

# TEACHING AND EXAMINATION REGULATIONS

## MASTER'S DEGREE PROGRAMMES

A. FACULTY SECTION

B. PROGRAMME-SPECIFIC SECTION

*Academic year 2016-2017*

## **Introduction to the Teaching and Examination Regulations for Master's degree programmes of the Faculty of Electrical Engineering, Mathematics and Computer Science.**

### General

Since the introduction of the Dutch Higher Education and Research Act (*Wet op het hoger onderwijs en wetenschappelijk onderzoek*, WHW) in 1993, it has been compulsory for the broad outlines of the teaching programme and examining for each degree programme to be recorded in Teaching and Examination Regulations (OER).

In accordance with Section 7.13, paragraph 1, of the WHW, the OER must contain sufficient and clear information about the degree programme or group of programmes. Section 7.13, paragraph 2, of the WHW lists those issues that must, as a minimum, be regulated in the OER with respect to the procedures and rights and responsibilities relating to the teaching and examinations applicable for each degree programme or group of programmes. The WHW also includes a number of separate obligations relating to the inclusion of rules within the OER.

The model OER is subdivided into two sections (Section A and Section B), which together form the OER. Section A, which can be seen as the faculty section, includes provisions that may apply for several degree programmes. Section B contains the provisions that are specific to the particular degree programme.

## SECTION A: FACULTY SECTION

### 1. General provisions

#### Article 1.1 Applicability of the Regulations

1. These Regulations apply to the teaching and examinations for the Master's degree programmes: Applied Mathematics, Business Information Technology, Computer Science, Electrical Engineering, Embedded Systems, Human Media Interaction, Internet Science and Technology (formerly Telematics).
1. (Hereinafter referred to as: the Master's programme) provided by the Faculty of Electrical Engineering, Mathematics and Computer Science (hereinafter referred to as: the faculty or EEMCS) of the University of Twente.
2. These Regulations consist of a faculty section (A) and a programme-specific section (B). Section A contains general provisions and applies to the teaching and examinations of the Master's programmes of EEMCS. Section B contains programme-specific provisions. Together, Sections A and B form the Teaching and Examination Regulations for the programme.
3. The Regulations can be declared to apply *mutatis mutandis* to the joint degree programmes and units of study, pursuant to Section 7.3c of the WHW, also provided by the faculty.
4. These Regulations apply to anyone enrolled in the programme, irrespective of the academic year in which the student was first enrolled in the programme.
5. Section B of these Teaching and Examination Regulations may contain additional general provisions for the relevant programme.
6. The general provisions and the programme-specific appendix of the Teaching and Examination Regulations are authorized by the dean.
7. The Examination Board set down the Examination Board Regulations for the execution of its tasks and powers in accordance with Section 7.12b of the WHW. These regulations are laid down in the Rules and Regulations of the Examination Board.

#### Article 1.2 Definitions

The following definitions are used in these Regulations:

- a. **EC:** European Credit. A unit of 28 hours of study load, in accordance with the European Credit Transfer System (ECTS), a full academic year consisting of 60 EC or 1680 hours (Article 7.4 WHW);
- b. **Final examination (examen):** A degree programme concludes with a final examination. A final examination is deemed successfully completed if the units of study belonging to a programme have been completed successfully. The examination may also include an additional assessment by the Examination Board;
- c. **Executive Board:** Executive Board of the University of Twente;
- a. **Dean:** Head of the faculty;
- b. **Fraud and plagiarism:** Fraud is an act or omission by a student designed to partly or wholly hinder the forming of a correct assessment of his own or someone else's knowledge, understanding and skills. Fraud also includes plagiarism, which is copying someone else's work without correct reference to the source;
- c. **Joint degree:** a degree awarded by an institution together with one or more institutions in the Netherlands or abroad, after the student has completed a degree programme (a degree programme, a major or a specific curriculum within a degree programme) for which the collaborating institutions are jointly responsible;

- d. **Double degree:** two degrees awarded by two higher education institutions offering a joint programme attesting the successful completion of this programme;
- e. **Course:** a unit of study of the programme within the meaning of the WHW;
- f. **Quarter or quartile:** a part of a semester as specified in the academic calendar (jaarcirkel) of the university;
- g. **Practical exercise:** the participation in a practical training or other educational learning activity, aimed at acquiring certain (academic) skills. Examples of practical exercises are:
  - researching and writing a thesis;
  - carrying out a research assignment;
  - taking part in fieldwork or an excursion;
  - taking part in another educational learning activity aimed at acquiring specific skills or participating in and completing a work placement.
- h. **Examination Board:** Sometimes referred to as Board of Examiners. The Examination Board is the body that establishes objectively and expertly whether a student meets the criteria set in the Education and Examination Regulations regarding knowledge, insight and skills needed for obtaining a degree;
- i. **Master's programme or programme:** the Master's degree programme as denoted in Article 7.3a paragraph 1 subparagraph b of the Act: the totality and cohesion of the course components, teaching activities/methods, contact hours, testing and examination methods and recommended literature;
- j. **Programme board:** The committee charged by the Dean with managing the programme;
- k. **Programme committee:** The Programme committee as referred to in article 10.3c WHW;
- l. **Master thesis project / final project:** a component comprising literature research and/or a contribution to scientific research, always resulting in a written report;
- m. **Student:** Anyone registered with a programme in accordance with Article 7.34 and 7.37 of the WHW;
- n. **Study adviser:** Person appointed by the Dean of the Faculty who acts as contact between the student and the programme, and in this role represents the interests of the students, as well as fulfilling an advisory role;
- o. **Disability:** all conditions which are (at least for the period in question) chronic or lasting in nature and which form a structural limitation for the student in receiving education, sitting (interim) examinations or taking part in practicals;
- p. **Student Information System (SIS):** The system designated by the institutional administration for the registration of and information relating to the relevant student and study data, as stipulated in the WHW, in this case Osiris;
- q. **Course catalogue:** the guide for the degree programme that provides further details of the provisions and other information specific to that programme. The course catalogue is available electronically at [www.utwente.nl/coursecatalogue](http://www.utwente.nl/coursecatalogue);
- r. **Study load:** the study load of the unit of study to which an interim examination applies, expressed in terms of EC (ECTS = European Credit and Transfer Accumulation System). (The study load for 1 year (1,680 hours) is 60 EC credits);
- s. **Academic year:** the period beginning on 1 September and ending on 31 August of the following calendar year;
- t. **Interim examination (tentamen)** an assessment of the student's knowledge, understanding and skills relating to a course component. The assessment is expressed in terms of a final mark. An interim examination may consist of one or more tests (*deeltentamens*);
- u. **Test:** part of an interim examination (*deeltentamen*);

- v. **Examiner:** The individual who has been appointed by the Examination Board in accordance with Article 7.12c of the WHW to hold examinations and tests and determine their results;
- w. **Admission Board** the committee that assesses, on behalf of the dean, whether a candidate meets the requirements for admission to the Master's degree programme of his/her choice. If there is no Admissions Board appointed for the degree programme, the programme board functions as Admissions Board;
- x. **Bridging programme or premaster:** a programme that can be offered to students with limited deficiencies and who are not yet admissible to the master programme according to Article 7.30 of the Act;
- y. **Homologation:** a programme that can be offered to students with limited deficiencies and who are already admissible to the master programme according to Article 7.30 of the Act;
- z. **University:** the University of Twente (UT);
- aa. **WHW:** the Dutch Higher Education and Research Act (*Wet op het hoger onderwijs en wetenschappelijk onderzoek*, WHW);

The other terms have the meanings ascribed to them by the WHW.

## 2. Previous education and admission

### Article 2.1 Previous education

1. In order to qualify for enrolment in a Master's programme, a Bachelor's degree obtained in academic higher education (WO) or a bachelor degree from a university of applied sciences (HBO) complemented with an appropriate pre master programme is required. The requirements that the Bachelor's degree must meet are specified in Section B.
2. In the event that a candidate does not have a Bachelor's degree as referred to in paragraph 1, the Admissions Board of the degree programme will assess suitability for admission to the programme on the basis of the requirements stipulated in Section B.

### Article 2.2 Registration and enrolment

1. The deadline for application for admission for the Master's programme is stipulated on the website [www.utwente.nl/master](http://www.utwente.nl/master). Different application deadlines apply to different types of applicants.
2. After registering on time, the student must enroll before 1 September or before 1 February.

### Article 2.3 Admissions Board

Each programme has an Admissions Board established by the dean. The dean will appoint its members after consultation with the programme directors and Examination Boards of the relevant degree programmes.

### Article 2.4 Admissions procedure

1. The Admissions Board is responsible for admission to the programme.
2. With a view to admission to the programme, the Admissions Board assesses the candidate's knowledge, understanding and skills. The Board may request experts within or outside the University to test certain types of knowledge, understanding and skills, in order to supplement written evidence of the programme/programmes the student has already completed. In its assessment, the Board includes knowledge of the language in which the programme will be taught.

3. Candidates receive either confirmation of admission to the master's programme, admission to a pre-master's programme or a negative decision. An appeal against a decision can be lodged with the *UT Klachtenloket* (or UT Complaints Desk) within six weeks.

#### Article 2.5 Refusal or termination of enrolment (unsuitability/judicium abeundi)

1. Based on the provisions of Section 7.42a of the WHW, the dean or the Examination Board may, in exceptional cases, ask the Executive Board to terminate or refuse a student's enrolment in a programme, if that student's actions or remarks show that he/she is unsuitable either for practicing one or more of the professions for which the programme in question is preparing the student or for the practical preparation for professional practice.
2. If a student is suspected of being unsuitable as described in paragraph 1, the Examination Board or the dean will institute an inquiry, of which the student will be informed immediately. The Examination Board or the dean will not issue any recommendation without carefully considering the interests involved and giving the student the opportunity to be heard.

#### Article 2.6 Admission requirements

1. Students with a Bachelor's degree in a field that corresponds to a sufficient extent with the subject area covered by the Master's programme can request admission to the programme.
2. The Admissions Board will investigate whether the interested person meets the admission requirements.
3. The Admissions Board can admit students that lack some prior knowledge, if it is estimated that the student's chances to finish the programme successfully will not be hampered by this.
4. The Admissions Board can determine that units they shall stipulate must be included in the master's study to compensate for lacking knowledge of the student (homologation courses).
5. In addition to the requirement referred to in the before mentioned sections, the Board will also assess requests for admission in terms of the following documents:
  - a. Motivation letter;
  - b. English proficiency test (art 2.8)
  - c. Diploma
  - d. Transcript of records
  - e. Curriculum vitae
  - f. Two references
  - g. Abstract of thesis
  - h. Course descriptions for programme-specific courses, research methodology courses, math courses and a table of content for the course materials.
6. The Bachelor's programme from which students are automatically admissible are mentioned in the programme-specific section B.
7. If the intended Master's programme includes different specializations, admission requirements may differ per specialization for applicants who are not directly admissible.
8. When the programme commences, the candidate must have a fully completed the Bachelor's programme allowing admission to this Master's programme.
9. Additional admission requirements are stipulated in Section B.

#### Article 2.7 Pre-Master's programme

1. A pre-Master's programme is a bridging programme containing a study load of 15 or 30 EC.
2. The pre-Master's is assembled by the programme director together with the Admissions Board.

3. The Admissions Board can decide to admit a candidate to the Master's programme on the condition that before the final admission a bridging programme is completed successfully.
4. Proof of a successfully completed pre-Master's programme, together with the related bachelor's programme degree serves as proof of admission to the Master's programme specified within it, in the same and the subsequent academic year.
5. From the start, candidates shall complete the pre-Master's programme within an academic year unless otherwise specified. For the interim examination of each part of the programme two occasions are given.

#### Article 2.8 English language requirement for English-language Master's programmes

1. The proficiency requirement in English as the language of instruction can be met by the successful completion of one of the following examinations or an equivalent:
  - IELTS: 6.5
  - TOEFL internet based test: 90
  - Cambridge CAE-C (CPE)
2. Exemption is granted from the examination in English referred to in the first paragraph to students who:
  - are native speakers of the countries specified on the relevant page on the web site of the UT, see [www.utwente.nl/en/education/master/admission-requirements/international-degree/](http://www.utwente.nl/en/education/master/admission-requirements/international-degree/);
  - have obtained a relevant bachelor's degree from an accredited academic institution in the Netherlands;
  - have obtained a three-year bachelor's degree in one of the following countries: Australia, Canada, Ireland, New Zealand, the United Kingdom or the United States of America

### 3. Degree programme structure

#### Article 3.1 Structure of academic year

1. Every degree programme will be offered in two years, each of which divided into two semesters.
2. Every semester consists of two consecutive periods of ten weeks.
3. The programmes will be taught in full-time.
4. The language of instruction is English.

#### Article 3.2 Programme structure

1. The programme comprises the units of study included in Section B.
2. The size of the degree programme in EC is 120. These 120 credits must not include any credits which constituted part of a previously passed Bachelor's audit.
3. If students must sign up for participation in a unit of study, this will only be possible in the periods designated for that purpose.

#### Article 3.3 Master's final Project

1. Requirements to starting the Final project:
  - a. Outside of the Final project a maximum of 10 EC for unfinished courses is allowed
  - b. In case the programme allows a combined final project and internship, 10 EC unfinished courses outside the internship and final project are allowed.
2. The student and the (day-to-day) supervisor must make an appointment about the starting and finishing dates of the Master's project.

3. This will be documented in a plan that takes into account the nominal length of the final project, a reasonable holiday period and uncompleted study units.
4. The planning must be approved by the supervisor and signed by the student.
5. Programme-specific regulations regarding the Final Project are stipulated in the programme-specific section B.

#### Artikel 3.4 Internship

1. The internship is a period of study related work for the amount of 20 credits that is carried out by the student at a company, university or institute outside the University of Twente.
2. Requirements for starting the internship:
  - a. At least 45 EC should be obtained before starting the internship.
  - b. For each programme additional requirements can apply. If so, these will be stipulated in section B.
3. A description of internship must have been drawn up in accordance with and be approved by a member of the staff who has a permanent position at the University of Twente. The approval must be given before the start of the internship.
4. The student has to register with the Internship Office EEMCS at least three months before starting his internship.
5. The daily supervisor of the internship is a staff member appointed by the institute where the placement is being done. This person should be mentioned in the project description, mentioned in paragraph 2.
6. The staff member, mentioned in paragraph 3, supervises the student from a distance during the internship. If adequate supervision is not - or no longer - possible, in the opinion of this supervisor, the latter can decide to take over the daily supervisor.
7. During the internship the student should write a report about his work. At the end of the internship period the report should be handed over to the daily supervisor. The daily supervisor gives an assessment by filling in the assessment form, handed over by the student. The assessment will be based on the supervisor's observations of the student and on the report.
8. The UT supervisor shall act as examiner for this unit, and will base his mark on the assessment by the company supervisor, the report by the student and a discussion with the student. The student should hand in the report to the UT supervisor within two months after the end of the internship.

#### Article 3.5 Confidentiality

1. The final report and internship report are public unless confidentiality conditions have been imposed as follows.
2. The programme management can declare a (final) report confidential for a limited period upon receiving a motivated request:
  - a. A request regarding confidentiality should be done by the first supervisor before the start of the final project or internship.
  - b. The confidential report is accessible for the supervisor, the programme management, and members of bodies that have the authority to assess the quality of the grading of the entire programme
  - c. All parties mentioned in 2b are obliged to respect the confidentiality of the report.
3. In case confidentiality conditions are imposed according to 2, the final presentation may be adapted in a way to avoid making the issues that are considered confidential public



### Article 3.6 Flexible Degree programme

1. The Examination Board of the programme decides whether a student may take part in a flexible degree programme as stipulated in Section 7.3d of the WHW. The Examination Board assesses whether the programme is appropriate and consistent within the domain of the programme and whether the level is high enough in the light of the final attainment targets of the programme.
2. The flexible degree programme is put together and motivated by the student and must at least have the size, breadth and depth of a regular Master's programme.
3. The following conditions must at least have been met in order to be eligible for the Master's degree:
  - a. A deviation from the regular Master's programme of at least 30 EC with a coherent content
  - b. the level of the programme must match the objectives and exit qualifications that apply for the programme for which the student is enrolled

### Article 3.7 Double / combined programme

In some cases, a student can obtain diplomas for two Master's programmes on the basis of a combined course programme satisfying the requirements of each individual programme.

The following conditions for the composition of a combined programme are formulated.

1. The student's course programme can be described as the amalgamation of two (not necessarily) disjunctive course programmes satisfying the requirements of both programmes.
2. The two sub-course programmes referred to in 1. Have no more than 30 credits from courses in common outside of a possible combined final project. In case of a combined final project and combined internship of 20 EC, both programmes may not have more than 20 EC from course in common. This not only includes units of study included in both course programmes, but also courses for which an exemption was granted for one course programme on the basis of a result earned as part of the other course programme.
3. If a single final project is included in the intersection of both course programmes as referred to in 1, the study load of the assignment should be at least 100% of the requirement in EC for the final project of the course programme of the student plus at least 50% of the requirement in EC for the graduation project of the other course programme.
4. In individual cases the programme director may determine that not all conditions have to be met.
5. Approval for the combined course programme is needed from both Examination boards.

#### *Passing the final assessment for a combined programme*

Students who based in a course programme as described above sit a combined final assessment will successfully pass if the assessments included in the file would result in passing the final assessment of both programmes individually in accordance with the applicable regulations. The Examination Boards of the programmes involved must decide to allow a student to pass the final assessment. The programme management gives instructions on the date of a combined final colloquium.

## 4. Examinations

### Article 4.1 Signing up for courses and examinations

1. Every student must sign up in SIS for participation in a course. It is also mandatory to register beforehand for every interim examination opportunity.
2. By way of exception to the provisions of paragraph 1, any student who has correctly signed up for participation in the instruction/classes for a particular course and has been admitted

will also be signed up for the subsequent interim examination, unless the degree programme stipulates a different approach.

3. The student has the right to inspect recent model test questions or model tests, or old tests and their keys, along with the norm for assessment.
4. The assessment schedule must be published in Blackboard at least two weeks prior to the start of the study unit.
5. The assessment schedule must include:
  - a. The learning objectives;
  - b. When and how tests will be administered;
  - c. the relative weighting of the tests;
  - d. any required minimum grade per test
  - e. the resit for each test (if applicable), the form of the resit, when it will take place, and any conditions for participating in the resit;

#### Article 4.2 Type of examination

1. In the course catalogue the way is stipulated in which a unit of study is concluded and the form any examination will take.

At the student's request, the Examination Board may permit a different form of examination than that stipulated in the course catalogue.

The examiner can request the Examination Board to permit a different form of examination on the condition that all participants agree.

2. In the case of a unit of study that is no longer offered, in the academic year following its termination, at least one opportunity will be provided to sit the interim examination(s) or parts thereof and a transitional arrangement will be included in the programme-specific section for the subsequent period.

#### Article 4.3 Oral examinations

1. The examiner may conduct oral examinations involving more than one student at a time, unless one of the students involved objects to this.
2. Oral tests will be conducted in public, unless the Examination Board has determined otherwise in a particular case, possibly at the request of the examiner or the student.
3. If a third party wishes to be present during an oral test must submit this request to the Examination Board at least ten working days prior to the oral test. This does not apply for graduation colloquia.
4. If the Examination Board has determined that members of the Examination Board (or an observer representing the Examination Board) are to be present during the oral test, it will notify the examiner and the student at least one working day prior to the test.
5. For an oral test, there must be proof that the student was treated properly and that the assessment is reliable. This can be shown by, e.g., the presence of a second expert or a video recording of the sitting of the oral test. The assessment is documented by means a form that shows that the intended learning outcomes are met.

#### Article 4.4 Determining and announcing results

1. The result of a written exam or practical exercise is published via the SIS within 20 working days. The publication will be done by BOZ (Office of Educational Affairs).

- a. The examiner will determine the result of a written exam within 15 working days after the exam and notify BOZ of the result.
  - b. No rights can be derived from exam results that have been published via Blackboard or any other medium not being the SIS.
2. The result of an oral exam is made known to the student within one working day in the form of an authorized proof of result provided by the examiner.
3. If the result for a unit of study is based on the completion of one or more assignments, or on writing a paper or thesis, then the date of submission of the final assignment, paper or thesis will count as the exam date.
4. Should the examiner not be able to meet the term as described in paragraphs 1 and 2 due to extraordinary circumstances, he/she reports this with reasons to the Examination Board. The student is informed of the delay as soon as possible by the Examination Board, whereby the new term within which the result will be made known is also communicated. If the Examination Board is of the opinion that the examiner has not met his/her obligations, it may appoint another examiner to ascertain the result of the exam.
5. If a second exam is planned shortly after the first, the results of the first exam will be published at least ten working days prior to the second exam.

#### Article 4.5 Examination opportunities

1. There will be an opportunity at least twice a year to sit written or oral exams. Practical exercises can be completed at least once per year.

#### Article 4.6 Examination results

1. Marks are given on a scale from 1 to 10, with no decimal after the point.
2. EC will only be awarded for the unit of study if an interim examination has been completed with a grade of 6 or higher. No EC's will be awarded for components of units of study and/or individual tests.
3. If a student receives more than one authorized result for one and the same unit of study, the highest result will apply.

#### Article 4.7 Exemption

1. At the written request of the student, the Examination Board may exempt the student from taking one or more examination components, if the student:
  - a. has passed a course component of a university or higher professional education programme that is equivalent in both content and level; or
  - b. has demonstrated through his/her work and/or professional experience that he/she has sufficient knowledge and skills with regard to the relevant course component.
  - c. Students may be exempted from the obligation to participate in practical exercises if they can demonstrate that they expect to be placed in a moral dilemma as a result of the need to meet one of the requirements for this component. In such cases, the Examination Board decides whether the component can be carried out in another manner to be determined by the Board.
2. Exemptions may be granted with a maximum of 30 credits. The Examination Board can grant an exception in extraordinary cases.
3. Exemptions cannot be granted on the basis of results from a Bachelor's programme, the course in question should be substituted by another course.

#### Article 4.8 Validity period for results

1. The period of validity for an exam result that has been successfully completed is six years. .
2. Test results are only valid in the academic year in which they were obtained.
3. The Examination Board can extend this period in individual cases at the request of the student.

#### Article 4.9 Post-examination discussion and right of inspection

1. The student is entitled to a justification of the results of a test from the examiner, whereby the examiner substantiates the assessment that was given. If no collective discussion of the results is held, the student may submit a request for an individual discussion of the results to the examiner within ten working days of publication of the test results. The discussion must take place at the latest five weeks after the publication of the test results, in the presence of the examiner or an authorized replacement.
2. The student has the right to inspect his or her work for a period of two years after the assessment.

#### Article 4.10 Retention of examination results

1. The questions, elaborations and the assessed work of written tests will be retained for a period of two years.
2. The retention period of final assignments of the programme is seven years.

#### Article 4.11 Master's final examination

1. The Examination Board determines the result of the Master's final examination after it has established that the student has passed all the units of study belonging to the programme. The date recorded on the diploma, i.e. the examination date, is the date on which the student successfully completed the last remaining unit of study.
2. A diploma can only be awarded after the student has received formal approval for his study programme as described in the programme-specific section B.
3. If so desired, the student has the right to submit a substantiated request in writing to the Examination Board to postpone declaring the examination as 'successfully completed' and consequently postpone the presentation of the certificate as well. The student must indicate at least the duration of the postponement he desires in his request
4. If the student has requested postponement on the basis of paragraph 3, the examination date will be the date following postponement on which the Examination Board has decided to declare the student to have successfully completed the final examination.

#### Article 4.12 Diploma and transcript

1. The Examination Board grants a diploma as proof that the student has passed his/her final examination. The Executive Board sets the model for the diploma. The Examination Board adds a diploma supplement to the diploma providing information on the nature and content of the degree programme completed. The diploma supplement is drawn up in Dutch or English and complies with the European format.
2. The International Diploma Supplement will be appended to the certificate for the successfully completed final examination (WHW, Article 7.11, paragraph 4).
3. Individuals who have successfully completed more than one component of the programme and who cannot be awarded a diploma as stipulated in paragraph 1 will, on request, receive a

statement to be issued by the relevant Examination Board stating at least the components that have been successfully completed together with the units of study they involved, the number of EC obtained and the way in which the interim examinations were taken.

#### Article 4.13 Cum Laude

1. The Examination Board checks whether the student has fulfilled all requirements. If the *judicium Cum Laude* applies, then this will be mentioned on the diploma and its supplement.
2. In exceptional cases the Examination Board may positively deviate from the requirements to obtain *Cum Laude*.
3. The *judicium Cum Laude* can be mentioned on the Master's certificate on the following conditions:
  - a. The average grade for all parts of the Master's examination programme has to be at least a mark 8.0;
  - b. Those parts of the study programme that were granted exemption or that were not marked with a number are not considered for determination of the average grade.
  - c. Exemptions within the programme may be granted with a maximum of 15 EC
  - d. The Master's thesis (final project) is marked with at least 8.0
  - e. The study programme is completed within 30 months. In the case of a combined programme, the maximum period to be eligible for *Cum Laude* is proportional to the total study load, that is, the number of months does not exceed the total study load in EC's divided by four.

#### Article 4.14 Fraud and plagiarism

1. The provisions of the Regulations governing Fraud and Plagiarism in the Rules and Regulations of the Examination Board EWI apply in full.
2. Electronic detection software programs may be used to detect plagiarism in texts. In submitting a text, the student implicitly consents to the text being entered into the database of the detection program concerned.

## 5. Student counselling and study progress

#### Article 5.1 Administration of study progress and academic student counselling

1. The Dean is responsible for student counselling, which includes informing the student of study opportunities in or outside the programme.
2. Each student is appointed a study adviser
3. The study adviser counsels the student and offers advice on study-related matters, as well as personal problems that may affect his studies if the student so desires.
4. If a student wishes to exercise his right to specific counselling or special facilities, he is required to contact the study adviser. The study adviser will record any agreements made with the student, of which the student and the programme board can derive rights.
5. The following applies to the entitlement to special facilities:
  - a. demonstrable force majeure or personal circumstances;
  - b. if necessary and possible, dispensation for participation of exams or tests and/or the availability of special facilities with regards to examination. Such dispensation and additional testing opportunities can only be granted by the Examination Board.
6. Every student has a list of the results achieved put at his/her disposal in SIS. The student can request a certified study progress overview from the Student Services Desk if required.

## Article 5.2 Adaptations for students with a disability

1. A disability is a physical, sensory or other impairment that might limit the student's academic progress.
2. It is explored in consultation with the student and on the basis of an interview with the study adviser what adjustments as referred to in Article 2 of the Equal Treatment Act on the basis of a Handicap/Chronic Illness (WGB h/cz) are considered most effective for this student.
3. Adjustments are intended to remove specific obstructions when following the degree programme and/or sitting interim examinations. Where necessary, these may concern facilities pertaining to the accessibility of infrastructure (buildings, classrooms and teaching facilities) and study material, changes to examinations, alternative courses or a custom study plan. Realizing the attainment targets must be guaranteed when implementing changes.
4. On the basis of the interview described in paragraph 2, the student submits a written application for the facilities in consultation with the study adviser. The application is submitted to the Dean of the Faculty, preferably three months before the student is to participate in classes, exams and tests for which the facilities are required.
5. The application is supported by documents that can reasonably be requested to assess the application (such as a doctor's or psychologist's letter or, in case of dyslexia for example, a report by a testing bureau registered with BIF, NIB or NVO).
6. The Dean of the Faculty makes a decision, within twenty working days of receipt of the application or earlier if the urgency of the application necessitates it, on the validity of the application as described in paragraph 4, and informs the student and the study adviser of his decision.
7. The study adviser ensures that the relevant parties involved are informed in due time of the facilities granted to the student with a disability.
8. Should the Dean of the Faculty turn down the application in full or in part, the Dean will inform the student of the reason at the basis of this rejection and the possibilities for lodging an objection or an appeal. Objections must be submitted in writing within six weeks, of the decision being announced to the relevant party, at the Complaints Desk at Student Services.
9. Should extra facilities be granted, it will be stated for what term this grant will apply. The applicant and the study adviser will evaluate the facilities before the end of this term. During this evaluation, the parties will discuss the effectiveness of the facilities provided and whether they should be continued.
10. If additional time for a test is granted e.g. in case of dyslexia, an additional period of 15 minutes for every clock hour is allowed.

## 6. Amendments, transitional arrangements, appeals and objections.

### Article 6.1 Conflicts with the regulations

If other additional regulations and/or provisions pertaining to teaching and/or examinations conflict with these Education and Examination Regulations, the present Education and Examination Regulations take precedence.

### Article 6.2 Administrative errors

If, following the publication of an interim examination result, a list of marks, or an overview of a student's progress, an apparent error is discovered, the discoverer, be it the university or the student, is required to make this known to the other party immediately upon finding the error and to cooperate with rectification of the error.

#### Article 6.3 Amendments to the regulations

- 1) Substantive amendments to these Education and Examination Regulations are determined by the Dean in a separate decision.
- 2) In principle, substantive amendments to these Regulations do not apply to the current academic year. Substantive amendments to these Regulations may apply to the current academic year if the interests of the students are not prejudiced within reasonable bounds, or in situations of force majeure.
- 3) Amendments to these Regulations have no effect on earlier decisions of the Examination Board.
- 4) Transitional arrangements are made in accordance to Article 6.4.

#### Article 6.4 Transitional arrangement; examination opportunities

- 1) In the case of amendments to the Education and Examination Regulations, the Dean may decide on a transitional arrangement.
- 2) The transitional arrangement will be published in the programme-specific section B.
- 3) Points of departure for a transitional arrangement if a degree programme is changed:
  - a. Changes to a degree programme are published before the start of the academic year in which they are to apply.
  - b. No guarantee can be given that all the units of study of a degree programme, as they existed at the time of a student's enrolment in a programme, will continue to be part of his degree programme. The degree programme as most recently approved by the Dean serves as the basis for establishing the results of the Bachelor's examination.
- 4) The transitional arrangement will always include:
  - a. which lapsed units of study are equivalent to units of study or components thereof in the current degree programme included in the programme appendix; that if a unit of study without practical exercises is removed from the programme, there will be at least two opportunities in the subsequent academic year to take a written or oral exam or to obtain an assessment by some other means;
  - b. that if a unit of study that involves practical exercises is removed from the programme, and during the subsequent academic year no opportunities are offered to carry out these practical exercises, at least one unit of study is designated as a suitable replacement for the lapsed unit of study;
  - c. the term of validity of the transitional arrangement.
- 5) The transitional arrangement requires the approval of the Examination Board pursuant to the provisions of paragraph 4.
- 6) In exceptional cases, and if this is to the student's advantage, the Examination Board may allow a deviation from the number of times and the way in which interim examinations may be taken for a unit of study that is no longer included.

#### Article 6.5 Review of the education and examination regulations

- 1) The Dean is responsible for the regular review of the Education and Examination Regulations and takes into account the resultant study load for the students to enable this to be monitored and adjusted if necessary.
- 2) In accordance with Article 9.18 of the WHW, the Programme Committee is responsible for issuing advice on the Education and Examination Regulations as well as the annual assessment of the manner in which the Education and Examination Regulations are implemented.

#### Article 6.6 Appeal and objections

An appeal against a decision made by the Examination Board or an examiner, and objections to decisions made by the Dean on the basis of these Regulations, must be submitted in writing to the Complaints Desk at Student Services within six weeks after notification of the decision.

#### Article 6.7 Hardship clause

In the event of demonstrable, considerable unreasonableness and unfairness, the Examination Board can permit departures from the provisions of these Regulations.

#### Article 6.8 Publication

The Education and Examination Regulations and the Rules and Regulations of the Examination Board are published via the website of the programme in question.

#### Article 6.9 Commencement

These Regulations take effect on 1 September 2016 and supersede the Regulations of 1 September 2015.



## SECTION B: PROGRAMME-SPECIFIC SECTION 3TU EMBEDDED SYSTEMS

### 1. General provisions

#### Article 1.1 Definitions

In addition to definitions in Section A, Article 1.2, the following definitions are used in this Section B:

1. Programme mentor: a staff member, who is appointed by the examination board, to supervise students until they start their Master's thesis project.

### 2. Programme objectives and final attainment targets

#### Article 2.1 Aim of the programme

This Master's programme is intended to impart sufficient knowledge, skills and a clear understanding of the area of Embedded Systems in order that the graduate is able to perform independent professional and scientific activities in the area at an academic level.

#### Article 2.2 Final attainment targets

1. The graduate has an all-embracing view on embedded systems, their design and their application in systems of various sizes (e.g. from small robots to cyber physical and networked systems) including their evolution over time, demonstrated by an integration approach in system design.
2. He<sup>1</sup> is capable of analysing the functional behaviour of complex embedded systems in a structural way using appropriate abstractions.
3. He is able to describe and study the non-functional aspects of embedded systems, e.g. resource boundedness and dependability.
4. He has a thorough knowledge of state-of-the-art methods and techniques for embedded systems design such as requirements engineering, hardware-software integration, performance modelling and analysis, validation and testing.
5. He is able to design embedded systems that satisfy the functional and non-functional requirements, taking into account the performance of the system during its lifetime. He is also aware of costs and environmental issues making optimal use of the available resources.
6. He has the ability and attitude to include other disciplines or involve practitioners of these disciplines in his work, where necessary. As an engineer he is therefore able to work in a multidisciplinary setting.
7. He is able to conduct research and design independently and has a scientific approach to complex problems and ideas.
8. He possesses intellectual skills that enable him to reflect critically, reason and form opinions.
9. He has the ability to communicate the results of his learning, thinking and decision-making processes at an international level.
10. He is aware of the temporal and social context of science and technology (comprehension and analysis) and can integrate this context in his scientific work.

---

<sup>1</sup> "He", "his" or "him" is referring to graduates of either gender.

### 3. Further admission requirements

#### Article 3.1 Additional admission requirements

1. Students in possession of a Bachelor degree in Electrical Engineering (*Elektrotechniek*) or Computer Science (*Technische Informatica, Telematica* or *Informatica*) from a Dutch university are eligible for direct admission to the programme.
2. Students in possession of another Bachelor's degree issued by a Dutch university are eligible for admission to the programme if their knowledge and skills are comparable to subsection 1 after following a pre-master programme.
3. Students in possession of a Dutch Bachelor's degree issued by a School of professional education (Dutch: HBO, HTS) can gain admission after first successfully completing a pre-master programme.

#### Article 3.2 Pre-Master's programme

For students with an 'HBO degree' Elektrotechniek the pre-master programme is:

Course code	Name	Credits	Period
201500291	Calculus A	5	Semester 1
201500293	Calculus B	4	Semester 1
191512061	Linear Algebra A	3	Semester 1
191231490	Linear Systems	6	Semester 1
191512041	Calculus C	3	Semester 1
201400315	Digital Logic and Computer Organization	4	Semester 1
201500051	Self-tuition project (programming)	5	Quarter 1B

For students with an 'HBO degree' Technische Informatica, Computertechniek the pre-master programme is:

Course code	Name	Credits	Period
201500291	Calculus A	5	Semester 1
201500293	Calculus B	4	Semester 1
191512061	Linear Algebra A	3	Semester 1
191231490	Linear Systems	6	Semester 1
191512041	Calculus C	3	Semester 1
201400315	Digital Logic and Computer Organization	4	Semester 1
191210001	Instrumentation for Embedded Systems	5	Quarter 1B

## 4. Curriculum structure

### Article 4.1 Composition of programme

The 120 EC programme consists of the following components:

- a. compulsory units of study
- b. homologation
- c. electives
- d. internship (optional, not for students with Dutch institute of professional education (HBO))
- e. final project preparation and final project

### Article 4.2 Compulsory units of study

The compulsory courses are:

#### Year 1

Course code	Name	Credits	Period
192130240	Embedded Computer Architecture 1	5	Quarter 1A
192140122	System Validation	5	Quarter 1A
201200006	Quantitative Evaluation of Embedded Systems	5	Quarter 1B
192130200	Real-time Systems	5	Quarter 2A
201000168	Embedded Systems Laboratory	5	Quarter 2B

#### Year 2

Course code	Name	Credits	Period
201600017	Final Project Preparation	10	-
192199978	Final Project	30	-

### Article 4.3 Homologation

1. Students who have completed a Dutch university Bachelor's degree programme in computer science are required to include the following course in the homologation part of the master programme:

Course code	Name	Credits	Period
191210001	Instrumentation for Embedded Systems	5	Quarter 1B

Students may also follow a 15 EC TEM (Twente Educational Model) module, or a part of this module (if possible) of the bachelor Electrical Engineering. Approval by the examination board is required.

Missing knowledge can also be obtained with the course Self-tuition project (192191500)

2. Students who have completed a Dutch university Bachelor's degree programme in electrical engineering are required to include the following course in the homologation part of the master programme:

Course code	Name	Credits	Period
191210760	Advanced programming	5	Quarter 1B

Students may also follow a 15 EC TEM (Twente Educational Model) module, or a part of a module (if possible) of the bachelor Computer Science. Approval by the examination board is required.

Missing knowledge can also be obtained with the course Self-tuition project (192191500)

3. Students with a Bachelor's degree awarded by a Dutch institute of professional education (HBO) are required to include the following course in the homologation part of the master programme:

Course code	Name	Credits	Period
192130122	Energy Efficient Embedded Systems	5	Quarter 1B

Students may also follow a 15 EC TEM (Twente Educational Mode I) module, or a part of a module (if possible) of the bachelor Computer Science or Electrical Engineering. Approval by the examination board is required.

Missing knowledge can also be obtained with the course Self tuition project (192191500)

4. For admitted students not mentioned in paragraph 1, 2 and 3 an individual homologation programme is made by the examination board.

#### Article 4.4 Electives

Specialization courses totaling at least 15 credits should be selected. An Individual Study Programme containing courses that are not in the list, e.g. relevant courses from the TU-Delft and TU-Eindhoven, require approval from the examination board. See Article 5 for approval of the Individual Study Programme.

Course code	Name	Credits	Period
192135310	Modelling & Analysis of Concurrent Systems 1	5	Quarter 1A
191211590	System-on-chip-Design for Embedded Systems	5	Quarter 1A
201000075	Wireless Sensor Networks	5	Quarter 1A
191210780	Modern Communication Systems	5	Quarter 1A
192130092	Faulttolerant Digital Systems	5	Quarter 1A
191210750	System-on-chip-Design	10	Semester 1
192130112	Distributed Systems	5	Quarter 1B
191210760	Advanced programming	5	Quarter 1B
192130250	Embedded Computer Architectures 2	5	Quarter 1B
192130122	Energy Efficient Embedded Systems	5	Quarter 1B
191210900	Introduction to Biometrics	5	Quarter 1B
201000231	Computer Arithmetic	5	Quarter 2A

201000232	Knowledge-Based Control Systems	4	Quarter 2A
192130022	Design of Digital Systems	5	Quarter 2A
191210950	Implementation of Digital Signal Processing	5	Quarter 2A
191210910	Image Processing and Computer Vision	5	Quarter 2A
192111301	Ubiquitous Computing	5	Quarter 2A
192620010	Mobile and Wireless Networking 1	5	Quarter 2A
192170015	Testing Techniques	5	Quarter 2A
191211090	Real-time software Development	5	Quarter 2B
192130210	Real-Time Systems 2	5	Quarter 2B
192135320	Modeling & Analysis of Concurrent Systems 2	5	Quarter 2B
201100254	Advanced Computer Vision and Pattern Recognition	5	Quarter 2B
192620020	Mobile and Wireless Networking 2	5	Quarter 2B
191211060	Modern Robotics	5	Quarter 2B
191210840	A/D Converters	5	Quarter 2B

#### Article 4.5 Internship and Multi-Disciplinary Design Project

1. An internship may only be chosen by students whose prior education included 30 credits or less worth of work experience.
2. The students can complete an internship worth 20 credits, or a multi-disciplinary design project worth 10 credits, but not both, only after an agreement with the programme mentor.

#### Article 4.6 Thesis Project

1. A student will carry out the thesis project to the accountability of the chair ICD, SCS, CAES, DACS, PS, RaM or FMT.
2. The thesis project of 40 credits consists of a Final Project Preparation (201600017) and a Final project (192199978).
3. The Final Project Preparation consists of literature survey, feasibility study and detailed planning for the graduation project. The preparation has to be finished before the start of the graduation project.
4. The detailed graduation regulation of the thesis project is on Master's programme website.

### 5. Study Program

1. Students must draw up their individual study programme and submit this to the examination board for approval before the start of the third quarter of their first year.
2. The composition of the thesis committee and the thesis description have to be submitted to the examination board within a month of starting their final thesis project.
3. Each individual amendment to an approved study programme or an approved thesis committee must be resubmitted to the examination board for approval.

## 6. Degree

Students who have successfully completed their Master's final examination are awarded a Master of Science degree. The degree awarded is stated on the diploma.

## 7. Transitional and final provisions

Article 7.1 Transitional provisions

Notwithstanding the current Teaching and Examination Regulations, the following transitional provisions apply for students who started the programme under a previous set of Teaching and Examination Regulations:

- The individual project (191211749) year 2015-2016 is equivalent with the final project preparation (201600017)

Article 7.2 Publication

1. The dean will ensure the appropriate publication of these Regulations and any amendments to them.
2. The Teaching and Examination Regulations will be posted on the faculty website.

Article 7.3 Effective date

These Regulations enter into force with effect from 1 September 2016