During the site visit the student members of the Educational Committee explained that the evaluation process has greatly improved over the past few years. One major improvement is the publishing of evaluations on BlackBoard (at TUD this still needs to be implemented). Evaluations have resulted in gradual improvements of the programme contents and structure. Problems that showed up during evaluations have generally been dealt with, although some topics – such as the sometimes deficient cooperation between students (partly due to varying levels of knowledge) and the insufficient English skills of some lecturers – require further attention. The grades for CME courses are high. Usually they are marked 7 or 8, which is higher than the grades given to bachelor courses. Respondents frequently praise the diversity between the courses, the interaction with the teacher and the course material.

2.2. Considerations

2.2.1. Cornerstone courses

To assess whether the curriculum matches the intended learning outcomes, the committee focused on the cornerstone courses, which form the common core of the 3TU programmes. Local electives and specialization courses were given less attention.

As a rule, the committee is satisfied with the cornerstones. Judging from the course material, these are solid courses, supported by well-chosen case studies and literature and a variety of teaching-methods. Especially where the interdisciplinary aim of the CME-programmes is concerned, the committee established that the cornerstones cover the learning outcomes in a sufficient manner.

One specific observation made by the committee, is that methodology seems more or less absent in the cornerstones. The committee suggests that this subject could do with more emphasis, since it is an important requirement for the thesis work. Although the committee was generally impressed with the theses, it found that many of them would have benefited from a more systematic approach. More emphasis on methodology would also provide a stronger embedding of theses within the research done at the different faculties. In the end this could facilitate the establishment of a joint 3TU research programme in CME.

During its investigation, the committee found that at present only two cornerstone courses are fully integrated courses. The other courses are still taught locally. As a result, the differences between the contents of different local varieties of cornerstone courses are considerable. Individual courses use different literature, case studies and assignments. According to the committee, reducing these differences should be an important objective for the programme management.

The committee examined whether the curriculum at each location can be successfully completed within the time nominally set and concluded that the programmes fulfil the criteria. The committee appreciated that homologation courses are offered to the students, enabling a consistent basis to continue the programme for students with different prior education. Based on the information in the self-assessment report and the interviews, the committee saw no indication that the workload is structurally too heavy.

2.2.3. Integration of the programmes

The committee states that student mobility could be a potential strength of the 3TU programme, but at present it is not. Exchange between the different local programmes is rather limited. Partially, this is due to the physical distance between the programmes, which requires quite some travelling of staff and students. Other inhibiting factors mentioned during the interviews, were the incomplete synchronization of the curriculum and insufficient information on the interrelation between courses at the different universities.

While the committee understands the difficulties associated with physical mobility, it does see room for improvement with regard to the exchange of students between the three institutions. Both students and alumni were very enthusiastic about meeting each other, which would suggest that more opportunities for contact within the 3TU framework should be created, e.g. in the shape of a week of joint group work. The number of contact days, now annual, could be increased.

During its tour of the facilities at UT the committee visited the virtual classroom, that is used for the video lectures. Although the committee feels that video lectures are an ingenious way of bridging spatial barriers, it also wishes to stress that video lectures could never fully replace face-to-face instruction. In the opinion of the committee, culture does not travel well by cable.

In order to further enthuse students about the interuniversity aspect of the CME-programmes, the committee feels that it is necessary to improve the structure of the programme, so that practical barriers that prevent taking classes at multiple locations are reduced. Better explanations of the interrelation between different courses at different universities could provide an extra stimulus for students to explore their options elsewhere.

The committee realizes that its recommendations with regard to changes in the content and structure of lectures and thesis work require a lot of coordination on the one hand and flexibility on the other hand. In order to get staff members of the different locations on the same page, the programme management should be able to operate with authority. This could mean that within the programme management someone has to be formally in charge.

2.2.4. Internationalization

Because internationalization is mentioned as one of the key aims of the 3TU cooperation, the committee devoted particular attention to the manner in which the international orientation is elaborated in the curriculum. Here it found some contradictions. For example: the committee was surprised to find out that some compulsory literature for cornerstone courses is provided in Dutch, not English.² Also, the character of the subjects taught does not always match the international ambitions of the programme. E.g. in the Legal & Governance course, an English translation is provided of Dutch construction regulations. However, there is little reference to international regulations, like the FIDIC conditions of contract, which differ from the Dutch ones, with consequences for areas such as risk assessment of contractors and consultants.

A general comment that can be made on the level of internationalization, is that staff members have not always mastered the English language sufficiently and that not all regulations relevant to students seem to be presented in English. The committee strongly feels that the position of foreign students should be equal to that of their Dutch counterparts.

Excepting the inconstant level of English, the committee evaluates the qualities of the teaching staff as good. Each location has its own areas of expertise and performs research at a high level. Several members of the staff members involved in the CME programmes are (inter) nationally seen as leaders in their profession. Furthermore, the committee concluded that the programmes make adequate efforts to ensure the didactic qualities of the teaching staff.

Despite its critical remarks on some aspects, the committee feels that the current programmes enable students to achieve the intended learning outcomes. The curriculum sufficiently corresponds with the end qualifications, the programmes boast a staff of acclaimed specialists and they have proven to invest in the development of innovative teaching elements, such as a

² In response to this issue, the 3TU.Federation has indicated that only at TU/e study materials in Dutch are used.

simulation game and a virtual classroom. All in all, the committee feels it is fair to say that five years after the start of the 3TU programmes in CME, the cooperating universities have devised a feasible outline of a teaching- and learning environment that it can expand on in the future. The committee therefore assesses the second standard as 'satisfactory'.

2.3. Conclusion

Master's programme Construction Management and Engineering: the committee assesses Standard 2 as **satisfactory**.

Standard 3: Assessment and achieved learning outcomes

The programme has an adequate assessment system in place and demonstrates that the intended learning outcomes are achieved.

Explanation:

The level achieved is demonstrated by interim and final tests, final projects and the performance of graduates in actual practice or in post-graduate programmes. The tests and assessments are valid, reliable and transparent to the students.

3.1. Findings

3.1.1. Assessments

As was mentioned before, currently each 3TU location has its own Examination Committee and therefore its own closed system of assessment and quality control. These committees are legally responsible for everything related to the grading and the order during examinations, and prepare rules and regulations governing these matters. Issues with regard to the programme objectives, contents and scheduling are regulated separately in the programme's Teaching and Examination Regulations (OER). The Faculty Board is legally responsible for producing these regulations.

Prior to the site visit, the committee received two different versions of the OER. The original version, which was included in the self-evaluation report, was (shortly before the site visit) followed by a revised edition. This second version was made available in Dutch only. The initial confusion about these different versions of the OER was cleared up during the site visit. Members of the Examination Committees of the participating universities informed the committee that the OER supersedes the exam regulations of the three participating universities and is valid for all three programmes. For international students an English version of the OER is available.

The CME study programmes consist of a broad portfolio of educational forms, including classroom lectures, projects, instructions and site visits. The assessment methods are tailored to the learning goals: lecture courses usually end with oral or written examinations, essays (with or without presentations) or project assignments, including written reports. Lab work assignments are evaluated, and students are usually required to explain their solutions orally to the assessor. For projects, reports and student presentations are assessed. All in all, the assessment philosophy adopted by the programmes relies on a combination of group testing and assessment of individual performance.

According to the self-evaluation report, assessment criteria can be found in the OER (regulation for the general rules and criteria for assessment) and the study guide, course information system and electronic learning environment (descriptions of all CME courses, including the content, learning objectives, educational method and assessment methods).

At the moment, most courses lack general 3TU assessment criteria and procedures. Policies of the Examination Committees of the three locations differ slightly and theoretical courses do not explicitly share the same standards. Only the integrated cornerstones (Integration & Orientation, Legal & Governance Aspects and - to a lesser extent - Process Management), share the same assessment criteria. The self-evaluation report states that in the latter courses, lecturers exchange examinations in order to learn from each other.

At each location, the Examination Committee supervises and ensures the correct procedures, guidelines and criteria of the examination rules. In addition, the Board receives individual requests from students and makes decisions on a case-by-case basis. The Examination Committee must approve the composition of graduation committees. Each of the Examinations Committees regularly investigates the quality of assessments and master's theses. Due to a change in the law on higher education and science (WHW), the role of the Examination Committee with respect to assessment will become more important. The committees are currently determining how to adapt to their new roles.

During the site visit the committee found that students are generally positive about assessment procedures. In their experience, exams and assignments cover the course contents and learning goals.

3.1.2. Master's thesis

The self-evaluation report describes the procedures for entering the thesis phase, the composition of graduation committees and the graduation itself. Also, it reveals that there are currently no standard thesis criteria or assessment procedures. Separate criteria and procedures for the three locations are not listed in the report.

The possibilities for streamlining the grading of theses are reflected upon in the self-evaluation report. It indicates that the management team recently decided to exchange theses amongst themselves in order to investigate whether the marks assigned to theses at the various locations reflect the same level of student competence, as well as to learn from each other's assessment procedures. According to the report, this may, in the future, lead to a joint assessment procedure and assessment form.

During the site visit the committee asked the staff about the assessment criteria for theses (of which there is no mention in the self-evaluation report) and found that theses should be on the cutting edge of management, organization and technical engineering. CME theses are not so much in depth on one aspect, they show an interrelation between process management and engineering. Integration of knowledge itself is the 'new', original part that is contributed by CME students.

Thus far, many students have conducted their thesis work within companies. The committee is not sure whether this type of thesis work always complies with the academic standards associated with research that is embedded in research programmes. From its interview with CME graduates, the committee learned that students sometimes feel caught in the middle between external and internal supervisors. Companies simply have other demands than

academia. Usually they want practical tools, not academic reflection. According to the graduates this is also part of the charm of company graduation. Keeping both internal and external supervisors happy is a good exercise in stakeholder management.

According to the interviewed graduates, the methodological preparation for the thesis could be improved. At present methodology is not offered as a 3TU wide cornerstone. Each location hosts its own methodology course, with credits ranging from 3 to 14 ECTS. TUD provides a specialization block called 'Methodology for Scientific Research' (3 ECTS), TU/e supplies students with a specialization block called 'Research approaches for CMUD' (14 ECTS). UT only offers methodology as an elective course. This is called 'Research Methodology & Academic Skills' (7,5 ECTS).

The self-evaluation report reveals that there is currently no formalised practice of cross-referencing. Staff members from the different locations only incidentally participate in the assessment of the master's theses at other locations, thereby contributing to an exchange of views on the criteria and standards. During the site visit the committee stressed the importance of cross-referencing.

3.1.3. Realised academic level

According to the self-evaluation report, the academic level of graduates can be deduced from their theses, as the learning outcomes of the thesis largely coincide with the learning outcomes of the programmes themselves. The domain-specific knowledge and results are assessed during the evaluation of the project, and its level largely determines the final grading.

To testify to the realised academic level, the self-evaluation report points at the generally high passing marks of graduates. Although there is a target of 15 percent of the students receiving marks of 6 for their master's theses, in practice no student has ever received a mark of 6. The distribution (minus 5%) of the passing grades is as follows:

- 27% of students have received marks of 7
- 2% of students have received marks of 7,5
- 45% of students have received marks of 8
- 5% of students have received marks of 8,5
- 21% students have received marks of 9

This particular distribution of grades was also reflected by the theses that the committee studied.

The self-evaluation report also states that the professional paths of alumni can be taken as an indication of the realised academic level. Alumni questionnaires reveal that, although positions held vary, most graduates are working in consultancy. 65 percent were working in the field of CME and 29 percent were working in the CME field to some extent. Currently, graduates are employed by commercial companies such as Arcadis, DHV, Fakton, Grontmij, Ballast, Royal Haskoning, Heijmans and Hurks, as well as in housing corporations or government agencies.

Thus far, only one graduate of the CME programme has entered a PhD programme. This small number can be attributed to the small overall number of students and the number of years that the programmes have been active. Experiences with similar programmes show that about 10 percent of graduates continue to pursue PhD projects. As the number of CME

graduates increases, the programme management expects similar results. Several students are currently preparing to enter a PhD programme (1 at TUD, 3 at TU/e, 1 at UT).

Graduates reported having found jobs easily. Only 8 percent of the CME alumni were of the opinion that they were not adequately prepared for their jobs. These 8 percent attributed this to the broad scope offered by the programmes in CME. Compared to their counterparts with degrees in civil engineering, alumni of the CME programmes indeed differ in the breadth of the scope and knowledge. This was also reflected in the interviews with companies that employ CME engineers. Generally, employers indicated that this broad scope is appreciated. CME-graduates have a high conceptual level and are less practical, but this is seen as a good thing. All respondents agreed that for certain jobs CME engineers are preferred, while they would prefer engineers from traditional disciplines for other jobs. In general, they would recommend CME engineers to their colleagues.

The surveys recently conducted amongst alumni and commercial organizations revealed that commercial organizations are very satisfied with 3TU CME engineers. They consider it a good programme that delivers a sufficient amount of technological knowledge and has a broad scope without being overly superficial. In general, the competencies listed in the learning outcomes of the programmes were considered relevant to the work performed by CME alumni.

As a general remark on the abovementioned surveys, the committee wishes to stress the importance of a transparent, uniform format. Currently, each university uses its own survey method. The committee concluded that particularly the oral interviews conducted by the UT could result in a biased image.

3.2. Considerations

3.2.1. Assessments

From the self-evaluation report and the interviews held during the site visit, the committee learned that each of the participating universities operates its own closed quality system. The establishment of a joint Examination Board has been contemplated for some time now, but, as yet, no action has been undertaken in this respect.

While the committee appreciates that it takes much time and effort to fully integrate three separate programmes, it feels that without joint assessment criteria and procedures the 3TU cooperation is incomplete. It therefore strongly recommends to intensify the cooperation between the individual Examination Boards (e.g. with regard to the internal efforts of the local boards of examiners, thesis work and course assessments) and eventually to establish a joint Examination Board.

To assess whether the CME programmes possess an adequate system of quality control, the committee studied the assessment forms and exams from the cornerstones (as these form the common core of the programmes in CME) and the assessment criteria and procedures for the thesis work. From the information gained during the site visit, it concluded that the master's programmes in CME use a variety of assessment methods corresponding adequately to the aims and didactic methods.

During its investigation, the committee noted that the absence of joint 3TU assessment criteria and procedures also applies to the evaluation of the thesis work. Currently each

location follows its own criteria and procedures. In this respect, the committee recommends the programme management to take the necessary steps for further integration of the programmes. According to the commission, prerequisites for successful cooperation would be to introduce joint thesis requirements, to develop a mutual assessment form, to further streamline separate thesis preparation courses and admissions procedures, to implement a system of cross referencing, to equal out grading arrangements (at the moment some universities award 0,5 points, while others do not) and to develop a methodological cornerstone course that prepares students for setting up their own research projects.

3.2.2. Master's theses

To assess whether the learning outcomes as specified in standard 1 are achieved, the committee studied both the cornerstones and the theses. Most attention was devoted to the latter, since the committee is of the opinion that the thesis is inevitably most telling of the quality of the student.

In preparation for the site visit each committee member studied six recent master's theses. Although the committee concluded that the grades given were on the high side (especially at TU/e and slightly less so at UT), it was generally impressed with the quality of the work. Most theses reflect that in the final phase of their study, students have mastered the specified learning criteria; i.e. they are competent in one or more scientific disciplines, they display a scientific approach, they are competent in conducting research, they are able to efficiently communicate, they are competent in designing, they possess basic intellectual skills, and they are aware of the temporal and social context.

Of the before mentioned skills, the committee found most room for improvement in the 'scientific approach' as displayed in the thesis work. In general, the theses contain little reflection on methodology. The choice of particular case studies seems motivated by time management issues rather than by methodological considerations. According to the committee, this is indicative of a more general shortcoming of the programmes. As mentioned before, it feels that methodology should hold a more central position within the curricula.

The committee detected that the focus of the theses is, generally, more practical than scientific. For one particular thesis, the committee concluded that the student in question had delivered a piece of consultancy work, rather than an academic exercise. Considering the fact that most students graduate at a company, this practical angle is unsurprising. Even though the committee feels that the close relationship with the industry should be highly valued – not least because it creates career opportunities for graduates – it also wishes to stress the value of sound academic work.

Furthermore, the committee concluded that the combination of technology and management, that is characteristic for the programmes in CME, is not clearly present in all theses. In the future, efforts should be made to ensure that theses reflect the aim of the programmes at large.

3.2.3. Realised academic level

From the self-evaluation report, the committee learned that the institutions see a correlation between in company graduation and the high level of grading. It is stated that external

supervisors are inclined to assign high marks, thereby testifying to their esteem of CME-graduates.

This practice has somewhat surprised the committee. Even though it found the general level of the thesis work to be good, it still feels that the range of marks given should realistically be bigger. The total absence of theses marked below 7 seems to indicate that the programmes could and should be more ambitious.

In order to challenge students to make the most of themselves, the programmes should raise their standards. In the opinion of the committee, the quality of the theses is instrumental for the employability of graduates and therefore for the valorisation of the programmes. Setting high thesis standards will, in the end, benefit the international career opportunities of CME graduates.

All in all, the committee found its meetings with CME-students and alumni to be most convincing of the accomplishments of the programmes. After hearing their personal experiences, the committee concluded that CME engineers unquestionably form a valuable addition to the workforce. Their conceptual thinking, broad scope, creative thinking and entrepreneurship sets them apart from mono-disciplinary traditional engineers.

As a result, CME graduates are in high demand and industry is supportive of the CME-programmes' efforts. The alumni that the committee spoke to were unanimously enthusiastic about their career opportunities and the work they do. The committee feels that the personal stories of these graduates form an important testimony to the relevance of the CME programmes, not just to the construction industry, but also to society in general.

From the information gained from the self-evaluation report and the site visit, the committee determined that in order to take the curriculum to the next level, a further integration of professional practice and scientific approach is required. By all means, this will take persuasiveness, hard work and leadership from the programme management. However, the committee strongly believes that for these efforts the 3TU-Federation will be rewarded with a programme that adds an alternative dimension to engineering and is unique in its kind.

The committee would like to conclude by stressing the importance of the CME-programmes succeeding in overcoming the existing barriers for more intense co-operation. It assesses the third standard as 'satisfactory'.

3.3. Conclusion

Master's programme Construction Management and Engineering: the committee assesses Standard 3 as **satisfactory**.

APPENDICES

Appendix 1: Curricula vitae of the members of the assessment committee

Prof. ir. K. (Kees) d'Angremond (em) (chair) graduated as a civil engineer from Delft University of Technology, the Netherlands in 1963. After his graduation he worked with Delft Hydraulics (now Deltares) in various positions. His work consisted of research and management of research programs in the field of coastal engineering, with emphasis on stability of maritime structures and dredging. Subsequently, he worked with Adriaan Volker Dredging Company (later on Volker Stevin Dredging) where he was involved in planning, design and construction of large projects like maintenance dredging in Rotterdam, the construction of the A27 in Amelisseweerd, the Eastern Scheldt Storm Surge Barrier and various other projects, mainly in S.E. Asia. He then worked as director of the Port of Amsterdam. In 1989, he was appointed professor of coastal engineering at Delft University of Technology, from which position he retired in 2001. During his tenure at TU Delft, he held the positions of chairman of the "Vakgroep Waterbouwkunde" and dean of the Faculty of Civil Engineering. After his retirement he became active as arbitrator and consultant.

Prof. M. (Mike) Kagioglou is a professor of Process Management and Head of School of the School of Built Environment at the University of Salford. He is the University's Built and Human Environment Theme Leader, Director of the Health and Care Infrastructures Research and Innovation Centre (HaCIRIC) and Director of the Salford Centre for Research and Innovation (SCRI). Professor Kagioglou comes from a manufacturing background and has been involved in teaching and research in the Built Environment for the last 16 years. Main areas of research include construction management, process and performance management and issues relating to service delivery through infrastructure development. In particular Mike's work is at the nexus of service and building design and operations/construction management with knowledge and performance management. His publications include books, many international referred journals and conferences and chaired/co-chaired a number of conferences. A main focus of Mike's work currently includes the issue of 'Benefits Realisation' through Health and Care infrastructure development.

Ir. C.J. (Kees) Vriesman received his MSc in Civil Engineering at the Delft University in the early '70's. Afterwards he worked several years as a researcher at the same university and later on became a project team leader within the Deltadienst, a public organization that was assigned to realize the Delta programme (mainly: closing the estuaries in the Dutch Delta Area). In later years, he worked at the Ministry of Housing and Physical Planning, where he oriented himself on general management and policy analysis. In the beginning of the '90's Vriesman made the transition to the private sector and became CEO of a medium construction firm and – later on - Executive Vice President of the ABN AMRO Bank for (international) Corporate Real Estate. At the end of the '90's, he returned to the earlier mentioned ministry as Director-general of Physical Planning, and after that General-director of the state-owned organization for Nature, landscape and recreation. At the end of his career, he chaired a ministerial committee for airport planning and became mayor (temporarily) of Den Helder. Nowadays, Vriesman is chairman of a public/private organization for improving the quality of products from the building industry.

Prof. dr. E.J.M.M. (Jos) Arts is strategic advisor Infrastructure and Environment for the Dutch Ministry of Transport, Public Works & Water Management (Rijkswaterstaat). He is also Professor of Environmental and Infrastructure Planning at the University of Groningen, the Netherlands. Since completing a PhD on EIA follow-up, he has organized international workshops and published on impact assessment, environmental, spatial and infrastructure planning (e.g. "Handbook of EIA and SEA follow-up" Earthscan, London 2006). More

recently, he focuses on issues as planning approaches for sustainable infrastructure, life-cycle and area oriented approaches to infrastructure planning, early contractor involvement, risk management, time and costs issues in planning and decision-making for transport infrastructure.

N. (Nicolien) van Eeden BSc is a student of the master's degree Urban and Regional Planning at the University of Amsterdam. At this University, she is a member of the education committee of GPIO. Her main interest is multi-scalar and multi-actor planning in a complex-decision making and policy-making arena. She finished her bachelor social geography and planning at Utrecht University in 2009. At this University, she was a student assessor, who represents the students and advises the faculty board on all student-related matters, was a member of several committees at the student association (organizing activities for fellow students) and she travelled through Europe, the U.S. and Asia during her study and after finishing her bachelors degree. Next to this, she had several part time jobs while studying. She did an internship at the municipality of The Hague and worked there temporary as a junior-planner after graduating.

Appendix 2: Programme of the site visit

5 October: arrival in hotel + dinner (19.30 hrs)	
6 October 2011	
08:45 - 09:00	Arrival of committee and welcome
09:00 - 11:30	Meeting committee (behind closed doors)
11:30 - 12:30	Meeting with management and staff responsible for the programme: <ul style="list-style-type: none"> - Ir.drs. J.G. Verlaan, Director of Education CME, TUD - Dr.ir. S.P.G. Moonen, Director of Education CME, TU/e - Dr.ir. C.M. Dohmen-Janssen, Director of Education CME, UT - Prof.dr.ir. H.A.J. de Ridder, Professor CME, TUD - Prof.dr.ir. W.F. Schaefer, Professor CME, TU/e - Prof.dr. G.P.M.R. Dewulf, Professor CME, UT - D.J.W.M. Mulders MSc, Senior Educational Policy Advisor, TU/e - Ir. S. Laudy, Programme developer 3TU-CME
12:30 - 13:15	Lunch
13:15 - 14:00	Meeting with students: <ul style="list-style-type: none"> - K. Zebracki BSc, Master's student CME, TUD - L. Olde Scholtenhuis BSc, Master's student CME, UT - R.G.C. Reijnhoudt BSc, Master's student CME, UT - J. Matos Castaño BSc, Master's student CME, UT - Ing. T.J.M. Woestenburg, Master's student CME, TU/e - M.J.A.M. Marczynski BSc, Master's student CME, TU/e - P. Martens BSc, Master's student CME, TU/e
14:00 - 14:45	Meeting with staff members: <ul style="list-style-type: none"> - Dr.ir. S.I. Suddle, Assistant Professor Safety Integrated Design, TUD - Dr. R. Schoenmaker, Assistant Professor Integral Design, TUD - Dr.ir. R.S. de Graaf, Lecturer CME, UT - Dr.ir. T. Hartmann, Assistant Professor CME, UT - Ir. A.G. Entrop, Assistant Professor CME, UT - Prof.dr.ir. B. de Vries, Professor Collaborative Design & Engineering, TU/e
14:45 - 15:00	Break
15:00 - 15:30	Meeting with student members Educational Committee: <ul style="list-style-type: none"> - C. van Loenhout BSc, Studentmember Educational Committee, TUD - R.G. Sleumer BSc, Studentmember Educational Committee, TU/e - J.P. van der Meer BSc, Studentmember Educational Committee, UT - Y. Mastenbroek BSc, Studentmember Educational Committee, UT
15:30 - 16:00	Meeting with staff members Educational Committee: <ul style="list-style-type: none"> - Mr. F.A.M. Hobma, Staff member Educational Committee, TUD - Dr.ir. P.C. Roos, Staff member Educational Committee, UT - Ir.ing. A. van der Zee, Staff member Educational Committee, TU/e - Drs. L.A.Woud, Master's Coordinator UT
16:00 - 16:15	Break
16:15 - 17:00	Round tour facilities / Consultation hour
17:00 - 17:45	Meeting with Alumni: <ul style="list-style-type: none"> - J. Dix MSc, Alumnus CME, TUD - R. van Rijn MSc, Alumnus CME, TUD - J. Veneberg MSc, Alumnus CME, UT - H. Topper MSc, Alumnus CEM, UT

	<ul style="list-style-type: none"> - E. Floor MSc, Alumnus CEM, UT - I. Nieuwenhuijsen MSc, Alumnus CME, TU/e - N. van Geenhuizen MSc, Alumnus CME, TU/e
7 October 2011	
08:15 - 08:30	Arrival of committee
08:30 - 09:15	Meeting with Board of Examiners and student advisor: <ul style="list-style-type: none"> - K.O. Karsen, Student Advisor, TUD - Drs. P. de Smidt, Student Advisor, TUD - Drs. W.J. Buurke, Student Advisor, TU/e - Ir. J.G. de Kiewit, Student Advisor, UT - Drs. M. Leijten, Member of the Board of Examiners, TUD - Dr. A.F.H.J. den Otter, Member of the Board of Examiners, TU/e - Prof.dr.ir. J.I.M. Halman, Member of the Board of Examiners, UT - Dr. J.T. Voordijk, Member of the Board of Examiners, UT
09:15 - 09:30	Break
09:30 - 10:30	Concluding meeting with management
10:30 - 13:00	Committee meeting behind closed doors + lunch
13:00 - 14:00	Oral presentation on first impression by committee

Appendix 3: Domain-specific framework of reference

Table 1: 3TU academic criteria and learning outcomes

3TU Academic Criteria	Description of Learning Outcomes
1. Competent in one or more scientific disciplines	<p>Graduates have knowledge in the following sub-areas of Construction Management and Engineering, are experts in at least one of these areas and are able to maintain and expand their expertise in the field of Construction Management and Engineering (e.g. by consulting relevant literature or searching for connections).</p> <ul style="list-style-type: none"> o Project and Process management in the field of Construction Engineering (i.e. complex constructions, large-scale infrastructure, urban development) o Legal and Governance aspects in the field of Construction Engineering o Markets and organizations in the field of Construction Engineering o Innovations and Integral Design in Construction Engineering. <p>Graduates are able to combine management theory and technical knowledge. This ability covers the knowledge and application of technical process management and innovation regarding construction and engineering processes in the sub-areas listed above.</p>
2. Competent in conducting research	<p>Graduates are competent in acquiring new scientific knowledge through research or systematic reflection.</p> <p>Graduates understand the potential benefits of research, and they are able to understand and incorporate the results of research into their own work.</p>
3. Competent in designing	<p>Graduates are able to:</p> <ul style="list-style-type: none"> o Contribute to a functional design of complex constructions or o Design management processes in the field of Construction Engineering <p>This means that:</p> <p>Graduates have creativity and synthetic skills with respect to design projects.</p> <p>Graduates are application-oriented with regard to the construction industry when designing constructions or management processes.</p> <p>Graduates are able to translate technological concepts and developments into appropriate process innovations for construction.</p> <p>Graduates are able to find a balance between possible solutions of complex requirements, technical possibilities, genuine interests of the parties involved and justified value creation on the scientific and operational level.</p>
4. Scientific approach	<p>Graduates have the habit of reflecting upon their own work, and they continuously use relevant information to improve their capabilities.</p> <p>Graduates have an attitude that endorses their personal development and enhances their expertise.</p> <p>Graduates knows that models only approximate reality, and they are able to develop and use them adequately whenever it is beneficial to do so.</p> <p>Graduates make decisions based on calculated risks, costs, time, quality, stakeholders' participation, value creation and legislation, and they are able to evaluate these decisions.</p> <p>The scientific attitude of graduates is not restricted to the boundaries of Construction Management and Engineering; they are able to cross these boundaries wherever and whenever necessary.</p>
5. Basic intellectual skills	<p>Graduates are able to work independently.</p> <p>Graduates are able to work systematically and methodically.</p> <p>Graduates are able to reflect on the complete scope of Construction Management and Engineering issues, to analyse critically and to generate novel ideas.</p> <p>Graduates are able to invent their own tools, theories and techniques if they are not available.</p>
6. Competent in cooperating and communicating	<p>Graduates are able to work effectively in the context of a multidisciplinary environment; they are able to manage complex assignments, and they can act in different roles, depending upon the situation (i.e. can assume responsibility as members and/or as project leaders).</p> <p>Graduates know the importance of oral and written communication, particularly in English, and they can make effective use of these skills. This</p>

	<p>means that:</p> <ul style="list-style-type: none"> o Graduates are skilled in the proper documentation and presentation of the results of scientific and design work, including the underlying knowledge, choices and considerations, to colleagues and to a broader public. o Graduates are competent in reasoning. o Graduates adhere to existing academic conventions (e.g. giving proper credit and referencing).
7. Considers the temporal and societal context	<p>Graduates are able to form opinions or judgements and to contribute to discussions about complex matters related to Construction Management and Engineering.</p> <p>Graduates know that compromises are inevitable, and they are able to cope with them effectively.</p> <p>Graduates are aware of the societal disadvantages of certain decisions, and they can communicate them to the relevant parties (stakeholders). Graduates are capable of considering the purpose of the design and its context.</p>

Appendix 4: Overview of the curricula

Programme setup

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Year 1	Deficiency/elective 7,5 ECTS	Project management 7,5 ECTS	Specialisation/elective 7,5 ECTS	Specialisation/elective 7,5 ECTS
	Legal & governance aspects 7,5 ECTS	Process management 7,5 ECTS	Collaborative design & engineering 7,5 ECTS	
	Integration & orientation 7,5 ECTS			
Year 2	Specialisation/elective 7,5 ECTS	Specialisation/elective 7,5 ECTS	Master's thesis 30 ECTS	
	Specialisation/elective 7,5 ECTS	Preparation Master's thesis 7,5 ECTS		

Relationship between course components and final attainment level: learning outcomes

3TU Academic Criteria	Competent in one or more scientific disciplines	Competent in conducting research	Competent in designing	Scientific approach	Basic intellectual skills	Competent in cooperating and communicating	Consideration of the temporal and social context
<i>Course name</i>	Expert Combines management theory and technical knowledge Acquires new scientific knowledge Understands benefit of research Creativity and synthetic skills Application-oriented with regard to the construction industry Translates technological concepts and developments into an appropriate process Able to find a balance Has the habit of reflecting Endorses personal development Able to develop and use models adequately Makes decisions based on calculated risks Crosses boundaries of CME domain Able to work independently Able to work systematically and methodically Reflects on complete scope Invents own tools, theories and techniques Works effectively in the context of a multidisciplinary environment Knows the importance of oral and written communication Forms an opinion or judgement and contribute to discussions Knows that compromises are inevitable Is aware of the disadvantages and can communicate these to stakeholders						
Core Programme							
Legal & Governance aspects	x x		x	x x x x	x x x x	x x x x	x x
Project Management	x	x x x x	x x x x	x x x x	x x x x	x x x x	x x
Process Management	x	x x x x	x x x x	x x x x	x x x x	x x x x	x x
Collaborative Design & Engineering	x x x		x x x x	x x x x	x x x x	x x x x	x x
Integration & Orientation	x		x x x x			x x x x	x x
Specialisations and electives at TUD							
Open Design & Construction Management	x x		x x	x x	x x	x x	x x
Philosophy, Technology Assessment & Ethics		x x	x	x x x	x	x	x x
Cross-Cultural Management				x x x x	x	x x x x	x x
Infrastructure Projects & Planning	x		x		x x	x x x x	x
Methodology for Scientific Research		x x	x	x x	x x x x		
Financial Engineering	x		x	x	x	x	x
Dynamic Control of Projects	x x		x	x	x	x	x
Electives							
Master's thesis ⁷⁴⁾	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x
Specialisation and electives at TU/e							
Entrepreneurship	x x x		x x	x x	x	x x x	x
Research Approaches for CMUD		x x			x x x	x x	

3TU Academic Criteria	Competent in one or more scientific disciplines	Competent in conducting research	Competent in designing	Scientific approach	Basic intellectual skills	Competent in cooperating and communicating	Consideration of the temporal and social context
Course name	Expert	Combines management theory and technical knowledge Acquires new scientific knowledge Understands benefit of research Creativity and synthetic skills Application-oriented with regard to the construction industry Translates technological concepts and developments into an appropriate process Able to find a balance	Has the habit of reflecting Endorses personal development Able to develop and use models adequately Makes decisions based on calculated risks Crosses boundaries of CME domain Able to work independently Able to work systematically and methodically Reflects on complete scope Invents own tools, theories and techniques Works effectively in the context of a multidisciplinary environment Knows the importance of oral and written communication Forms an opinion or judgement and contribute to discussions Knows that compromises are inevitable Is aware of the disadvantages and can communicate these to stakeholders				
Special Subjects for CMUD			x	x	x	x	x
Electives	x						
Master's thesis	x	x	x	x	x	x	x
Specialisations and Electives at UT							
Research Methodology & Academic Skills		x	x				
Procurement Strategies & Tendering	x		x	x	x	x	x
Markets, Organisation & Innovation	x	x	x				
Supply Chain Management & ICT	x	x	x	x	x	x	x
Industrialisation & Innovation in Construction	x	x	x	x	x	x	x
Project Control & Risk Management	x	x		x	x	x	x
Sustainable Building	x	x	x	x	x	x	x
Integrated Global Project Management	x	x	x	x	x	x	x
Elective: Infrastructure Management	x		x	x	x		
Elective: Geo Risk Management	x	x	x	x			
Elective: Hydraulic Engineering	x	x	x	x			
Elective: Integrated Assessment	x	x		x	x	x	x
Master's thesis	x	x	x	x	x	x	x

Specialization Blocks at the three locations

Specialisation Block at TUD ⁶⁶⁾

Course code	Course name	ECTS	Contact Hours
WM0312CT	Philosophy, Technology Assessment & Ethics	4	28
EPA1431	Cross Cultural Management	6	42
CT4030	Methodology for Scientific Research	3	28
CT4760	Infrastructure Projects; Assessments & Planning	6	42
CME2300	Financial Engineering	4	28
CME2200	Dynamic Control of Projects	4	28
CME2210	Operations Research	4	28
CME2000	Master's thesis Project (individual)	32	50

Specialisation Block at TU/e ⁶⁸⁾

Course code	Course name	ECTS	Contact hours
1ZS01	Technology Entrepreneurship: Literature	3	32
1ZS02	Technology Entrepreneurship: Business Plan Development	3	12
1ZS03	Technology Entrepreneurship: Research Assignment	3	4
7CS15	Research Approaches for CMUD	14	14
7CS25	Special Subjects for CMUD	14	14

Specialisation Block at UT ⁷⁰⁾

Course code	Course name	ECTS	Contact hours
195800200	Markets, Organisation & Innovation	7.5	32
195810100	Supply Chain Management & ICT	7.5	32
195810400	Sustainable Building	7.5	32
195810310	Industrialisation & Innovation in Construction	7.5	32
195810600	Project Control & Risk Management	7.5	16
195820600	Integrated Global Project Management	7.5	32
201000095	Procurement strategies & tendering	7.5	30

Electives at the three locations

Electives at TUD ⁶⁷⁾

Course code	Course name	ECTS	Contact hours
CT4010	Economics	4	28
CT4130	Probabilistic Design	4	28
CT4260	Building Design & Construction Informatics	4	18
CT5930	System Dynamics	4	28
AE4230	Safety of Transportation	3	21
SPM6300	Introduction Risk Management	3	21
AE4-230	Risk Management	3	21
CME2100	Internship/Multidisciplinary project	10	70

Electives at TU/e ⁶⁹⁾

Course code	Course name	ECTS	Contact hours
0E920	Real Estate Law	3	16
7C600	Technical & Organisational Structures for Urban Areas	4	8
7R611	Advanced European Building Process Management	3	16

Electives at UT ⁷¹⁾

Course code	Course name	ECTS	Contact hours
195410300	Hydraulic Engineering	7.5	48
195460600	Integrated Assessment	7.5	20
195820300	Geo Risk Management	7.5	16
195820400	Research Methodology & Academic Skills	7.5	32
195820500	Infrastructure Management	7.5	32

Teaching and assessment methods in the Core Programme

Name	Location	Teaching method	Assessment	Contact hours
Collaborative Design & Engineering	TUD	Project courses	Report and presentation	49
	TU/e	Lectures	Product report, process report, individual report	32
	UT	Lectures, project work	Written examination and group assignment	32
Project Management	TUD	Lectures, assignment, simulation game	Written examination and assignments	49
	TU/e	Lectures and seminars	Written examination and group assignment	18
	UT	Lectures, excursions	Written examination and group assignment	32
Process Management	TUD	Lectures, case studies and a simulation game	Written examination and assignments	49
	TU/e	Lectures and Case studies	Examination, redesign project report, gaming report	16
	UT	Lectures, exercises, seminars	Written examination and group assignment	35
Legal & Governance Aspects		Lectures	Written exam, written assignments	28
Integration and Orientation		Group work	Individual and group assignment, reflection	8

Appendix 5: Quantitative data regarding the programme

Data on intake, transfers and graduates

Year	Intake	Graduated in two years			Graduated in three years		
		BSc National	BSc International	Beng+	BSc National	BSc International	Beng+ ³
2007	7	0%	100%		50%	100%	
2008	13	24%	50%		72%	100%	
2009	19						

The table below specifies the influx of students, 2007-present:

TUD	INFLUX	BSc National	International	Beng+	TOTAL
	2007	6	3	3	12
	2008	6	4	3	13
	2009	10	5	4	19
	2010	28	5	5	38
	2011	31	7	5	43

TU/e	INFLUX	BSc National	International	Beng+	TOTAL
	2007	4	0	17	21
	2008	6	3	16	25
	2009	5	2	8	15
	2010	5	3	14	22
	2011	4	4	12	20

UT	INFLUX	BSc National	International	Beng+	TOTAL
	2007	3	1	1	5
	2008	10	0	1	11
	2009	16	2	3	21
	2010	13	4	11	28
	2011	21	1	13	35

3TU TOTAL	INFLUX	BSc National	International	Beng+	TOTAL
	2007	13	4	21	38
	2008	22	7	20	49
	2009	31	9	15	55
	2010	46	12	30	88
	2011	56	12	30	98

³ Beng+ is used to indicate students holding HBO-level Bachelor's degrees who have also finished the pre-Master's programme.

Data on the numbers of students completing the programmes, 2007-present, can be found in the table below:

TUD	INFLUX	BSc National	International	Beng+	TOTAL
	2007	0	0	0	0
	2008	0	0	0	0
	2009	0	1	0	1
	2010	1	4	2	7
	2011	5	4	2	11

TU/e	INFLUX	BSc National	International	Beng+	TOTAL
	2007	2	0	17	19
	2008	4	0	24	28
	2009	6	2	8	16
	2010	5	3	12	20
	2011	4	2	14	20

UT	INFLUX	BSc National	International	Beng+	TOTAL
	2007	0	0	0	0
	2008	0	0	0	0
	2009	0	1	0	1
	2010	6	0	1	7
	2011	8	0	1	9

3TU TOTAL	INFLUX	BSc National	International	Beng+	TOTAL
	2007	2	0	17	19
	2008	4	0	24	28
	2009	6	4	8	18
	2010	12	7	15	34
	2011	17	6	17	40

Teacher-student ratio achieved

The self-evaluation report states that it is not easy to calculate the precise staff-student ratio, as many staff members are active in more than one bachelor's or master's programme. Tables 11-13 show the staff quantities for the three locations.

	FTE	Men	Women	% education	Total FTE in education
Professor	8	7	1	30	2.4
Associate professor	2	2	0	40	0.8
Assistant professor	3	3	0	10	0.3
Lecturer	5	5	0	20	1
TOTAL	18	17	1	25	4.5

Table 11 FTEs TUD

	FTE	Men	Women	% education	Total FTE in education
Professor	1,9	1,9		50	0,95
Associate professor	0,25		0,25	40	0,1
Assistant professor	3,13	1,7	1,6	40	1,25
Lecturer					
TOTAL	5,28	3,6	1,85	44	2,3

Table 12 FTEs TU/e

	FTE	Men	Women	% education in CME	Total FTE in education in CME
Professor	2.8	2.8	0	25	0.7
Associate professor	2.2	2.2	0	25	0.5
Assistant professor	7	7	0	25	1.8
Lecturer	2.6	2.6	0	50	1.3
TOTAL	14.6	14.6	0	30	4.4

Table 13 FTEs UT 45)

Calculation of the staff-student ratio

At TUD, students realised 3840 ECTS during the 2009-2010 academic year. One student is equivalent to 60 ECTS per year. Teaching staff account for 18 FTE of the total FTEs listed in Table 11. Considering the various percentages of time devoted to education, the educational staffing thus amounts to 4.5 FTE. The staff-student ratio is approximately $(3840/60)/4.5 = 1:14$.

At TU/e, the FTE in education (as listed in Table 12) is 2.3. The sum of ECTS credits realised by the 2009/2010 cohort is 1742. Following the method applied for TUD, the staff-student ratio is approximately $(1742/60)/2.3 = 1:12$.

For UT, the sum of the realised ECTS 2010 was 4425 46). About 63 % of these ECTS (2780) are realised within CME. The FTE in education for CME is 4.4 (Table 13). The staff-student ratio is thus approximately $(2780/60)/4.4 = 1:11$. This is an approximation, as not all students acquire 60 ECTS in one year. Some CME courses are offered by other research groups, and PhD students are often involved in master's theses as well.

Average amount of face-to-face instruction per stage of the study programme

Name	Location	Teaching method	Assessment	Contact hours
Collaborative Design & Engineering	TUD	Project courses	Report and presentation	49
	TU/e	Lectures	Product report, process report, individual report	32
	UT	Lectures, project work	Written examination and group assignment	32
Project Management	TUD	Lectures, assignment, simulation game	Written examination and assignments	49
	TU/e	Lectures and seminars	Written examination and group assignment	18
	UT	Lectures, excursions	Written examination and group assignment	32
Process Management	TUD	Lectures, case studies and a simulation game	Written examination and assignments	49
	TU/e	Lectures and Case studies	Examination, redesign project report, gaming report	16
	UT	Lectures, exercises, seminars	Written examination and group assignment	35
Legal & Governance Aspects		Lectures	Written exam, written assignments	28
Integration and Orientation		Group work	Individual and group assignment, reflection	8

Appendix 6: Documents studied by the committee during the visit

- Subject-specific reference framework;
- Learning outcomes of the programme;
- Overview of the curriculum;
- Outline description of the curriculum components [stating learning outcomes, teaching method(s), attainment targets, assessment methods, literature (mandatory/recommended), teacher and credits];
- Teaching and examination regulations;
- Allocated staff with names, positions, scope of appointment, level and expertise;
- Overview of the contacts maintained with the professional field;
- Report on the institutional quality assurance assessment;
- Reports on consultations with relevant committees/bodies;
- List of the final projects of the past two years;
- Reference books and other learning materials;
- Summary and analysis of recent evaluation results and relevant management information;

The committee studied 15 theses, which were selected at random by the project leader and the chair of the committee. Each thesis was studied by two different committee members.

1542346	1170376	0556000	0620048	0043028
1546716	1168592	0508212	s0069353	0048267
1542338	s020623	0642625 0645756	& S0178403	0119903

Since the assessment committee had to evaluate programmes leading to a scientific degree (MSc), specific attention was paid to the scientific level of the theses, the requirements, the carefulness of the reviewer's judgement of the programme, and the assessment procedure used. After all, in a thesis the student has to show evidence of the required qualifications to earn a degree.

Appendix 7: Declarations of independence Committee Members

23/05/2011 16:21 0302303129

QANU

PAG. 01



ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: K. d'Angremont

PRIVÉ ADRES: Hogedijk 16A
2635 ND Zevenhoven

IS ALS DESKUNDIGE / ~~SECRETARIS~~ GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Master Construction Management and Engineering

AANGEVRAAGD DOOR DE INSTELLING:

3TU Federatie

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;



VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE
AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN
VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN
WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER
REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS:

Zeven Loven,

DATUM:

6 mei 2011

HANDTEKENING:

A handwritten signature in black ink, consisting of a stylized 'W' followed by a long horizontal stroke that curves upwards at the end.

**ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING**

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM:

ir. C. J. Vriesman

PRIVÉ ADRES:

*Smerperweg 8**1777 NL Hippolytenhoef*

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

CM J E van de TU's

AANGEVRAAGD DOOR DE INSTELLING:

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOULDEN KUNNEN BEÏNVLOEDEN;



VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: *Kijzandijkweg* DATUM: *4 mei 2011*

HANDTEKENING:



ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING
 INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM:

JOS ARTS

PRIVÉ ADRES:

*FijnjeKade 214
2521DT / DER HAAG*

(NB: ik ga verhuizen per 1/8/2011

*WELLIJK BETER MJA RIJNWAERSTAD ADRES
TE GEBRUIKEN DOOR STUKER INFO ZIE BIJLAGE
KAARTJES) OF RUG*

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

*CONSTRUCTION MANAGEMENT &
ENGINEERING*

AANGEVRAAGD DOOR DE INSTELLING:

3 TU FEDERATIE

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE Zouden KUNNEN BEÏNVLOEDEN;



VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE
AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN
VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN
WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER
REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: *GRONINGEN* DATUM: *11 MEI 2011*

HANDTEKENING: 



DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

Construction Management Q305

THE UNDERSIGNED

NAME: PROFESSOR M. KAGIOGLOU

HOME ADDRESS: 2 Hazelborough Close,
Gorse Cove, Birchwood, Harrington,
Cheshire WA3 6UL

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY:

CM&E data en onafhankelijkheidsverklaring.

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

3TU. FEDERATION

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;



HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INsofar AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: University of Twente DATE: 6/7 October 2011

SIGNATURE: 



ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: Nicolien van Eeden

PRIVÉ ADRES: Hondseug 200
3524 BU Utrecht

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Construction Management & Engineering

AANGEVRAAGD DOOR DE INSTELLING:

3TU

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE Zouden kunnen beïnvloeden;



VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE
AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN
VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN
WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER
REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS:

Utrecht

DATUM:

5/5/2011

HANDTEKENING:

A handwritten signature in black ink, appearing to be 'Sedra' followed by a period.

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM:

M. FREDERIK

PRIVÉ ADRES:

CATHARGINESINGEC 56
3503 RA WIRECHT

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

CONSTRUCTION, MANAGEMENT &
ENGINEERING

AANGEVRAAGD DOOR DE INSTELLING:

BTU FEDERATIE

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVINGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE Zouden KUNNEN BEÏNVLOEDEN;



VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE
AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN
VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN
WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER
REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: UTRECHT

DATUM: 6 juni 2011

HANDTEKENING:

A handwritten signature in black ink, consisting of several fluid, connected strokes.



ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: *Floor Meijer*

PRIVÉ ADRES: *Noorderstraat 103*

1017 TT Amsterdam

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Construction Management & Engineering

AANGEVRAAGD DOOR DE INSTELLING:

3 TU.Federatie

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE Zouden kunnen BEÏNVLOEDEN;



VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE
AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN
VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN
WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER
REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: *Utrecht*

DATUM: *1 Oktober 2011*

HANDTEKENING:

A handwritten signature in black ink, appearing to read 'S. Meijer', is written over a horizontal line. The signature is stylized and cursive.