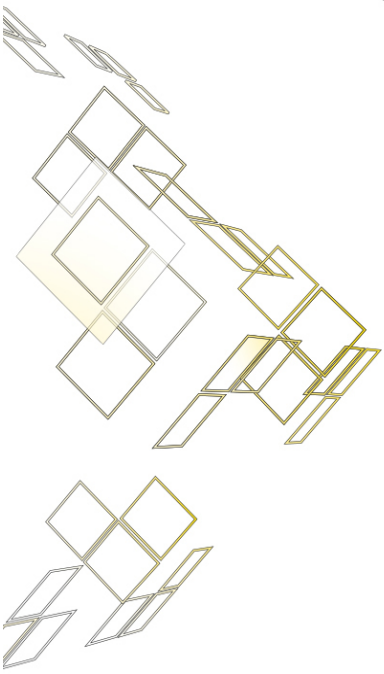

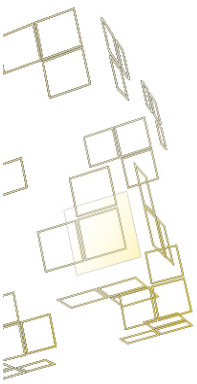

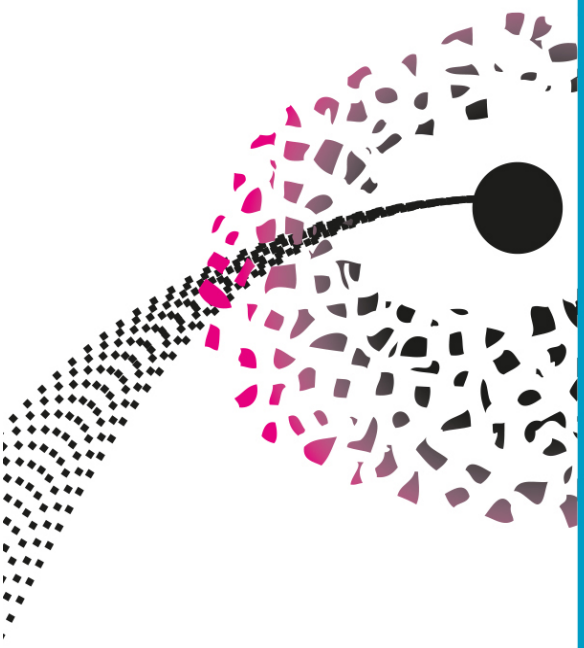

STUDY GUIDE
ENGD PROGRAMME
BUSINESS & IT

L. FERREIRA PIRES
A. VAN OS

21 SEPTEMBER 2022

UNIVERSITY OF TWENTE.

Preface

Welcome to the two-year Business & IT (BIT) Engineering Doctorate (EngD) programme at the University of Twente. This study guide provides information about your programme, including start-up information, a to do list, the training and supervision plan (T&SP), Hora Finita information, the Qualifier, courses to be chosen, the final design project and the assessment criteria. This guide also gives information about the relevant contacts for the BIT EngD programme.

Your supervisors, study guide, EngD charter and Hora Finita only help you through the EngD programme. However, bear in mind that *you* are responsible for your own process in the two years the programme lasts. Applications, such as Hora Finita and Osiris, are only in place to support you, but you are the one who makes this process works!

We wish a lot of success in our programme!

dr. Luís Ferreira Pires
Programme Director

Table of Contents

Abbreviations and Acronyms

4TU	Federation of the Technical University Eindhoven, Technical University of Delft, University of Twente and Wageningen University
ACM	Association for Computing Machinery
AIS	Association for Information Systems
BIT	Business Information Technology
BITOC	'BIT Opleidingscommissie' (BIT Programme Committee)
BOZ	'Bureau Onderwijszaken' (Bureau of Educational Affairs)
BoE	Board of Examiners
BMS	Faculty of Behavioural, Management and Social Sciences
CTD	Centre for Training and Development
EEMCS	Faculty of Electrical Engineering, Mathematics and Computer Science
HAVO	Higher General Secondary Education
HTHT	High Tech, Human Touch
ILO	Intended Learning Outcome
IT	Information (and communication) Technology
EngD	Engineering Doctorate
PhD	Doctor of Philosophy
TGS	Twente Graduate School
UT	University of Twente

1 Introduction

In today's networked and individualised world, businesses, consumers, citizens, and governments form complex networks of interaction that span the globe and at the same time have great local impact. Information technology (IT) is the means that makes these innovations and their impact possible. IT offers the means to connect organisations, people, and devices, to make these connections mobile, and to analyse the huge amounts of data generated by these connections. This in turn makes intelligent services possible, with which business and non-profit organisations can innovate their products and services. However, careful analysis of IT-based mechanisms of value generation in business networks and IT-based design of new organisational configurations is needed to make these innovations a success.

1.1 Two-year programmes at the 4TU.SAI (Stan Ackermans Institute)

4TU.SAI is a joint initiative of the four universities of technology in the Netherlands, namely Delft University of Technology, University of Twente, Eindhoven University of Technology and Wageningen University, in which these universities offer two-year programmes with a focus on technological design. In addition to broadening your technological expertise, you will also learn more professional skills that will enhance your career opportunities. Industry offers engineers from our programmes excellent jobs, because of the strong reputation of our graduates.
More about 4TU.SAI can be found at www.4tu.nl/sai/en/

1.2 EngD Programme Business & IT

The Engineering Doctorate in Business and IT (EngD BIT) aims to raise the level of competence of professionals in IT to deal with the opportunities and challenges that these developments pose. The complexity of today's IT-enabled world implies that IT professionals cannot restrict themselves to one discipline, such as IT or Management Science. They need competences ranging from requirements engineering to system architecture, from design thinking to business analytics, and from e-business innovation to renovation of legacy systems.
For more information, visit the website: www.utwente.nl/engd.

1.3 EngD Diploma and Degree

Once you have successfully completed the EngD programme, you will receive a certified diploma. You will be entitled to use the academic degree of Engineering Doctorate (EngD) and will be registered as a Technological Designer in the Dutch register kept by the Royal Institution of Engineers in the Netherlands (KIVI).

The quality of the programme is guaranteed by an assessment and certification procedure on behalf of the Dutch Certification Committee for Technological Design Programs (CCTO, 'Nederlandse Certificatie Commissie voor Opleidingen tot Technologisch Ontwerper').

2 Programme Organisation

The organisations, committees and persons mentioned in this section are relevant for the BIT EngD trainees.

2.1 Twente Graduate School (TGS)

The Post-Master EngD programmes at the University of Twente are part of the Twente Graduate School. TGS is the University section that registers doctoral students and EngD trainees. Its mission is to train and educate excellent researchers and designers, usually at the start of their career, and to present and promote excellent research and design via clustered or separate (professional) doctoral programmes. The Dean of the Twente Graduate School is responsible for the quality assurance of the EngD educational programme.

2.2 Programme Management

The coordination of the EngD Programme Business & IT (BIT) is under the responsibility of the Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS). The Programme Management of the BIT EngD programme consists of the following persons:

- Dr. L. (Luís) Ferreira Pires (Director BIT EngD programme) is responsible for the implementation, realisation, and quality of the programme. If you have content-related questions, you can contact him at l.ferreirapires@utwente.nl or by calling 053 489 3843.
- Astrid van Os (Coordinator BIT EngD) is responsible for the daily operational activities. You can contact her at a.vanos@utwente.nl or by calling 053 489 1279.

2.3 Programme Committee

The EngD BIT Programme Committee is responsible for the structure and content-related directives of this programme.

Chairman	Dr. L. Ferreira Pires
Members	Prof.dr. G. Heijenk
	Prof.dr. M.E. Iacob
	Prof.dr. W. Jonker
	Dr.ir. M. van Keulen
	Dr. M. Mes
	Prof.dr. A. Rensink
	Dr.ir. M.J. van Sinderen
Secretary	A. van Os

2.4 Supervisory Committee

You are assigned to a Supervisory Committee that consists of at least (1) your *thesis supervisor*, who is a professor at the University of Twente, (2) your *daily supervisor*, who is member of the scientific staff of the university (i.e., Assistant Professor or higher), and (3) a *company supervisor*. Most likely, the members of the supervisory committee are also member of the *graduation committee*, which together with the thesis supervisor is responsible for assuring that your thesis meets the acceptance requirements (see article 14 of the PDEng Charter[1]).

You are responsible for planning meetings with your supervisors on a regular basis. The frequency must be determined in consultation with your thesis supervisor and daily supervisor(s). This frequency must be entered in the supervision agreements in the Training & Supervision Plan (T&SP) that needs to be uploaded in Hora Finita (see page 5).

[1] 'PDEng' refers to the old name of the programme. This will be updated soon. The PDEng Charter can be found at www.utwente.nl/engd /intranet (requires login).

2.5 EngD Board of Examiners

The University of Twente established a EngD Board of Examiners (BoE). This board functions under the mandate of the Doctorate Board (final responsibility remains with the Doctorate Board). It is an independent authority regarding anything that has to do with course examinations and EngD projects. The BoE establishes rules set in the PDEng Charter[2] regarding, for instance, the qualifier, graduation, and cum laude-requirements.

The EngD BoE has the following members:

- Chairman: Prof. Ariana Need (Dean TGS)
- Vice chairman: dr. Hans Voordijk
- Programme directors: dr. Tom Vaneker (ROB), dr. Artur Pozarlik (EPT), dr. Seirgei Miller (ET), dr. Matthijn de Rooij (MT), dr. Luís Ferreira Pires (BIT)
- Secretary: Brenda Kroeze

[2] Name will be updated soon.

Appendix X gives an overview of the tasks and working methods of the EngD Board of Examiners.

2.6 EngD Counsellor

If you face obstacles during your EngD that you cannot discuss with your supervisors, or feel you need some external coaching, you can contact the EngD Counsellor. There you will find individual easily accessible coaching with the focus on staying on track. The EngD Counsellor is independent and will maintain the strictest confidentiality.

Possible subjects:

- Productivity
- Motivation
- Cultural differences (for instance in your group)
- Combining personal life with the heavy workload
- Self-confidence
- Advice regarding difficult situations with your supervisor and the organization you do your project for
- Stress

For appointments you can contact the secretariat of SACC at +31 53 489 2035 or by email: sacc@utwente.nl

2.7 Useful links and contacts at the University

Appendix II gives a list of useful links and contacts.

3 Regulations

3.1 PDEng Charter

All rules and regulations for the EngD programmes at the University of Twente are laid down in the PDEng Charter[3]. The PDEng Charter defines the duties and responsibilities assigned to you and your supervisors and is adopted by the Doctorate Board of the University of Twente. This document describes what is expected from you as an EngD trainee, and what you can expect from your supervisors and the University. This Charter is the key for a productive and well-organised EngD programme. Therefore, we strongly recommend that you read the PDEng Charter with due attention. Some of the information of the Charter may also be included in this study guide. In the unlikely case this study guide and the Charter contradict each other, the Charter prevails.

3.2 Hora Finita

Hora Finita is the online registration and monitoring system for EngD trainees and PhD candidates at the University of Twente. All EngD trainees are registered in Hora Finita after being accepted by the faculty. Hora Finita is aimed to facilitate, formalise, and archive the most essential interaction between you, the thesis supervisor, and a mandated member of the EngD Board of Examiners. The monitoring system is designed in such a way that you will be alerted for upcoming actions, like some reporting to be done. The thesis supervisor and the EngD Board of Examiners will be prompted to review and accept the reporting in the monitoring system. After several reminders, overdue actions will be reported to the Dean of the faculty.

Hora Finita is only concerned with the formal steps and approval as mentioned in the PDEng charter[4]. It is assumed that informal exchange of drafts and discussions occur outside Hora Finita between you, your thesis supervisor, and your daily supervisor(s). In other words, Hora Finita is not meant to be a bureaucratic instrument to pinpoint the creative academic exchange and supervision process, neither to replace it by tick marks.

Hora Finita and the PDEng Charter can be reached at www.utwente.nl/engd/intranet.

3.3 Scientific Integrity

The UT subscribes to the guidelines for scientific integrity, as specified in the Netherlands Code of Conduct for Academic Practice, which can be found at the VSNU website[5]. These guidelines hold for all staff and students from the University of Twente and is applicable to all design, research, and educational activities. For EngD trainees, this implies that the guidelines are valid for both the educational program as well as the technological design project.

The Executive Board established the Scientific Integrity Complaints Procedure in order to protect and guarantee scientific integrity. This procedure provides a system for reporting and dealing with possible violations of scientific integrity is consistent with the national LOWI regulations (available in Dutch). The first point of contact is the university's confidential adviser for scientific integrity (for the complainant). Possible violations of scientific integrity as well as any follow-up steps can be discussed with her in all confidence.

Actual reports about (possible) violations of scientific integrity are dealt with by the UT scientific integrity committee. If desired, staff members of the UT who have faced a complaint with regards to their integrity can be assisted by the independent university's confidential adviser, who knows the rules and procedures and can support the accused. The accused staff member can share their doubts and concerns with this confidential adviser, who can also provide aftercare services.

As an EngD trainee, you need to take the compulsory TGS Academic Integrity course and explicitly agree with the Scientific Integrity code of the University. You can do this by clicking Academic Integrity Code tab in Hora Finita.

[3] Name will be updated soon.
[4] Hora Finita is accompanied by the PDEng Charter, which forms the basis for the monitoring system.
[5] https://www.vsnu.nl/files/documents/Netherlands%20Code%20of%20Conduct%20for%20Research%20Integrity%202018.pdf

4 Programme Goals

4.1 Technological design

The Business & IT EngD programme fits in the third cycle of the Bologna declaration. This means that you are expected to deliver a scientific or technological contribution to society. We determine what a 'contribution' should be based on the following definition of *engineering* from the American Engineering Council of Professional Development (ECPD/ABET):

> *"The creative application of scientific principles to **design** or **develop** structures, machines, apparatus, manufacturing processes or works…"*

In other words, the solution of an engineering problem is an *artefact*. Examples of technological artefacts are:

- Products and structures.
- Processes.
- Systems for transport of humans, information, and goods.
- Control systems for production and transport.
- Instruments, safeguarding integration and synthesis.

Artefacts serve an economical or societal purpose, which means that they have a *value*. Artefacts should be designed according to *scientific principles*, which means that there should be a systematic method for *synthesising* the design and that a design is evaluated using scientifically based *analysis* methods.

In the Business & IT EngD programme, the technological design of an artefact is the outcome (contribution) of the project. The technological design can be dedicated to a complete artefact, a component of a larger artefact or a redesign of an existing artefact. In each project, the emphasis can be on different phases of a design, which means that the focus can be on the requirements, modelling, or analysis of the artefact.

4.2 Intended Learning Outcomes

The BIT EngD programme educates people who are able to make high-quality, creative and innovative designs for complex issues with a multidisciplinary character. This means that after completion of the programme, you must be able to:

- Make a design on a multidisciplinary artefact in the field of Business & IT.
- Contribute to a more comprehensive design (independently or in cooperation with colleagues).
- Give direction in a project team to accomplish a design.

The intended learning outcomes of the programme specify the knowledge, attitude, and skills that each EngD trainee should master upon completion of the programme. The general EngD final qualifications are mentioned in article 4 of the PDEng Charter. Additional qualifications specific for the BIT EngD programme are listed on the next page. These are formulated along ten clear competence areas in three domains:

Knowledge
After successfully finishing the BIT EngD, the graduate is able to … 1. … explain the roles of all disciplines within the field of Business & IT, and the state-of-the-art knowledge in specific areas of this field. 2. … explain the roles of related disciplines such as economics, environment and safety, the relevance of these sub-areas of Business & IT and how should be handled within a project. 3. … explain the possibilities of new emerging technologies in the field of Business & IT and develop a roadmap for their implementation in the field.

Design skills
After successfully finishing the BIT EngD, the graduate is able to … 4. … analyse complex problems, determine connections between multidisciplinary aspects of the design problem and maintain an overview of the entire design problem. 5. … think out-of-the-box, apply creative thinking to design and realise innovative solutions. 6. … explain different design methods, determine which method is best suited to a particular design problem and apply a design method. 7. … analyse actors' constraints and demands (giving attention to the full lifecycle of the design) in order to generate or select solutions that fit within the constraints, make choices that lead to a feasible design and validate the design on the basis of the defined constraints.
Professional skills
After successfully finishing the BIT EngD, the graduate is able to … 8. … actively contribute to constructive informal team meetings in order to arrive at innovative solutions (through discussion). 9. …contribute in a project-based setting and within a team and determine the reasons why a team is not functioning properly. 10. … have a critical attitude towards her short-term and long-term professional development and actively control the steps to secure this development.

4.3 Post-master level

BIT Master graduates do have knowledge and skills to assess and redesign business-IT alignment, but do not have sufficient knowledge or experience to integrate IT networks, coordination processes and business architecture into a whole that balances economic sustainability with an acceptable level of IT-related vulnerabilities, such as vulnerability to online fraud or to attacks by threat agents. This requires familiarity and experience with the business itself, as well as a deep knowledge of business networks, business analytics and techniques for fraud assessment and for IT security risk assessment. The multidisciplinary of these problems in practice is greater than what Master students have been trained to handle.

The BIT EngD programme is organised in a three-step design cycle, in which the designer investigates existing networks of people and organizations, and designs and validates IT-enabled improvements of these networks:

- *Problem investigation* consists of the analysis of existing e-business value chains, social networks, and e-government chains to identify current problems and the opportunities for improvement. This includes not only the identification of stakeholders and goals, but also modeling business architecture and network structure, the identification and analysis of large-scale network phenomena and big data generated by these networks, and the identification of innovations offered by novel IT.
- *Treatment design* consists of the specification of requirements for solutions and redesign of enterprise architectures and business processes.
- *Treatment validation* consists of the analytical as well as empirical validation that these designs satisfy the requirements.

Figure 1 depicts this three-step design cycle.

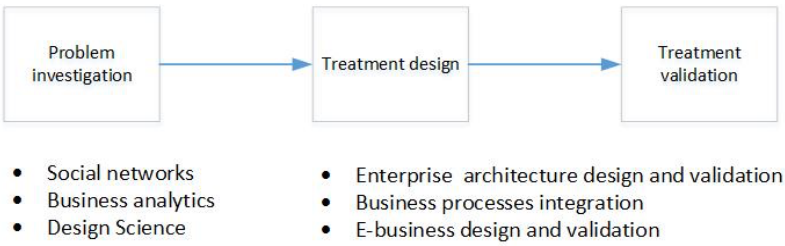

Figure 1. Three-step design cycle

In addition, an EngD graduate has a wide range of skills, for example, in the field of creative thinking, out-of-the-box thinking, applying design methodologies and communication skills.

5 Course programme

5.1 European Credits

The University of Twente uses the European Credit Transfer System (ECTS/EC) to register the study load. All EngD programmes have a two-year (24 months) duration and are worth 120 credits. Since this system is used throughout Europe, your academic record will be easily recognised if you want to continue your education at another university or if you apply for a job abroad. As a trainee at the University of Twente, you can check your own credits via the Osiris website at http://osiris.utwente.nl/[6].

The average study load per EC is 28 hours. The number of credits of each course and general information about each course can be found at the course descriptions at the Osiris website. Each course will be finalised with an examination or assignment. The final mark of each course has to be 6 or higher (on a scale of 1-10). Agreements made and rules established concerning exams, including the determination and publication of the results, the duration of the validity of the exams, the right to inspect the results, appeal and objection and fraud, are provided in the PDEng Charter and the Education and Examination Regulations (EER) of the educational MSc programmes that provide the courses.

5.2 EngD programme structure

The programme[7] consists of three blocks: (1) professional development, (2) in-depth and broadening courses and (3) the technological design project. These blocks have a total study load of 120 EC and can run in parallel. The in-depth and broadening courses can be partly tailored to the technological design project. Gained skills in professional development and gained knowledge from in-depth and broadening courses are directly applied in the design project.

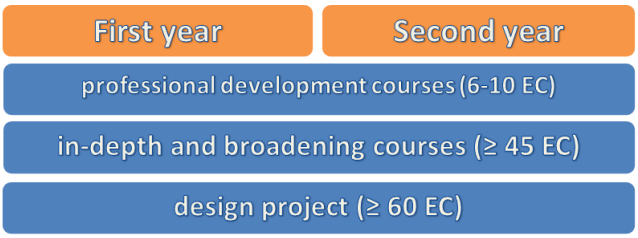

Figure 2. Programme structure

5.3 Professional Development

The professional development courses are intended to improve professional skills and advance career opportunities. Therefore, Professional Effectiveness course (2 EC) and the TGS Introductory Workshop (1,5 EC) are compulsory. Other courses are elective and can be chosen in consultation with your supervisors. Be aware that only one language course can be followed, and a maximum of 2 EC can be granted for its completion. Recommended elective professional development courses include:

- Project management (0.5 EC)
- Science writing (2 EC)
- Time management (1 EC)
- Personal branding for Scientists
- Analytical Storytelling (0.5 EC)
- Creative and Design Thinking (1 EC)

The total study load of the professional development courses is 6 to 10 EC. These courses cover the professional skills learning goals mentioned on page 7. See www.utwente.nl/en/ctd/courses/ for an overview of the professional development courses that you can choose, and how to register for the courses. *You are expected to use your employee-number (m-number) to register to the courses provided on that website.*

[6] See www.utwente.nl/en/educational-systems/about_the_applications/osiris/ for more information about OSIRIS
[7] See also Appendix I for a timeline of the 2 years the programme lasts

5.4 In-Depth and broadening courses

The in-depth and broadening block have a total study load of at least 45 EC and consists of a compulsory block and an elective block. This block is set up to cover the design skills learning goals mentioned on page 7. Table 1 shows the courses of the compulsory block.

Table 1. BIT EngD compulsory courses

General EngD design course	**Code**	**ECs**		
Systems Design & Engineering for EngD	202000251	15		
Besides, you have to choose at least two of the courses mentioned below:				
EngD BIT courses	**Code**	**ECs**		
		Total	*Basic part*	*EngD part*
Business Process Integration Lab for EngD	202001482	6	3.5	2.5
Enterprise Architecture for EngD	202001483	6	3.5	2.5
Architecture of Information Systems for EngD	202001484	6	3.5	2.5
System Validation	192140122	6	3.5	2.5

The four EngD BIT courses must be accompanied with upgrade-assignments specific for EngD trainees. In case you have already followed one of the mentioned courses in your (UT) Master's programme, you can choose other courses *or* get an exemption for the basic part of the course and do only the EngD part (additional upgrade-assignment). In the latter case, the EngD part is awarded with 2.5 EC. *Exemption is only possible if a specific course is already followed at the University of Twente.* Compulsory courses must always be on a post-master level.

Example: A trainee follows the course Enterprise Architecture for EngD that she never followed before. After passing the examination she earns 6 EC. Another trainee skips the basic part (decision in agreement with the lecturer) because she already followed the course in her UT-Master and does the EngD as an additional upgrade-assignment. She will get 2.5 EC.

Important: To sign up for the in-dept and broadening courses in Osiris and Canvas you should use your s-number.

5.4.1 Upgrade assignments

As mentioned above, the four EngD BIT courses need to be upgraded to a post-Master level by means of an additional assignment. Therefore, a project (related to the main design project) has to be defined and carried out, in which you have to apply the course content. You can define the additional assignment as follows:

1. After the first course, contact the lecturer of the course and indicate that you are an EngD trainee who needs to upgrade the course to a post-Master level, and discuss how to define the additional assignment.
2. Make sure that the assignment meets the following requirements:
   - In the assignment you should apply the content of the course in the context your Design Project.
   - It should have a design focus and on a post-Master level.
   - It should have a workload of at least 2.5 EC.
3. Fill in the approval form for upgrade assignments (see Appendix VI) and ask your lecturer and programme director to sign the form for approval. After the approval, upload this document to the T&SP element in Hora Finita (see page 14).
4. Examination of the upgrade assignment is possible by means of a presentation or report.

5.4.2 Elective block

The elective block of at least 12 EC allows you to extend your competences on a specific topic as a further preparation for the design project and future career. For the composition of this elective block, you *freely choose courses from five different topics*, which contain some pre-approved courses (see Table 2). Besides, you can select courses outside of the topics that are of interest for the technological design project, but the whole elective block must be eventually approved by your supervisors and registered in your Training & Supervision Plan (T&SP, see Section 5.5). Elective courses can either be Master courses or post-master courses at the University of Twente, National research schools, Capita Selecta courses, conference visits (incl. paper and/or poster), summer schools or in-company courses. Any additional costs related to following courses either in this university or elsewhere, are on the account of the research chair. This means that you have to contact your thesis supervisor for approval (for regular courses as mentioned in Osiris and the CTD-website no costs are charged).

Table 2. BIT EngD topics

Topic: E-business Architectures	**Course code**	**ECs**
Service-oriented Architecture with Web Services	192652150	5
Information Systems for the Financial Services Industry	194105070	5
Multi Agent Systems	192320601	5
Topic: E-business processes and coordination		
E-commerce	192320501	5
Complex Networks	201800222	5
Stochastics Models in production & Logistics	191531830	5
Topic: Security		
Internet Security	201700074	5
Cybersecurity Management	201500041	5
Blockchain and Distributed Ledger Technologies	201700079	5
Topic: Data analytics		
Data Science	201400174	5
Research Experiments in Databases and Information Retrieval	201300074	5
Advanced Machine Learning	201600071	5
Specialised topics		
Capita Selecta (project specific topics, external courses, courses at research schools, conference presentations, etc.)		

5.4.3 Capita Selecta courses

Capita Selecta courses can be used for (educational) activities that are not covered by the regular courses at the University (i.e., tailored assignments, courses at research schools or in-company courses). The content, amount of work, and the form of the Capita Selecta must be set up in agreement with your supervisors.
In case you want to set up a tailored assignment or course, you have to follow the next six steps:

1. Start writing learning goals.
2. Communicate with your supervisor who is the teacher or content expert who can evaluate your capita selecta.
3. Describe how this will be done, make clear why and how you will do it, make a planning and depending on the content decided by your supervisor and programme director make sure the capita selecta is on (Post-)Master level.
4. Use the following codes for the Capita Selecta:
   - Capita Selecta EngD (tailored assignment) 202001486
   - Capita Selecta EngD (tailored assignment 2) 202200267
   - Capita Selecta EngD (in-company training) 202001522
   - Capita Selecta EngD (external course) 202001521
5. Describe this whole idea/plan in the T&SP element in Hora Finita, and get approval on this.
6. If you pass let the teacher fill in the mark sheet that is needed for Osiris with the coding (see point 3).

Capita Selecta courses have a standard number of credits of 6 EC, but the teacher responsible for a Capita Selecta can assign a different number of ECs depending on the kind of activity and workload of the course. A maximum of two Capita Selecta courses can be granted during the programme, for a maximum of 12 EC. Trainees who have already taken one of these Capita Selecta courses should use the code 202200267 to register their second Capita Selecta.

Appendix VI contains a form that you must fill in together with the responsible teacher to describe the Capita Selecta. This description should be also approved by the Programme Director. After its completion, make sure that your supervisor registers the course in Osiris.

To request participation in available courses at research schools or in-company courses, you should write the description and the learning goals of the course in Hora Finita, and let your supervisor register the course in Osiris with the number of credits and the Capita Selecta course codes mentioned above.

A Capita Selecta course can be graded as Pass/Fail or with a numeric grade (with one decimal digit).

The Capita Selecta courses described here have been introduced to be used exclusively by EngD trainees. Conversely, EngD trainees are not allowed to use the Capita Selecta courses that have been defined in the regular Master programmes.

5.4.4 Conference visits

It is possible to earn ECs in the elective courses block for conference visits. Just visiting is not enough for receiving credits, you must also hand in at least a report of the conference. The number of to be provided ECs is as follows:

- Conference visit including conference report 1 EC
- Conference visit including conference report and poster 2 EC
- Conference visit including conference report and paper 3 EC

The course code for conference visits is **201600191**. Note that the responsible lecturer or supervisor should write the corresponding number of credits on the mark sheet. A maximum of 3 EC points can be granted for visiting various conferences, under the condition that the level of participation in the consecutive conference is higher than in the former one. After approval, upload the conference report, poster and/or paper in the course element in Hora Finita.

5.5 Training and Supervision Plan (T&SP)

You need to set up a T&SP including an education plan in Hora Finita within the first three months of your appointment. This should be done in consultation with your daily supervisor at the University of Twente and the company. You can find the template for your T&SP at www.utwente.nl/engd/intranet. Your T&SP contains the names of your thesis supervisor and daily supervisor, supervision arrangements, the chosen set of courses including course descriptions, and what knowledge and skills must be acquired. After completion, it must be approved by both your thesis supervisor and the EngD Board of Examiners in Hora Finita. In order to do so, in the home-screen of Hora Finita you must go to the T&SP tab, upload the document, and click the button “Submit T&SP for review”. After approval enter all courses/portfolio items separately in Hora Finita, including the course name, number of credits, dates, organiser, and course description.

Your T&SP is a working document, so in consultation with your supervisors and based on advancing insights, it is possible to adjust your T&SP during your EngD programme. *After each change in your T&SP new approval in Hora Finita is needed by both your thesis supervisor, as well the EngD Board of Examiners.*

When setting up your education plan, keep in mind that most of the following aspects should be present in your educational programme:

- Function of the designer in the industry.
- Technical creativity.
- Modern design methods.
- Quality of a product, process, or system.
- Risk analysis of possible failures during the design period.
- Specification of the requirements which the product, the procedure or the system should meet.
- Attention to the civil aspects of designing (energy consumption, environmental impact, safety, raw material consumption, residues processing etc.).
- Attention to laws and regulations of the government.
- Knowledge of patent literature.
- Choice of production techniques and industrial feasibility (in terms of investments, location, available production instruments, the environment, noise- and energy regulations and vulnerability).
- Meaning of lifespan, maintenance and reliability.
- Project-based approach, including planning and completion time, and the relation with the developments on the market.

Supplement specific for a process designer including:

- Specification of the process.
- Setting up a parameter set with limits and tolerances.

Supplement specific for a product designer including:

- Functional demands for the design project; translation to product specifications (including quality, manufacturability, and price).
- Preparation for manufacturing.
- Methodological designing (distinct between designing consumer products and industrial products).

These aspects are covered by the final qualifications (intended learning outcomes) described on page 6.

6 Technological Design project

The design project is defined in close consultation with the organisation or institution you will be working for. The programme ensures that the design project is innovative and complex, contains sufficient design aspects and is sufficiently multidisciplinary. Due to the complex and multidisciplinary character of the project, in most cases you will work together with colleagues. The workload of the design project is at least 60 EC.

6.1 Design process

The design project covers at least 50% of the EngD programme and leads to a solution of a software/engineering problem. An additional goal is to evaluate your skills and knowledge by carrying the work (or part of it) within an industrial or governmental environment or in close cooperation with such an organisation. The design project is related to a technological problem and is constrained by time planning, project management, industrial and/or governmental context, and project deliverables. The assessment criteria for the design project are divided into three main groups:

1. Design product.
2. Design skills.
3. Professional skills.

The subdivision of these assessment criteria for the design process are documented in the graduation assessment form (Appendix VII).

During the design project, you have at least 50 contact hours with experienced designers. The designers:

- are employed within the company or University of Twente and have sufficient practical experience.
- have relevant technological and methodological knowledge.
- are familiar with the stages of a design process.

6.2 EngD Thesis

In order to assess your Design Project, you individually have to write an EngD Thesis. In this thesis, you report on the aspects mentioned above. These are covered by the points mentioned in the EngD Thesis format in Appendix V. You can download a template for your EngD thesis at www.utwente.nl/engd/intranet. The title page shown in Appendix X is mandatory and should be the first page after the thesis cover.

7 Programme Milestones

7.1 Qualifier

The (public) qualifier is held between 6 and no more than 9 months after the start of the EngD programme. It is a meeting to determine whether the technological design proposal is of a sufficient level and whether it is likely that you will complete your EngD programme within the remaining period. During this meeting, you present to the Qualifier Committee[8] the goal(s) of your design, our first results and the technological design proposal for the remaining period, as well as the progress and plans regarding the course work. The presentation is followed by a discussion. When it is time to plan the qualifier or annual interview with your supervisor, you will receive an email reminder from Hora Finita. Clicking on the link in this email will take you to a screen in Hora Finita where you can plan the date and upload the necessary files.

As input for this qualifier, you have to draw up a short progress report (typically no more than 5 pages), mentioning your results so far, results of your educational programme, and future ideas and planning of educational and project activities. This document must be submitted at least one week before the Qualifier date to the committee members, and it must be uploaded in the "Progress Interviews" tab in Hora Finita. The Training and Supervision Plan and a project planning of your EngD project must be added to the Qualifier report in Hora Finita as appendices. See Article 15 of the PDEng Charter for more information about the EngD Qualifier[9].

In case the advice of the Qualifier Committee on your Qualifier is 'sufficient', an evaluation interview (for EngD trainees who are employed at the UT) or progress interview (for EngD trainees who are employed at the company) follows. The result of the qualifier serves as input for the evaluation/progress interview between you and your thesis supervisor. In case the advice of the Qualifier Committee is 'insufficient', an assessment interview follows. The result of the qualifier serves as the input for the assessment interview. You have get an opportunity to meet the specific points mentioned in the interview within an improvement period of no more than 3 months. At the end of this period, a second qualifier follows.

See Article 16 of the PDEng Charter for more information about the evaluation/progress interview. You can download the appropriate forms for the Qualifier and evaluation/progress interview from www.utwente.nl/engd/intranet

7.2 Graduation[10]

To obtain the EngD degree, you have to complete the course programme successfully and write a EngD thesis covering your Design Project. The total design programme is examined by the Graduation Committee[11].

In order to assess the total programme, you have to provide a EngD thesis with the complete documentation of the design and process (in Dutch or in English) and present the results to the Graduation Committee. For the presentation of the results, you have to inform the BIT EngD Programme director at least six weeks before graduation about the exact date of graduation. This ceremony is public. After the presentation (~45 minutes including public discussion/questions from the audience), an interrogation session behind closed doors (~45 minutes) will take place with the Graduation Committee. The final decision of awarding or not the title will be taken by the Graduation Committee in a closed session after the adjournment of the interrogation session. For the assessment, the Graduation Committee makes use of the assessment form[12]. If you demonstrate exceptional competence in the practice of your technological design, you can be awarded 'with distinction' (cum laude)[13].

Prior to your graduation some administrative actions should be taken (see page 14). All documents must be correct and complete on time in order to guarantee that you can graduate on the intended graduation date.

[8] The Qualifier Committee consists of the Programme director, Thesis supervisor, daily supervisor(s), and at least one Assistant or Associate professor from outside the chair of the thesis supervisor.
[9] The PDEng charter can be found at www.utwente.nl/engd/intranet
[10] See article 17 of the PDEng Charter.
[11] The Graduation Committee comprises the Programme director (chair), the Thesis supervisor, and an Assistant or Associate professor from outside the chair of the thesis supervisor. The committee may have up to a maximum of eight members, with a minimum of four. Company supervisors can act as committee members.
[12] An overview of the criteria for the design process and design project are provided in Appendices II and III.
[13] See article 17a of the PDEng Charter.

8 To Do list

Contact your Programme Director
Plan a meeting with your Programme Director (Dr. L. Ferreira Pires) for a first acquaintance.

Intake EngD
First admission to the faculty is done by the faculty HR through appointment (only trainees employed at the University). Secondly, an appointment with the EngD office and the candidate is planned. During the intake you will be registered and introduced to the Hora Finita trainee monitoring system, you will be informed about your programme for the next two years, and the EngD coordinator takes care for registration as a student. This registration is needed to get access to Canvas and Osiris in order to make sure that you can follow courses and that your marks are stored.

If you are employed by a company/institute, you ALSO have to fill in a PNUT (person not employed by the University of Twente) form. The secretary of the research chair you are linked to should take care of this form!

1. Registration for courses and examinations
Registration for the in-depth and broadening courses takes place at https://canvas.utwente.nl[14] and https://osiris.utwente.nl[15]. You have to register for the examinations of these courses separately. For the registration in Osiris and Canvas you use your student number (s-number). For the registration for professional development courses at www.utwente.nl/ctd , you should use your employee number (m-number).

Training & Supervision Plan
You will set up a draft T&SP within the first three months of your appointment (see Section 5). Your T&SP should be approved in Hora Finita by your Thesis Supervisor and the EngD Board of Examiners. When setting up your T&SP, make sure that your personal educational programme conforms with the requirements specified on page 8.

The draft T&SP contains:
- The names of your thesis supervisor and daily supervisor.
- Supervision agreements with your thesis supervisor and daily supervisor.
- The chosen set of courses.
- Cover letters: The compulsory courses that needs to be upgraded to a post-master level need a cover letter from the lecturer, stating that you have completed the course at post-master level (see page 9 and Appendix V). In most cases it is not possible to upload this document within the first two months of your programme, so you have to upload a scan of this (signed) document as soon as the additional assignment is determined.
- Certificates: Make sure that you receive certificates for professional development courses and upload them in the specific T&SP element in Hora Finita.

Your T&SP is a working document, so in consultation with your supervisors, based on advancing insights, it is possible to adjust your T&SP during your EngD programme.

After approval, enter all courses/portfolio items separately in Hora Finita, including the course name, number of credits, dates, organiser, and course description.

Regular meetings
Plan regular meetings with your daily supervisor and your thesis supervisor. A frequency of at least once per two weeks is strongly recommended. *You are expected to mention the supervision frequency in your T&SP.*

Graduation[16]
At least 8 weeks before the expected graduation, and after you got approval (green light) from your thesis supervisor regarding your draft report, you have to arrange the following:
1. Make sure that all courses mentioned in your approved T&SP are listed in Osiris.
2. Together with your thesis supervisor, Programme Director and company supervisor, plan a date for your EngD thesis defense.

[14] See www.utwente.nl/en/educational-systems/about_the_applications/canvas/ for more information about Canvas
[15] See www.utwente.nl/en/educational-systems/about_the_applications/osiris/ for more information about OSIRIS
[16] Also see article 17 of the PDEng Charter for the formal regulations of the graduation

3. Make sure that your T&SP is complete and approved in Hora Finita. This includes all copies of professional development certificates and signed cover letters for additional assignments (for upgrading to post-master level).

Only after approval in Hora Finita by the thesis supervisor and programme director positive portfolio assessment in Hora Finita, you can continue with the following steps.

4. At least 5 weeks before the expected graduation, send a filled approval form for graduation (see Appendix V), signed by your thesis supervisor and the programme director to engd@utwente.nl to request approval by the TGS Dean. This form must include a list of the graduation committee, including their affiliations and roles in your committee. Make sure that your thesis supervisor has invited an external expert from another research chair or university, as member of the examination committee. *Only after receipt of the form, the diploma procedure can start* (on some occasions, this can take about a month).
5. Ask the secretary of your department to book a room at your graduation date for the presentation (max. 45 minutes), a separate room for the interrogation session (for 1.5 hour possibly in the professor's office), and a room where the diploma can be presented publicly (for 30 minutes).
   The interrogation session takes about 45 minutes (and 45 minutes for grading). Make sure that that your public (friends, family, colleagues, company) is aware of this. You can ask the secretary of the department for a separate room.
6. Agree with the graduation committee on how and when they will receive the final report (at least two weeks before the graduation date) and on how many hard copies are required.
7. Submit a PDF file of your final thesis to engd@utwente.nl.
8. If your EngD thesis is not confidential, provide the University Library the electronic version of your thesis[17].

Directly after graduation:
Fill in the evaluation form that will be provided by the EngD office and send it back to a.vanos@utwente.nl.

[17] See www.utwente.nl/en/cfm/services-abc/!/product/p885010/theses

Appendix I. Timeline EngD programme

Intake Office Manager EngD
Firstly, admission to the faculty is done by the faculty HR through appointment. Secondly, an appointment with the EngD Office Manager and the candidate is planned. This should be within two weeks after admission for the EngD. The Hora Finita system will be introduced to the EngD trainee, and the EngD Office Manager will inform the trainee about their programme for the next two years.

Subscribe to courses
In order to prevent for study delay, you can already start subscribing to (compulsory) courses before the T&SP is approved. Registration for courses takes place through the internet on https://canvas.utwente.nl and https://osiris.utwente.nl.

Training & Supervision Plan (T&SP)
The T&SP in Hora Finita contains names of (daily) supervisors, supervision arrangements, the chosen set of courses and what knowledge and skills must be acquired and how this should be done. It should be accepted in Hora Finita within three months after start of the EngD by both the Thesis Supervisor and the EngD BoE. See the EngD study guide for the requirements of your T&SP.

Qualifier and Progress/assessment review
Judgment of work so far and prospect of success finishing the EngD in time; update of T&SP. Between 6-9 months after start, with optional 3 months improvement period (with specified targets). Directly after the Qualifier, the progress/assessment review is held. See the PDEng Charter for more information.

At least 8 weeks before the expected graduation, and after you have got approval (green light) from your Thesis Supervisor regarding the draft EngD thesis, you have to arrange the following:

1) **Make sure that all courses, including the professional development course and capita selecta's, are listed in Osiris.** (This requires you to ask your daily supervisor to make a mark sheet of your attended professional development and capita selecta courses and send it to BOZ.
2) Make sure that your **T&SP is complete and approved in Hora Finita**. This includes the copies of professional development and capita selecta certificates, and it should meet all the programme requirements (Post-MSc level, design focus, scope etc.)
3) At least 5 weeks before graduation, **send a copy of the approval form for graduation**, signed by your Thesis Supervisor and the programme director to pdeng@utwente.nl for the signature of the TGS Dean.
4) **Prepare for graduation**
5) Agree with the graduation committee on how and when they will receive the final report (at least two weeks before the graduation date) and **send your final thesis to engd@utwente.nl**
6) **Graduation**
   See the PDEng Charter and your study guide for more information about graduation.
7) Fill in the evaluation form that will be provided by the EngD office.

Appendix II. Directions

Useful links

PDEng Charter	www.utwente.nl/engd/intranet
Hora Finita	https://horafinita.utwente.nl/
Hora Finita manual	http://www.utwente.nl/en/education/tgs/currentcandidates/phd/hora-finita/phd/research_phase/
Course catalogue Osiris	www.utwente.nl/onderwijssystemen/en/about_the_applications/osiris/
Academic calendar (check the MSc calendar)	www.utwente.nl/ces/planning-roosters/en/academic-calendar/calendars/
Course schedules	https://rooster.utwente.nl/schedule
Centre for Training & Development (Professional Development courses)	www.utwente.nl/nl/ctd/
Canvas	canvas.utwente.nl
EngD intranet	www.utwente.nl/engd/intranet
International trainees	https://www.utwente.nl/en/education/international-students/
University of Twente Campus map	https://www.utwente.nl/download/campusmap.pdf
Library, ICT & Archive	www.utwente.nl/lisa/en/

Contacts

General questions regarding the EngD programme and Hora Finita	Astrid van Os E-mail: a.vanos@utwente.nl Telephone: 053 489 1279
BIT EngD specific issues	Luís Ferreira Pires E-mail: l.ferreirapires@utwente.nl Telephone: 053 489 3843
Design project issues	Contact your Thesis Supervisor
HR related questions (travelling, housing, salary, contract)	E-mail: e.v.m.dijkhuis@utwente.nl Telephone: 053 489 4127
Osiris issues	Student Services E-mail: studentservices@utwente.nl
Canvas issues	E-mail: canvas-eemcs@utwente.nl
ICT issues	E-mail: servicedesk-ict@utwente.nl Telephone: 053 489 5577
Student Affairs Coaching & Counselling (SACC)	E-mail: sacc@utwente.nl Telephone: 053 489 2035

* *For information, advice, or support in case you have questions concerning matters that occur during your study*

Appendix III. Assessment Criteria for the Design Process

1. Organization and planning

Includes: project planning, time management, organizing meetings, reaching milestones

Indicator	Excellent	Good	Fair	Poor	Fail
Project planning	Planning contains milestones, specifications of activities and updates during the project	Planning contains milestones and specifications of activities	Planning contains phases and milestones	Only phasing	No planning
Plan realization	Reaches 90% of the updated milestones, even if there were disturbances during the course of the project	Reaches at least 70% of the updated milestones, even if there were great disturbances during the course of the project	Reaches at least 50% of the updated milestones, even if there were great disturbances during the course of the project	Reaches no more than 40% of the updated milestones	Reaches less than 30% of the updated milestones
Conducting meetings	Prepares a detailed agenda, takes care of supporting documentation, reserves a room and invites stakeholders, prepares detailed minutes of the meeting, follows up the actions agreed during the meeting	Prepares a detailed agenda, takes care of supporting documentation, reserves a room and invites stakeholders, prepares detailed minutes of the meeting	Prepares a detailed agenda, takes care of supporting documentation, reserves a room and invites stakeholders	Prepares a basic agenda, reserves a room and invites stakeholders, but fails in preparing supporting documentation	Is not reliable in preparing meetings: no agenda, room reservations and no invitations to stakeholders

2. Problem analysis and solution

Includes: problem statement, analysis of the context, conducting a literature study, showing creative thinking in searching for a solution.

Indicator	Excellent	Good	Fair	Poor	Fail
Analysis	Problem formulation with motivation and validated assumptions	Problem formulation with motivation and non validated assumptions	Problem formulation with motivation	Only problem formulation	No clear problem formulation
Understanding of impact	Demonstrates understanding of the impact of reaching the project goal on the project environment and beyond	Demonstrates understanding of the impact of reaching the project goal on the project environment	Has tried to understand the impact of reaching the project goal on the project environment	Realises that reaching the project goal may have impact on the project environment	Does not understand the impact of reaching the project goal on the project environment
Creativity	Dares to abandon the well-understood standard methods and creates and applies better ones resulting from exploring several alternatives	Considers abandoning the well-understood standard methods and proposes plausible alternatives	Is familiar with the standard methods, but also explores alternatives	Is somewhat familiar with the standard method and realizes that there may be alternatives	Has difficulties with understanding and applying the standard method
Genericity	The solution is applicable in the entire problem domain and other well-described domains	The solution is applicable for the entire problem domain and beyond	The solution is adequate for the entire problem domain	The solution is only adequate for a subset of the problem domain	The solution is not even adequate for a subset of the problem domain

3. Communication and social skills

Includes: communication with stakeholders, knowledge mobilization, working in teams, giving presentations, keeping a logbook, preparing agenda's for meetings and writing minutes, formulating meeting goals and summarizing the results of the meeting, looking for and using expert knowledge.

Indicator	Excellent	Good	Fair	Poor	Fail
*Reporting (orally and written)**	There is a clear purpose and structure and the reporting is adequate for various audiences	There is a clear purpose and structure and the reporting is adequate for the intended audience	There is a clear purpose and structure	There is a clear purpose	No clear purpose, no structure and no audience awareness
Knowledge management	Actively looks for information sources and proactively shares knowledge	Actively looks for information sources and shares knowledge when asked	Actively looks for information sources, but does not share knowledge	Does not share knowledge, but uses some external knowledge	Is not aware of external knowledge and is not sharing own knowledge
Stakeholder motivation	Shows adequate persuasion and negotiation in communication and is able to manage expectations	Shows adequate persuasion in communication	Shows little persuasion in communication	Has a passive role in the communication	Does not initiate any kind of communication with stakeholders
Atmosphere	Knows how to manage and mitigate conflicts, makes others feel comfortable working with her/him, and actively creates a good atmosphere	Knows how to prevent (potential) conflicts from escalating and makes others feel comfortable working with her/him	Capable of detecting (potential) conflicts and is aware of the level of comfort	Incapable of increasing or improving a feeling of comfort for his/her peers and of detecting (potential) conflicts	Lacks basic social skills and unnecessarily causes conflicts

** Presentations skills is assumed to be covered by 'orally reporting'.*

4. Structure and attitude

Includes: giving stakeholders feedback and receiving feedback from stakeholders, self reflection using a strengths and weaknesses analysis, having a constructive, systematic, creative and critical attitude.

Indicator	Excellent	Good	Fair	Poor	Fail
Structure and consistency	Has conciously chosen among various methods of structuring and consistency in his/her working and reporting	His/her work and reports show explicit and adequate structure and consistency	His/her work and reports show some structure and consistency	Realizes that coherence and consistency are necessary, but is incapable of achieving them	Is not aware of the need of coherence and consistency in his/her working and reporting
Reflection and critical attitude	Consistently demonstrates reflective thinking throughout the design process and the knowledge involved; tends to find and call attention to errors and flaws	Demonstrates reflective thinking in the major part of the design process and the knowledge involved; tends to seek errors and flaws	Occasionally demonstrates reflective thinking in parts of the design process and the knowledge involved; sees errors and flaws when pointed at, and reacts adequately	Lacks reflective thinking on the own design process and the knowledge involved; sees errors and flaws only when pointed at	Takes everything for granted
Independency	Consistently formulates and substantiates a personal opinion and defends it, when necessary going against commonly shared	Consistently formulates and substantiates a personal opinion	Incidently formulates and substantiates a personal opinion	Reluctantly formulates and incompletely substantiates a personal opinion	Has no well-formulated own opinion

Appendix IV. Assessment Criteria for the Design Project

The criteria are grouped per aspect. They all have a 5-point scale.

1. Functionality

a. *Satisfaction.* This concerns the extent to which the technological design satisfies the requirements. Often the formal requirements develop during the project, based on mere informal initial requirements. In case the requirements are relatively easy to meet, the evaluation team will be stricter in weighing the discrepancies than in case the requirements are very difficult. So in a way the judgment of the evaluation team will evaluate the satisfaction relatively to the difficulty of the problem.

1	2	3	4	5
Poor fit to the requirements	Insufficient fit to the requirements	More or less meets requirements	Meets requirements	Exceeds requirements

b. *Ease of use.* This concerns the ease of use for the stakeholders. The stakeholders are e.g.: end users, operators, engineers is responsible for installation and maintenance of the technological design.

1	2	3	4	5
Very difficult	Difficult	Acceptable	Easy	Very easy

c. *Reusability.* The extent to which the technological design can be used in other situations.

1	2	3	4	5
No reuse	In same context, same scale	In same context, different scale	In different context, same domain	In different domains

Distinguished are the notions of 'scale', 'context' and '(application) domain'. In different disciplines, these notions may have different meanings.

2. Construction

a. *Structuring.* This concerns the partitioning of the technological design in logical or physical *components*. Structuring may use *hierarchy*, which means that subsystems can be considered as components themselves. The 'structuring' is often called the 'architecture' of a technological design. Structuring is important to understand the construction of a technological design and it is used for instance for manufacturing and maintenance. The structuring has four elements: (1) overview, with or without hierarchy, (2) low degree of coupling between components, (3) high cohesion within components, (4) clear interfaces.

1	2	3	4	5
None	1 out of 4	2 out of 4	3 out of 4	All 4

b. *Inventivity.* The measure for originality. One way to express this is by the surprise factor.

1	2	3	4	5
No surprise at all	Surprise for laymen	Surprise for peers	Surprise for professionals	Surprise for supervisors

c. *Convincingness.* This concerns the evidence that the construction will work and has the defined functionality. Distinguished here are several forms of proof. An empirical proof is a statistical argument based of either simulations or on experimentation with a prototype.

1	2	3	4	5
No proof	Informal proof	Empirical proof based on simulation	Empirical proof based on a prototype	Formal and empirical proof

3. Realisability

a. *Technical realisability.* This concerns certainty that it is technically possible to produce the technological design.

1	2	3	4	5
Unknown if it can be produced	Informal arguments	Model-based analysis	Prototype is realised	0-series is produced

b. *Economical realisability.* This concerns the *business case* for the technological design. A business case can be scored in two ways: the analysis is convincing or the outcome such that it is easy to convince stakeholder to invest in it. The next scale combines the two.

1	2	3	4	5
No business case	Accurate estimate of costs	Accurate estimates of costs and revenues	A well-substantiated financing plan	Business case committed by stakeholders

4. Impact

a. *Societal impact.* This concerns the influence the technological design will have on societal values such as sustainability or health and well-being.

1	2	3	4	5
Negative impact	No impact	Low positive impact	Moderate positive impact	High positive impact

b. *Risks.* This either may concern the risks of the technological design during development or the risks related to the use of it. The analyses of the risks as well as the measures for mitigation are important.

1	2	3	4	5
Risks not analysed	Risks informally analysed	Risks scientifically analysed	Risk mitigation measures taken	Risks scientifically analysed and adequately mitigated

5. Presentation

The presentation includes the documentation of the technological design, but it may also concern a prototype or an animation.

a. *Completeness*

1	2	3	4	5
Very poor	Poor	Marginal	Good	Very good

b. *Correctness*

1	2	3	4	5
Unreliable presentation	Many errors found	Acceptable number of errors	Few errors found	No errors found

Final mark

Six of the twelve criteria concern the kernel of the technological design: the functionality and the construction, while the six others cover other aspects. To reach a final judgment, the scores on the 12 criteria need to be aggregated. This can be done by means of multiplicative weights, which allows expressing differences in relative importance among the criteria. By default, all weights could be taken equal; alternatively, the weights for the criteria 1a … 2c could be made bigger than those for 3a … 5b. Other motivated choices can be also appropriate. In case multiplicative weights are used the motivation to do this should be documented.

Appendix V. Approval Form Post-Master level

In case you have to upgrade a MSc course to a Post-MSc level by means of an additional assignment, you need this cover letter from the lecturer, stating that you have finished the course on a Post-Master level. Please fill in the requested information below and demand your lecturer and programme director for a signature for approval.
After approval, upload this document in Hora Finita (T&SP Element → Proof of attendance)

Name of the student:	
Course:	
MSc Course code:	
Lecturer:	
Description additional assignment (including the reason why this assignment is on Post-Master's level)	

APPROVAL

I hereby declare that the additional (design) assignment on the Master's course in …….. is on a Post-Master's Level:

Trainee's signature	Lecturer's signature	Dr. L. Ferreira Pires Programme Director's signature

Appendix VI. Capita Selecta Description Form

A Capita Selecta can be a tailored assignment, an in-company training or an external course (see study guide for course codes). The form, content, amount of work must be set up in agreement with your supervisor. Discuss who can evaluate the content of the Capita Selecta. Make sure the Capita Selecta is on (Post) Master level. Upload the deliverables to the Capita Selecta course in Hora Finita.

Name of the trainee		
Capita Selecta course code		Number of EC: 6
Lecturer / content expert		
Description - learning goals - activities (e.g., self-study, tasks, interviews) - planning (time schedule) - assessment procedure and criteria		
Deliverables (e.g. papers, reports, documents)		

APPROVAL

I hereby declare that the Capita Selecta has been set up in agreement with the supervisor and the content has been evaluated by the lecturer or content expert.

Trainee's signature	Lecturer's/ content expert signature	Thesis supervisor's signature	Program Director's signature

Appendix VII. Graduation Assessment Form

ASSESSMENT FORM DESIGN PROJECT
ENGD BUSINESS & IT

Name trainee: …… Project Title: …… ……	Student number: …… Course Code: ….. Report: □ public □ confidential, until: …… (max 1 year)

Committee members: Dr. L. Ferreira Pires (programme director) …… (thesis supervisor) …… (daily supervisor) …… (external examiner) …… (company supervisor) …… ……	EngD programme: ☐ Not graduated (F) ☐ Graduated (P) ☐ Graduated, with distinction (P) Report: ☐ Public ☐ Confidential, until: *(max 5 years)* ……

Signature L. Ferreira Pires: …… Signature thesis supervisor: ……	Date: ……

GRADUATION CRITERIA

Criteria	What went well / what could be improved
Design Product: – Mastering state-of-the-art knowledge – Insight into the possibilities of new technologies in the field – Quality of Design in relation to requirements, functionality, realisability, and innovativeness, – Out-of-the-box thinking – Design validation – EngD Thesis	
Design skills: – Able to analyse complex problems – Able to apply design cycle process – Knowledge of design methods – Self-critical on design results – Able to apply related disciplines such as economics, environment, life cycle and safety – Able to develop give an outlook on the practice – Risk management – Value management – Defense at exam session, answering and understanding of questions	
Professional skills: – Independent, critical, creative – Project meetings (preparation, feedback, leading) – Planning and project management (well defined and regularly updated plan to transform design steps to results) – Critical attitude towards own professional development – Communication with stakeholders, social skills – Presentation skills	

Appendix VIII. Approval form for Graduation

Please fill in the requested information below and ask your thesis supervisor and the programme director for a signature for approval of your professional doctoral thesis and the educational programme.
After approval by your thesis supervisor and the programme director, send a copy of this document to engd@utwente.nl *for the approval by the TGS Dean.*

Professional Doctoral candidate		
Name:		
Student number:		
Place of birth:		
Date of birth		
EngD Programme		
EngD programme:	Business & IT	
Faculty:		
Title thesis:		
Graduation date:		
Pre-education Engineering Doctorate candidate		
Academic Title:		
Discipline:		
Year of graduation:		
Institute/University:		
Graduation committee		
Name including title:	***Affiliation:***	***Role in the committee*:***
1. Dr. L. Ferreira Pires 2. 3. 4. 5. 6.	University of Twente	Programme Director Thesis Supervisor Daily Supervisor External examiner Company Supervisor
Signatures		
Thesis Supervisor	***EngD Programme Director***	***Dean TGS***
	Dr. L. Ferreira Pires	Prof.dr. A. Need

**Choose from chair (this is the EngD programme director concerned), thesis supervisor, daily supervisor, company supervisor or expert.*

Appendix IX. EngD Thesis Suggested Template

Cover: see https://www.utwente.nl/en/service-portal/communication/visual-corporate-identity-huisstijl/templates-and-downloads-ut-logo-powerpoint-posters-etc#house-style

Table of content

Appendix X. Title page EngD thesis

TITLE

EngD Thesis

to obtain the degree of
Engineering Doctorate (EngD) at the University of Twente,
on the authority of the rector magnificus,
prof.dr.ir. A. Veldkamp
on account of the decision of the graduation committee,
to be defended
on Wednesday the Day of Month Year at 12.45 hours

by

Full name

born on the Day Month Year
in place of birth, Country

This EngD Thesis has been approved by:

Thesis Supervisor: Name thesis supervisor

Co-supervisor(s): Name co-supervisor

Appendix XI. Regulations PDEng Board of Examiners University of Twente[18]

The Doctorate Board (DB) of the University of Twente (UT) hereby adopts the regulations for the PDEng Board of Examiners (PDEng BoE), which read as follows:

Preamble
The Doctorate Board of the University of Twente appoints the PDEng Board of Examiners.
In these Regulations, the Doctorate Board sets out rules for the implementation of the duties and powers of the PDEng Board of Examiners.

The Doctorate Board has granted mandate to the PDEng BoE for its duties and powers. This means the Doctorate Board remains responsible for and in control of the mandated duties and powers. The PDEng BoE is only granted authority to act as the representative of the Doctorate Board.

General provisions

Art. 1.1 definitions
In these regulations, the following terms shall be understood to mean:

DB	Doctorate Board
WHW	The Dutch Higher Education and Scientific Research Act
T&SP	Training & Supervision Plan
TGS	Twente Graduate School
Hora Finita	PDEng and PhD monitoring system
PDEng BoE	PDEng Board of Examiners
UT	University of Twente

Other terms used in these regulations shall have the meaning ascribed to them in the WHW.

Art. 1.2 Composition of the PDEng Board of Examiners
The Doctorate Board appoints the PDEng BoE for the PDEng programmes at the UT.
The PDEng BoE consists at least of the following members:

- Chair (TGS Dean)
- Vice chair (TGS PDEng coordinator)
- One member per PDEng-programme (or a deputy mandated by the programme director), who is content expert concerning the domain of that programme
- TGS PDEng Office Manager

The chair and vice chair are independent and do not have a role in the management of one of the PDEng programmes. Each programme director proposes a deputy, who has to be approved by the dean of the faculty responsible for the programme. Members should not be part of the decision whether a trainee of their own programme meets the criteria.

Art. 1.3 Tasks of the PDEng Board of Examiners
The PDEng BoE has the following tasks:

- The PDEng BoE functions under the mandate of the Doctorate Board (final responsibility remains with the Doctorate Board).
- Approves whether the T&SP proposed by the trainee meets the requirements of the PDEng programme.
- Approves changes in the T&SP in Hora Finita after first approval by the Thesis Supervisor of the PDEng trainee.
- Provides the professional doctoral candidate formal access to the PDEng defence, to be assessed by the Graduation Committee.
- Judges the completeness of the portfolio in Hora Finita of a trainee at the end of the programme.
- Approves changes in the internal and external requirements in the curricula of the PDEng programmes.
- Sets the entrance and exit qualifications for PDEng in general.
- Guards the entrance and exit qualifications per PDEng programme.

[18] This text will be updated to comply with the new terminology. 'PDEng' should be interpreted as 'EngD'.

- Monitors the internal quality assurance of each PDEng programme.
- Responsible for the self-assessment and site-visit of the Institutes accreditation[19].
- Reports annually to the Doctorate Board and the PDEng programmes concerning its activities.

Art. 1.4 Working method of the PDEng Board of Examiners for individual cases

- The PDEng BoE meets at least six times per year.
- Meetings are not public. Meeting reports are available on request by the TGS PDEng Office Manager.
- The PDEng BoE decides by a simple majority of votes. In case of a tie, the chair's vote shall be decisive.
- The PDEng BoE informs about its decisions within two weeks after its meeting in writing (or by e-mail) to the persons involved (trainee, his/her supervisor(s), course coordinator and the programme director of the PDEng programme).
- The PDEng BoE shall reach a decision within the response time but can delay the decision by a period of two weeks, having informed the PDEng trainee.
- The PDEng BoE gives the trainee the opportunity to be heard.
- If a trainee submits a complaint or request to the PDEng BoE involving a Supervisor or programme director who is member of the PDEng BoE, the involved Board member of the PDEng programme in question can be heard but shall not take part in the deliberations on the request or complaint.
- If a trainee submits a complaint or request to the PDEng BoE involving an issue in a course or exam within a specific PDEng programme, the involved Board member of the PDEng programme in question can be heard but shall not take part in the deliberations.

Final provisions

Art. 2.1 Upholds of decisions

If the PDEng Board of Examiners upholds its decision, after the trainee and/or the programme has been heard, the trainee and the programme can appeal to the Doctorate Board.

Art. 2.2 Amendments

Amendments to these Regulations for the PDEng Board of Examiners can only come into force in the current academic year if this does not, within reason, have a negative effect on the interests of the trainees.

Art. 2.3 Adoption of regulations

These regulations for the PDEng Board of Examiners came into effect on 3 March 2021.

[19] Institutes accreditations are expected soon.