Teaching and Examination Regulations

2013 - 2014

for the

Computer Science and Telematics

Master of Science programmes

University of Twente

(Section 7.13 of the Higher Education and Research Act)

The dean of the faculty authorizes,

in view of the Articles 9.5, 9.15, paragraph 1 under a, 7.13 paragraph 1 and 2, 9.38, under b, and 9.18, paragraph 1 under a, and 7.59 of the Higher Education and Research Act (WHW), and

in due consideration of the recommendations of the Board of Studies, as well as the approval by, or advice of, the Faculty Council.

Enschede, <mark>DATE</mark>

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DEFINITION OF TERMS

Terms taken from the Higher Education and Research Act maintain the meaning established in the Act.

In this Teaching and Examination Regulations, the following terms are understood to mean:

a. WHW: Higher Education and Research Act (*Wet op het Hoger onderwijs en Wetenschappelijk onderzoek*) in effect since 1 September 2002, including all applicable amendments;

b. dean: head of the faculty appointed by the Executive Board in accordance with Section 9.12, subsection 1, and Section 9.13, subsection 1, of the WHW;

c. faculty council: advisory board of the Faculty of EEMCS, the authorities of which are outlined in Sections 9.37, 9.38, 9.38a and 9.38b of the WHW;

d. programme committee: a committee instituted in accordance with Section 9.18 of the WHW which has an advisory role regarding matters of education in the programme;

e. Board of Examiners: the Board of Examiners of the programme established in accordance with Section 7.12 of the WHW;

f. study adviser: member of staff appointed or nominated by the dean to support students with all general study issues not directly related to their specific field of study;

g. graduation supervisor: chairholder of the chair chosen by the student to graduate from;

h. programme: referring to both the Master's programme in Computer Science as to the Master's programme in Telematics

i. course: unit of study, element of a Master's programme

j. course programme: set of courses to be completed for passing the Master's degree audit

k. programme mentor: individual appointed by the Board of Examiners to approve course programmes

l. credit: unit used to measure a student's study load; one credit is equal to 28 hours of study in accordance with Section 7.4, subsection 1, of the WHW;

m. Admissions Board. The Admissions Board is appointed by the Dean with the power to act in matters of admission to the programme

Paragraph 1 - Applicability and validity

Article 1 - Contravening the regulations

If the study guide and/or any other regulations relating to the study programme and/or the interim examination programme prove to contravene these Regulations and the accompanying appendices, precedence will be given to the provisions of these Regulations with which the appendices form an integral whole.

Article 2 - Amendments to the regulations

1.   Any amendments to these regulations will be made by special resolution of the Dean.

2.   No amendments will affect the current academic year unless it is reasonable to suppose that the interests of students will not be adversely affected.

3.   Amendments to these regulations may not retroactively affect a decision by the Board of Examiners to the detriment of the student.

Article 3 - Transitional arrangements

1.   If the composition of the study programme undergoes intrinsic changes or if these regulations are amended, the Dean will draw up transitional regulations that will be incorporated in the programme appendix of these Regulations.

2.   If and when appropriate, such transitional regulations are required to include:

a.   a provision concerning the exemptions that can be given on the basis of the interim examinations already passed;

b.   a provision specifying the validity of the transitional regulations.

If changes are made, a transitional arrangement is made for students further along in the programme, enabling them to complete their course programme of study in accordance with the rules. The transitional arrangements are in appendix B.

Article 4 - Publication of the regulations

The Teaching and Examination Regulations and the appendices, which form an integral whole with the Regulations, shall be published on the institution's website.

Article 5 - Appeal to decisions by the Board of Examiners

Decisions by the Board of Examiners based on these regulations may be appealed within four weeks after the announcement of the decision to the student in question. Appeals should be lodged with the Examination Appeals Board.

Article 6 - Appeal to decisions by the Dean

Decisions by the Dean based on these regulations may be appealed within six weeks after the announcement of the decision to the student in question. Objections are to be lodged with the Dean.

Article 7 - Entry into force

The date of commencement of these regulations is September 1st, 2013 and replaces the regulations of September 1st, 2012.

Paragraph 2 - General

Article 8 - Study load

The Master's degree audit for the Computer Science and Telematics programmes has a study load of 120 credits. These 120 credits must not include any credits which constituted part of a previously passed Bachelor's audit.

Article 9 - Organization of the programme

The programmes will be taught in full-time.

Article 10 - Language

1.   The language of the Master's programme is English. This applies both to teaching and to examination.

2.   The Examination Board can grant permission to conduct interim examination in another language. Permission can be granted only if it serves the quality of the assessment.

3.   The dean issues a regulation concerning the assessment of English language proficiency of staff members who teach courses in the programme, and of the support staff for the programme. All staff involved must meet the language requirements of the regulation. Courses to improve English proficiency of staff members are provided.

Paragraph 3 - Attainment targets

Article 11 - The general attainment targets of the programme:

1.   The degree programmes have the following general scientific attainment targets

   a.   Graduates have an extensive knowledge of and understand the issues relevant to their specific field of study (i.e. domain specific attainment targets) described in 11.2.

   b.   Graduates can contribute to scientific research, and independently design, conduct and present the results of small-scale research.

c. Graduates can provide an original contribution to the development and/or application of the field of study. 'Original' is understood to mean 'demonstrative of a creative contribution'.

d. Graduates can analyse complex problems (change problems) relevant to the field of study and obtain the required knowledge and information.

e. Graduates can design, validate and implement solutions/systems in their operational context; identify and apply relevant advanced knowledge, methods and techniques from their field of study.

f. Graduates can assess solutions/systems and their applications according to their properties and potential to solve problems even if they are new to or unfamiliar with the situation or lack information and/or reliable information; they can use their assessment as a basis for (substantiation of) decisions.

g. Graduates understand the ethical, social, cultural and public aspects of problems and solutions in their field of study; apply this insight in their international role as scholar.

h. Graduates can work as part of and play a leading role in a team; manage and plan a development process; document development and research processes.

i. Graduates can substantiate research results, designs and applications in writing and verbally; critically assess and participate in debates regarding the same.

j. Graduates can independently acquire new knowledge and skills; reflect on trends in their field of study, responsibilities and roles and use this insight as a guide for and integrate it into their own personal development.

k. Graduates can integrate information from other disciplines into their own work if necessary.

l. Graduates take a critical approach to reading, incorporating information presented in and participating in debates regarding international scientific literature relevant to their field of study.

Article 12 - The domain specific attainment targets

a. MSc Computer Science Specialization Computer Security

SEC 1: graduates have a profound understanding of security and privacy risks in ICT systems and are able to model and evaluate these risks.

SEC 2: graduates have a profound understanding and are capable of applying the formal methods and cryptographic foundations underlying security and privacy.

SEC 3: graduates have a profound understanding of and gained experience with methodologies for design of secure and privacy-preserving ICT systems.

SEC 4: graduates have gained insight into cross-disciplinary aspects of security and privacy such as law and business processes and are able to read and understand texts from those domains or communicate with domain experts from those domains over security and privacy issues.

SEC 5: graduates have profound knowledge about and gained first practical experience in methods and approaches for practical security evaluation of ICT systems such as penetration testing or risk management.

SEC 6: graduates have specialist knowledge and understanding of one or more sub-fields or aspects of the security and privacy discipline, e.g. Cybercrime or security in mobile systems.

SEC 7: graduates have practical experience conducting scientific research into security and privacy methods, contribute to such research, apply the results, follow the trends of this sub-field and contribute to its further development.

b. MSc Computer Science Specialization Information and Software Engineering

ISE 1: graduates have thorough knowledge of a distributed information system's life cycle (requirement analysis, architecture design, realization and maintenance).

ISE 2: graduates have thorough knowledge of workflow, groupware and e-business processes and the distribution of these across organizational units and physical locations.

ISE 3: graduates have thorough knowledge of the management of large volumes of internal information, including structured and sensor data, multimedia data or geographic information.

ISE 4: graduates are able to combine and configure basic software components of information systems, such as database management systems, transaction processing monitors, workflow management systems and middleware.

c. MSc Computer Science Specialization Methods and Tools Verification

MTV 1: graduates have a thorough knowledge of and understand the scope of formal methods as a scientific and design discipline.

MTV 2: graduates have a thorough knowledge of, understand and gain practical experience with the application of formal methods and tools in the development process of software, distributed and/or embedded systems.

MTV 3: graduates can apply formal methods and tools during system development on the basis of knowledge and insight, make an informed selection of these and contribute to their further development.

MTV 4: graduates have knowledge of and understand various aspects of theoretical computer science, including process algebra, proof systems and formal testing theory.

MTV 5: graduates have specialist knowledge and understanding of one or more sub-fields or aspects of the formal methods discipline, e.g. Process Algebra, Software Model Checking, Distributed Model Checking, Program Verification, Proof Systems, Testing, Quantitative Modelling and/or Analysis, Graph Transformations, Game Theory.

MTV 6: graduates have practical experience conducting scientific research into formal methods, contribute to such research, apply the results, follow the trends of this sub-field and contribute to its further development.

d. MSc Computer Science Specialization Wireless and Sensor Systems

WISE a: graduates have knowledge and understanding of flexible and efficient communication.

WISE b: graduates have knowledge and understanding of distributed wireless systems.

WISE c: graduates have knowledge and understanding of distributed data processing and reasoning.

WISE 1: graduates have the ability to demonstrate their comprehensive knowledge on principles of wireless and sensor systems

WISE 2: graduates have the ability to understand, analyze, and reason about system-wide aspects and interaction between the key principles of wireless and sensor systems

WISE 3: graduates have the ability to conduct scientific research in wireless and sensor systems and contributing to research in the field

WISE 4: graduates have the ability to apply their knowledge in system-wide context

e. Master of Science Telematics

M-TEL 1: graduates have thorough knowledge about and understanding of both wired and wireless communication devices, networks and systems, in terms of both key principles and contemporary technologies.

M-TEL 2: graduates can design and evaluate wired and wireless communication devices, networks and systems; in doing so, they can take into account both detailed aspects of the individual components, and system-wide aspects such as security and management.

M-TEL 3: graduates can quantitatively evaluate the performance of networked systems, and judge their formal correctness, using both analytical methods and computer tools.

M-TEL 4: graduates have practical experience conducting research and/or doing design work in a sub-field of networked systems, can follow trends in the field and contribute to its further development.

Paragraph 4 - Master's programme

Article 13 - Composition of the programme

1. The composition of the course programmes is as follows:
   a. Basic courses as described in article 15, these are the obligatory courses
   b. Advanced courses, as described in article 15, these are to be chosen from a restricted list
   c. Elective courses, as described in section article 15, these are freely chosen from other specializations
   d. Computer Ethics, 5 credits, course unit 191612680
   e. (Research) traineeship, not mandatory, as described in article 21
   f. Research topics, at least 10 credits, as described in article 21
   g. Final project, 30 credits, as described in article 21

2. Each student has an individual course programme which meets the programme requirements set in article 15, and also the general programme guidelines of 13.1

3. For the composition of the course programmes this teaching and examination regulation distinguishes between **the following** specializations, which are:

   a. Computer Security: a Computer Science (M-CSc) specialization in Computer Security. (The course programme is organized by the Kerckhoffs Institute, a cooperation of the University of Twente with the Technical University of Eindhoven and the Radboud University at Nijmegen)
   b. Information and Software Engineering : a Computer Science (M-CSc) specialization in information systems and software engineering.
   c. Methods and Tools for Verification (MTV) specialization: a Computer Science (M-CSc) specialization in methods and tools for verification.
   d. Wireless and Sensor systems (WiSe): a Computer Science (M-CSc) specialization on wireless and sensor systems. The programme is the Master part of the WiSe graduate school programme, that can be followed as a specialization (so independent from the graduate school).
   e. Telematics (M-TEL) Master: an independently accredited Master programme on Telematics.

4. In addition to the programme referred to in paragraph 1, students who will be admitted to the programme on the basis of a Bachelor's degree awarded by a Dutch institute of professional education (HBO) must also complete a pre-Master's programme. See the description in appendix A.

Article 14 - Academic and Organizational Skills

All students have to take the following course in their course programme:

191612680	Computer Ethics	5 ECTS	Mandatory

Moreover, the student may choose *0 to 10 ECTS* courses from the following list, or any other appropriate course that will help to further develop academic and organizational skills, in agreement with the programme mentor.

201000087	Entrepreneurial Finance	5 ECTS	Master Business Administration

201200009	Managing Change & Human Resources	5 ECTS	Master Business Administration
201000260	Advanced Science Communication	5 ECTS	Master Science Education and Communication
201200148	Study Tour	10 ECTS	If applicable

Article15 - Course programmes

1.   MSc Computer Science Specialization Computer Security

Basic courses:
192194100	-	Cryptography 1 (TU/e) (6 EC)
192195200	-	Security in organisations (RU) (6 EC)
192195100	-	Software security (RU) (6 EC)
192194200	-	Verification of security protocols (TU/e) (6 EC)
201100220	-	Security and Privacy in Mobile Systems (UT) (6 EC)
201000086	-	Network security for Kerckhoffs students (UT) (6 EC)

Advanced courses:
at least three of the following nine advanced courses:
191210901	-	Introduction to Biometrics (UT) (6EC)
192110941	-	Secure data management (UT) (6 EC)
192195400	-	Seminar (Privacy) (RU) (6 EC)
192194110	-	Cryptography 2 (TU/e) (6 EC)
192195300	-	Hardware and operating systems security (RU) (6 EC)
192195500	-	Law in cyberspace (RU) (6 EC)
201100140	-	Hacker's Hut (TU/e) (6 EC)
192194400	-	Seminar information security technology (TU/e) (6 EC)
201100221	-	Cyber-crime Science (UT) (6 EC)

Elective courses:
- a 20 EC traineeship
- other courses chosen from the courses offered by other specializations.
  to obtain the minimally required number of 120 credits

Mandatory (45 EC):
191612680	-	Computer Ethics (5 EC)
192199508	-	Research Topics (10 EC)
192199978	-	Final Project (30 EC)

A special way to fulfill the requirements of Computer Security specialization is by successfully completing the course programme on SaP in the EITICT Masterschool where the second year is done at University Twente. Details on the programme are found on: http://eitictlabs.masterschool.eu/programme/majors/sap/

For Computer security students the locations where the courses are offered are shown in the course name. UT is the University of Twente (at Enschede), TU/e is the Technical University of Eindhoven, and RU is the Radboud University (at Nijmegen).

2.   MSc Computer Science Specialization Information and Software Engineering

Basic courses:
192110902 - Advanced Database systems
192320820 - Design science methodology

and at least three of the following courses:
192320111 - Architecture of information systems
192340041 - Software Management
201200044 - Managing Big Data
192110940 - Secure Data management
192110961 - XML & Databases 1
192320501 - Electronic Commerce
192320850 - Advanced requirements engineering (start module)
192330301 - Specification of information systems
192652150 - Service-oriented architecture with web services
192111332 - Design of Software Architectures

Advanced courses:
at least 20 ECTS of the following courses:
201300074 - Research Experiments with Data and Information retrieval
192160400 - Information retrieval
192320220 - Advanced architecture of information systems
192320850 - Advanced requirements engineering (follow up modules)
192135450 - Advanced Design of Software Architectures - Model Driven
            Engineering
192135400 - Advanced Design of Software Architectures - Product Line Engineering

Elective courses:
  - a 20 EC traineeship
  - other courses chosen from the courses offered by other specializations.
    to obtain the minimally required number of 120 credits

Mandatory (45 EC):
191612680 - Computer Ethics (5 EC)
192199508 - Research Topics (10 EC)
192199978 - Final Project (30 EC)

3.   MSc Computer Science Specialization Methods and Tools Verification

Basic courses:
192111092 - Advanced Logic
192135310 - Modelling and Analysis of Concurrent Systems 1
192140122 - System Validation
192170015 - Testing Techniques
192135320 - Modelling and Analysis of Concurrent Systems 2
192114300 - Program Verification

Advanced courses:

at least three of the following courses:

192135450	-	Advanced Design of Software Architectures -Model Driven Engineering
192135400	-	Advanced Design of Software Architectures -Product Line Engineering
192111332	-	Design of Software Architectures
192130092	-	Fault Tolerant Digital Systems
191520751	-	Graph Theory
191560561	-	Introduction to Mathematical Systems Theory
201200006	-	Quantitative Evaluation of Embedded Systems
192620300	-	Performance Evaluation
191210341	-	Physical Systems Modelling of Embedded Systems
191580251	-	Mathematical Programming

And at least 10 EC from the following courses:

192114100	-	Principles of Model Checking
201300042	-	Limits to Computing
191581420	-	Optimization Modelling

Elective courses:
- a 20 EC traineeship
- other courses chosen from the courses offered by other specializations.
  to obtain the minimally required number of 120 credits

Mandatory (45 EC):

191612680	-	Computer Ethics (5 EC)
192199508	-	Research Topics (10 EC)
192199978	-	Final Project (30 EC)

4.   MSc Computer Science Specialization Wireless and Sensor Systems

Basic courses:

192620010	-	Mobile and Wireless Networking I (5 EC)
201000075	-	Wireless Sensor Networks (5 EC)
191211590	-	System-on-Chip for ES (5 EC)
192111301	-	Ubiquitous Computing (5 EC)

Advanced courses:
20 EC of the following:

192130112	-	Distributed Systems (5 EC)
191211030	-	Mobile Radio Communications (5 EC)
192620300	-	Performance Evaluation (5 EC)
192620020	-	Mobile and Wireless Networking II (5 EC)
201300116	-	Embedded Signal Processing (7 EC)
191211650	-	Multi Disciplinary Design Project (10 EC)
201100072	-	Introduction to Information Security (5 EC)

Elective courses:
- a 20 EC traineeship
- other courses chosen from the courses offered by other specializations in masterprogramme's of Computer Science, Electrical Engineering, Telematics and Embedded Systems.

to obtain the minimally required number of 120 credits

Mandatory (45 EC)
191612680   -   Computer Ethics (5 EC)
192199508   -   Research Topics (10 EC)
192199978   -   Final Project (30 EC)

5.   Master of Science Telematics

Basic courses:
192620010   -   Mobile and wireless networking 1
192620300   -   Performance evaluation
192652150   -   Service oriented architecture with web services
192654000   -   Network security

Advanced courses:
at least 1 of the following advanced courses on modelling and validation:

201200006   -   Quantitative Evaluation of Embedded Systems
192140122   -   System validation
192170015   -   Testing techniques

And at least 2 of the following advanced courses on networking technologies:
191211710   -   Core networks
192620020   -   Mobile and wireless networking 2
192620250   -   Selected topics in P2P systems
192653100   -   Internet management and measurement

And zero or more advanced courses chosen from the following list, such that
the advanced courses in total (i.e., including the ones chosen from the
above two lists) are at least 30 EC:

191210780   -   Modern Communication Systems
191211030   -   Mobile radio communications
192111301   -   Ubiquitous computing
192135450   -   Advanced Design of Software Architectures Model Driven Engineering
192140700   -   The numbers tell the tale (meten = weten)
201100140   -   Hacker's Hut (offered by TU/e)
192195200   -   Security in organisations (offered by RU)
192320111   -   Architecture of information services
192631000   -   Mobile e-health applications and services

Elective courses:
    -    a 20 EC traineeship
    -    other courses chosen from the courses offered by other specializations.
to obtain the minimally required number of 120 credits

Mandatory:
191612680   -   Computer Ethics (5 EC)
192199508   -   Research Topics (10 EC)
192199978   -   Final Project (30 EC)

Article 16 - Free Programme

1. Students can compile their own programme, with an associated degree audit. The programme requires prior approval by the Board of Examiners. The Board of Examiners draws up a regulation for approval of free programmes.

2. When applying to the Board of Examiners for the prior approval referred to in 16.1, students must provide details of their reasons for making this request.

Article 17 - Earning two diploma's with a single (extended) programme

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

The following conditions must be met to be eligible for a combined final assessment:

Composition of a combined programme:

1. The student's course programme can be described as the amalgation 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 in common outside of a possible combined final project. 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 17.1., the assignment must involve an exceptional study load, equaling at least 75% of the sum of the study loads of the final projects for each programme.

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.

Article 18 - Earning the diploma within graduate research programmes

There are some course programmes leading to the diploma that are embedded in a graduate research programme. More detailed information on these research programmes is found in Appendix C.
General information is found on: http://www.utwente.nl/tgs/

Paragraph 5 - Organizational issues

Article 19 - Course programme approval.

Approval procedures

The student must complete the following steps to obtain course programme approval:

1. <u>Contacting the programme mentor and laying down the course programme.</u>

   Students may complete courses and sit interim examinations up to a maximum of 15 credits in a specialization before contacting the programme mentor (*). At this point, permission from the programme mentor is required for complete programme of 120 credits. Criteria for approval of elective courses to be followed by the student are contained in the Rules and Regulations of the Board of Examiners. The programme is written down as an agreement on the content of the course programme, signed by both the student and the programme mentor. The programme mentor signs on behalf of the Examination Board.
   *) It is strongly recommended for students to contact the programme mentor immediately at the start of the master's study.

2. <u>Alterations and renewed approval of entire course programme</u>
   The course programme laid down in phase 2 can be altered during executing the master's programme, by laying down revised course programmes. This can be done until research topics and final project are started by the student. At that time the programme mentor should have approved the 120-credit course programme in its entirety. At this point it is clear which chair/chairs will bear responsibility for the student's graduation supervision.

3. The completed and signed form listing the course programme must be included in the student's file at S&O (the Student & Education service centre). In principle, the student will earn the programme diploma if he/she completes the units of study listed in the course programme and earns results in line with the guidelines for passing the final assessment.

4. If the course programme listed on a signed form does not satisfy the regulations described in this programme appendix and/or does not satisfy the conditions imposed by the admissions board, the Examination Board is authorised to impose additional diploma eligibility requirements.

5. Requirements apply to each course programme to ensure basic knowledge in the field of study and the track selected. The admissions board may adjust these programme requirements on the basis of the student's prior education and training. Such an adjustment will never entail an intensification of the requirements, the programme will always have a studyload of 120 credits. The Master's programme final assessment cannot be passed if the course programme does not satisfy the basic knowledge requirements. The only exception to this rule is when the admissions board lowers the basic knowledge requirements.

6. The total number of credits completed **at** the UT **or at another university or research institute approved by the study adviser, must be at least 90**. The Examination Board may permit a student to deviate from this rule.

   Forms to be found on:
   http://www.utwente.nl/csc/programmeinformation/rules_documents/

Article 20 - Approval of Free programme choice

The Board of Examiners shall decide on reasoned requests from students for free programme choice as referred to in Article 7.3c of the Act. Conditions related to this matter are to be specified in the Rules and Regulations of the Board of Examiners.

Article 21 - (Research) Traineeship, research topics, graduation work

Traineeship

1. All students **may** take a 20 EC traineeship in their course programme.

Organisational procedures are found on:
http://www.utwente.nl/csc/programmeinformation/traineeship.doc/
These procedures are considered part of this Regulation.

Research Topics

2. All students **must** take a 10 EC Research topics course in their course programme.

Organisational procedures are found on:
http://www.utwente.nl/csc/programmeinformation/final%20project/

These procedures are considered part of this Regulation.

Final Project

3. All students **must** carry out a Final Project under the graduation supervisor, a staff member from one of the responsible chairs of the specialization, with the following requirements:

a. Students complete the Final Project worth 30 credits.

b. The Final Project deals with carrying out a research project, delivering of a graduation report and a summary of the report, and finally an oral presentation in public. Generally the Research topics of section 21.2 above immediately precede the graduation work, and serve as a preparation for the Final Project.

c. Students may start the Final Project in principle only if they have completed all of the remaining components of the study programme, unless the graduation supervisor grants permission to deviate from this rule.

d. Faculty chairs take responsibility for supervision and assessment of the Final Project. Responsibility implies:

   - either the graduation committee contains a member of the chair

   - or the programme mentor has explicitly given permission for supervising the Final Project by a graduation committee containing no member of the chair

The responsibilities are as follows:

- Computer security:	DIES
- Information and software engineering:	ISSE or DB or FMT
- Methods and tools for verification:	FMT
- Wireless and sensor systems:	PS, CAES or DACS
- Telematics:	DACS

   The Final Project is written down as an agreement (by filling in the form "description final project"), signed by both the student and the supervisor. The supervisor signs on behalf of the Examination Board.

Organizational procedures are found on:
http://www.utwente.nl/csc/programmeinformation/final%20project/
These procedures are considered part of this Regulation.

Forms to be found on:
http://www.utwente.nl/csc/programmeinformation/rules_documents/
These forms are considered part of this Regulation.

Assessment and marking of the Final Project is written down in: Article 36

Article 22 - Organization of practicals
There are no specific regulations for the organisation of practicals.

Paragraph 6 - Courses

Article 23 - Assessment and marking

Tables 3 show how assessments for the courses are organised.

The 'Assessment method' columns use the following codes:
S   written interim examination
O   written assignment: detailed exercises, a report, an essay or other written document reviewed and assessed by the examiner, but not in the presence of the student
M   oral assessment: a meeting involving the student and the examiner or other individual, during which the student's knowledge is assessed
P   practical assignment: a functioning product prepared and submitted by the student to be assessed in terms of behaviour, operation and/or use (e.g. a simple programme or a larger, functioning prototype)
Pj   project: group activities as part of which the resulting group work and the student's participation are assessed
Pre   presentation: information presented by the student before an audience, usually other students

These codes are used to give a general indication of the assessment method of each course, not outline the exact rules governing the form of assessment.
The numbers in the Prerequisites column are explained at the end of the table.

Course	Study load	Assessment	Pre-requisites
191210001 Instrumentation for embedded systems	5	S	
191210341 Physical systems modelling of embedded systems	5	S	
191210441 Control engineering	5	S or O	

201300116 Embedded signal processing.	7	S, P, Pj	
191210780 Modern Communication Systems	5	O, Pre	1
191210900 Introduction to biometrics (UT)	5	O	
191211030 Mobile radio communication	5	O, Pre	
191211710 Core networks	5	S, O, Pre	
191511410 Algebra & Security	5	S	
191520751 Graph theory	5	S	
191560561 Introduction to mathematical system theory	5	S, P, O	
201100109 Signals and transformations	5	S	
191580752 Deterministic models in OR	5	S	
192130092 Fault tolerant Digital Systems	5	S	
201200044 Managing Big Data	5	O	
201000086 Network Security for Kerckhoffs students	6	S, O, P	
192110941 Secure Data Management	6	S, O	
201300074 Research Experiments with Data and Information retrieval	5		
192110902 Advanced database systems	5	S, P	
192110940 Secure data management	5	S, O	
192110961 XML & Databases 1	5	S, O	
192111092 Advanced logic	5	S, O	
192111233 Aspect oriented programming	5	O, P	
192111301 Ubiquitous computing	5	O, Pre	
192111332 Design of software architectures	5	S, O	
201300042 Limits to Computing	5	S	
192114100 Principles of model checking	5	S	
192114300 Program verification	5	S, O	
192130022 Design of digital systems	5	Pj	
192130112 Distributed systems	5	S	
192130122 Energy- efficient Embedded Systems	5	O, Pre	
192130200 Real-time systems 1	5	S	
192130210 Real-time systems 2	5	S, O	
192130240 Embedded computer architectures 1	5	S, Pj	

Course	Credits	Methods	
192130250 Embedded computer architectures 2	5	S	
192135310 Modelling and analysis of concurrent systems 1	5	O	
192135320 Modelling and analysis of concurrent systems 2	5	S, Pj	
192135400 Advanced Design of Software Architectures Product line engineering	5	S, O, Pre	
192135450 Advanced Design of Software Architectures Model driven engineering	5	S, O, Pre	
192140122 System validation	5	S, O	
192140700 The numbers tell the tale (meten = weten)	5	O	
192150201 Distributed Trust Management	6	S, O	
192160400 Information retrieval	10	S, O	
192170015 Testing techniques	5	S, P	
192194100 Cryptography 1 (TU/e)	6	S	
192194110 Cryptography 2 (TU/e)	6	S, O	
192194200 Verification of security protocols (TU/e)	6	O	
192194400 Seminar information security technology (TU/e)	6	O, Pre	
192195100 Software security (RU)	6		
192195200 Security in organisations (RU)	6		
201100022 Cyber-crime Science	5	S	
201100221 Cyber-crime Science	6	S	
201100023 Security and Privacy in Mobile Systems	5	S	
201100220 Security and Privacy in Mobile Systems	6	S	
192195300 Hardware and operating systems security (RU)	6		
192195400 Seminar (Privacy) (RU)	6	O, Pre	
192195500 Law in cyberspace (RU)	6		
192320111 Architecture of information systems	5	M or S	
192320220 Advanced architecture of information systems	10	O	
192320501 Electronic commerce	5	S, Pj	
192320820 Design science methodology	5	M or S	

192320850 Advanced requirements engineering	5	M or S	
192330301 Specification of information system	5	S, P	
192340041 Software management	5	M or S, O	
192620000 Telematics networks	5	S, P	
192620010 Mobile and wireless networking 1	5	S	
192620020 Mobile and wireless networking 2	5	S, Pre	
192620250 Selected topics in P2P systems	5	S, O, Pre	
192620300 Performance evaluation [1]	5	S, O	
192631000 Mobile e-health applications and services	5	Pj	
192652150 Service-oriented architecture with web services	5	S, O	
192653100 Internet management and measurement	5	O	
192654000 Network security	5	S, O, P	
192661001 Patterns of software development	5	O	

1. Students are eligible for this course only if they have taken two bachelor's courses: 1 Inleiding Telecommunicatie (191210091) and Inleiding Communicatiesystemen (191251530)

Paragraph 7 - Student support and monitoring

Article 24 - Student support and guidance
Responsibility for student support and guidance lies with the Dean. This includes informing students about study options within the programme or elsewhere. One or more study advisers may be appointed for this purpose.

Article 25 - Monitoring academic progress
1. The Dean is responsible for the registration and timely publication of the exam results of individual students in the institution's virtual learning system.

2. The Dean is responsible for facilitating discussion of the results between the student and the study adviser, when appropriate.

3. Each year, all students will receive at least one update in writing, outlining their study progress in the last period.

Paragraph 8 - Organizational aspects of examinations and audit

Article 26 - Number, times and frequency of interim examinations

1. There are at least two opportunities in each academic year for sitting interim examinations.

2. A timetable of all opportunities for sitting written interim examinations is drawn up on an annual basis and details are published before the start of the academic year.

3. Notwithstanding the provisions of 26.1, there will be at least one opportunity in a year to sit interim examinations relating to courses not taught in that academic year.

4. If a course is removed from the study programme, two opportunities to sit an interim examination in this course will be granted after the last classes in this course have been taught: an interim examination following the last of the classes, and one resit in the same academic year. In the following academic year there will be two subsequent resits.

5. In exceptional cases, the Board of Examiners may permit a deviation from the standard number of times and the way in which certain interim examinations may be administered.

Article 27 - The order of and the conditions for admission to courses, interim examinations and practicals.

To participate in a course it is mandatory for a student to register as a participant. Registration is possible in the periods published in the rosters. To sit (interim) examinations, registration is mandatory also. Periods for registration are published in the roster. Admission to courses and interim examinations can be denied to students who did not register. Additional conditions of admission to the courses and to interim examinations are in 21.3.c (for final project).

Article 28 - Transparency of interim examinations

For each interim examination, information should be available about the level, structure and grading of the examination, for instance by making available a model interim examination, an old interim examination, or a set of representative assignments.

Article 29 - The times and the frequency of the degree audit

There shall be an opportunity to undergo the Master's degree audit at least twice a year. The dates set by the Board of Examiners are to be published before the start of the academic year.

Article 30 - Validity of interim examinations

1. The result of an interim examination is valid for an unlimited period.

2. However, in cases where the interim examination result dates from over six years ago, the Board of Examiners may impose an additional or substitute interim examination.

Article 31 - Provisions for students with a handicap

Students with a physical or sensory handicap will be given the opportunity to sit interim examinations and complete practical exercises in a manner appropriate to their ability. This can be achieved by, for instance, adjusting the type or duration of the interim examinations or providing practical tools, tailored to the student's situation. Students wishing to invoke these regulations should contact their study adviser or, in cases of dyslexia, the Educational Affairs Office.

Article 32 - Oral interim 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. If the student or the examiner wants the presence of a third person during the oral examination, the Board of Examiners must be informed about it at least 10 days before the day of the oral examination.
3. If the Board of Examiners wants the presence of one of her member or an observer on behalf of her during the oral examination, the student and the examiner must be notified about it at least one day in advance of the oral examination**.**

Article 33 - Determining and announcing the results

1. The examiner is required to determine the result of an oral interim examination as soon as it is finished and to supply the student with a written statement of the result.

2. In the case of written interim examinations, the examiner is required to determine the result as soon as possible after the interim examination but within 15 working days at most. Taking due account of the student's right to privacy, the student administration then ensures that the results are registered and published within 20 working days of the interim examination date. If the examiner is unable to meet these criteria due to extenuating circumstances, the examiner must inform the Board of Examiners, stating reasons for the delay. The Board of Examiners will then pass this information on to the student or students without delay, and a new date for announcing exam results will simultaneously be made known.

3. Regarding any interim examinations that are not taken orally or in writing, the Board of Examiners will determine beforehand precisely how and within what period of time the student will be notified of the results.

4. When receiving the result of an interim examination, the student will be made aware of his or her right to inspect the results as referred to in Article 34, the opportunity for a subsequent discussion as referred to in Article 35 and the opportunity to lodge an appeal with the Examination Appeals Board.

Article 34 - The right to inspect the results

1. For a period of at least 20 working days after notification of the results of any written interim examination, the student has the right to inspect his or her marked work, on request. If a student intends to lodge an appeal regarding the marking of his or her written work, he or she will be supplied with a copy of the marked work at cost price.

2. During the period referred to in 34.1, all interested individuals may acquaint themselves with the questions and assignments set in the interim examination in question, as well as with the criteria used for marking.

3. The Board of Examiners may determine that the right to inspection as referred to in 34.1 and 34.2 will be exercised at a location specified beforehand and at no less than two specific times, also to be decided in advance.
   If the student can prove that he/she is or was unable to be present at the location at the set time due to circumstances beyond his or her control, then another opportunity will be provided, if possible within the period stated in 34.1.
   The location and times mentioned in the first sentence will be announced within five working days.

Article 35 - Subsequent discussion of interim examination results

1. As soon as possible after the results of an oral interim examination have been announced, an opportunity will be arranged for the examiner to discuss the results with

the student, if so requested by the student or at the instigation of the examiner. At this meeting, the reasons behind the marks awarded will be explained.

2. For a period of 20 working days after the results have been announced, students who have taken a written interim examination may submit a request to discuss the results with the relevant examiner. The discussion will take place within a reasonable time span and at a place and time determined by the examiner.

3. In cases where a collective discussion is organised by or on the instructions of the Board of Examiners, a student may only submit a request, as referred to in the preceding paragraph, if the student was present at the collective discussion and if the student provides a good reason for the request or if, due to circumstances beyond the student's control, the student was unable to attend the collective discussion.

4. The provisions of 35.3 are similarly applicable if either the Board of Examiners or the examiner first gives the student the opportunity to compare his/her answers with model answers.

5. The Board of Examiners may permit deviations from the provisions of paragraphs 35.2 and 35.3.

Article 36 - Exemption from interim examinations or practicals

1. After having been advised by the relevant examiner, the Board of Examiners may decide to exempt students from an interim examination or practical. Conditions for exemption are to be specified in the Rules and Regulations of the Board of Examiners.

2. The Board of Examiners may exempt a student from a specific interim examination only on the grounds of the content, level and quality of interim examinations successfully completed earlier or on the grounds of the student's prior knowledge, insights and skills developed outside of higher education.

3. Exemptions as referred to in 36.1 and 36.2 cannot be granted on the basis of results from the Bachelor's programme, the diploma of which made the student eligible for admission.

Article 37 - Assessment and marking of the Final Project

1. The student and supervisor agree on the starting date and on the finishing date.
2. The finishing date is determined taking into account the studyload for the student w.r.t. pending courses and examinations, and other activities.
3. The plan for executing the Final Project has to be approved and signed by both the s upervisor and the student.
4. The studyload according to the Final Project plan may not exceed the nominal studyload for the Final Project.
5. In case of illness of the student, the student has to report immediately to the supervisor in order to establish a new finishing date. The extension period will equal the period of illness.
6. In case of a re-examination for one of the pending courses, the student has to report immediately to the supervisor in order to establish a new finishing date. The extension period will equal the time needed for the new examination.
7. Immediately after the finishing date of the Final Project, the student receives the final grade. The final grade awarded will be 4 if the Final Project is not completed at the finishing date.
8. In case of an insufficient grade, the student has the opportunity to obtain a new assessment. The final grade is subject to a subtraction of one point.
9. In case the final grade of the Final Project is insufficient, even after a possible re-examination as mentioned in 37.8, the student has to carry out a new Final Project.

A. Admissions appendix to the Teaching and Examination Regulations of the Master's programmes Computer Science and Telematics

Enrolment as a student is required to sit interim examinations and to be eligible to earn the Master's diploma. In order to be enrolled, students must demonstrate that they have been admitted to one of the Master's programmes.

Article A.1 - Admission to the programme

1. The admissions appendix forms an integral part of these regulations. The regulations in this appendix are part of the teaching and examination regulations of the Master's programmes Computer Science and Telematics of the Faculty of Electrical Engineering, Mathematics and   Computer Science of the University of Twente.
2. Students in possession of a diploma which shows that they have passed the final examination for the Technische Informatica (TU/e, TUD, UT), Telematica (UT), Bedrijfsinformatietechnologie (UT) or Informatica (RUG, UU, UvA, VU, UL, RU, OU) Bachelor's programme will be eligible for admission to the programmes.
   In addition, students in possession of a diploma which shows that they have passed the final examination for the Elektrotechniek (TU/e, TUD, UT) Bachelor's programme are eligible for admission to the Telematics programme.
3. Students who are not in possession of the diploma mentioned in paragraph 1 will require a certificate of admission issued by the Admissions Board. The Admissions Board is appointed   by the Dean with the power to act in matters of admission to the programme. Admission involves an assessment of the student's eligibility for the Master's programme of his/her choice. If the admissions board positively assesses an application for admission, it issues a certificate of admission. Students with a certificate of admission are eligible for enrolment by the Central Student Administration. Enrolment will only take place if the other admission requirements maintained by the UT have also been satisfied
4. Notwithstanding the provisions of paragraph 1, the Dean may under special circumstances admit a student to one or more interim examinations and/or practicals of the programme before the student has passed the Bachelor's examination. A limited period of validity may be set for such permission.
5. Admission of foreign students:
   a. The student must submit a proof of sufficient command of English.
      Only the following three tests are accepted: IELTS, TOEFL internet based, and CPE. Scores required for admission are:
      IELTS: 6.5 or more;
      TOEFL internet based: 90 or more;
      CPE: C or higher;
   Exemption will be given by the examination board if the applicant provides a proof that his or hers previous education on secondary school and bachelor was conducted in English.
   b. The level of education in the country in which the student has completed his/her pre-university education: this must be more or less comparable with that in the Netherlands.

c.   Level of knowledge: the student must have accumulated sufficient knowledge on the basis of the courses he/she has studied abroad to be at a level comparable to that of Dutch students who are admitted to the Master's programme.

Article A.2 - Admission to the programme pursuant to a regulation
The Dean has adopted the following provisions for certain students to be eligible for admission. (next to the ones mentioned in Art. A.1.2):

In addition to these provisions from the Teaching and Examination Regulation
1.   Applicants who satisfy the following three requirements are eligible for admission to the CS Master's programme.
     a.   The applicant is holder of a diploma from Saxion Hogeschool Enschede or Hogeschool Windesheim Zwolle) demonstrating that he or she has satisfied the requirements of the final assessment of the Computer Science (Informatica) Bachelor's programme or the Technical Computer Science (Technische informatica) Bachelor's programme
     b.   The applicant has successfully completed the DOORSTROOMMINOR as part of his or her bachelor's course programme
     c.   The applicant, according to UT records, has sat the interim examination of either the course 214025 ADC plus or the course 214020 ADC while completing the Advanced Algorithms elective module and received a mark of 6, 7, 8, 9 or 10 or, if no mark is awarded, 'pass' ('G' in Dutch)
2.   Applicants who satisfy the following requirements are eligible for admission to the CSc Master's programme.
     a.   The applicant is holder of a diploma from the University of Twente demonstrating that he or she has satisfied the requirements of the final assessment of the Advanced Technology Bachelor's programme.
     b.   The applicant has successfully completed the following courses as part of his or her bachelor's course programme
     192135000 - Programmeren 1
     192135050 - Programmeren 2
     192110741 - Gegevensbanken
     192140250 - Algoritmen, Datastructuren en Complexiteit plus
     192110452 - Besturingssystemen
3.   Applicants who satisfy the following requirements are eligible for admission to the TEL Master's programme.
     a.   The applicant is holder of a diploma from the University of Twente demonstrating that he or she has satisfied the requirements of the final assessment of the Advanced Technology Bachelor's programme.
     b.   The applicant has successfully completed the following courses as part of his or her bachelor's course programme
     192135000 - Programmeren 1
     192135050 - Programmeren 2
     192630000 - Telematicadiensten
     192610000 - Telematicasystemen en toepassingen
     192140250 - Algoritmen, Datastructuren en Complexiteit plus
4.   Applicants who satisfy the following requirements are eligible for admission to the Wireless and Sensor Systems specialisation of the CSc Master's programme.
     a.   The applicant is holder of a diploma from the University of Twente demonstrating that he or she has satisfied the requirements of the final assessment of the Creative Technology Bachelor's programme.

     b.   The applicant has successfully completed the following courses as part of his or her bachelor's course programme

<pre>
        192131102 -   Computer Organisation
        192110542 -   Computer Systems
        192110452 -   Operating Systems
</pre>

Article A.3 - Admission to the Master's programmes after individual assessment

In all other instances than those mentioned in Art. A.1 and A.2., the admissions board conducts a detailed assessment of the applicant's eligibility for admission. This assessment takes the following factors into account:

a.   the highest diploma earned by the applicant: This must be at least a Bachelor's diploma from a recognised higher education institution. If such a diploma cannot be produced, the admissions board will ask for a statement attesting to the equivalency of the applicant's qualifications with the Bachelor's diploma required. The body issuing this statement must be authorised to do so.

b.   the nature of the degree course and the content of the course programme completed by the applicant, the speed with which the course programme was completed and the marks earned: The nature of the degree course, content of the course programme and marks earned for the individual units of study must clearly demonstrate that the applicant has the fundamental academic skills and appropriate basic knowledge for the Master's programme or is able to compensate for any gaps in basic knowledge.

c.   the student's motivation for applying for admission

d.   the applicant's command of English: This only applies to international students. The threshold values for sufficient command of English are in Article A.1.5.

Article A.4 - Variations in admission decisions

1.   <u>Issuing an unconditional certificate of admission</u>
The admissions board may decide to admit applicants to the Master's programme after assessing their file. These applicants will be issued a (unconditional) certificate of admission.

2.   <u>Issuing a conditional certificate of admission</u>
The admissions board may not reach a final decision about admission, because it finds insufficient or formally incorrect evidence of the applicant's status in the application file. In such a case the board can decide to admit the applicant conditionally. The student can enrol at the UT on the condition he or she submits the evidence lacking in the original application file to the satisfaction of the admissions board. (A typical case of conditional admission is when the applicant's file shows no formal proof of sufficient proficiency in English.)

3.   <u>Issuing a certificate of pre-Master admission</u>
In some cases, the admissions board will issue applicants a certificate of pre-Master admission. While these individuals may enrol at the UT, they are not entitled to sit interim examinations or to have the final assessment conducted.
Pre-Master admission is associated with a pre-Master's programme, i.e. a list of units of study, the attainment targets and learning objectives of which are at the undergraduate level. Selecting this list of units is done as follows:

-       checking the previous (BSc) programme on the presence of courses in programming, software engineering, computer architecture/organization, operating systems, information systems, databases and mathematics

-       The pre-master's programme contains in all cases a course on algorithms (5 EC) and a course in mathematics (5EC). There will be an individual part of two or three courses (of 5 EC) added on the aspects mentioned in previous item above that are lacking in the BSc programme with taking into account the specialization the student wants to choose in the master's programme.

Students in this category must first successfully complete this pre-Master's programme to be fully admitted to the Master's programme and become fully enrolled students with all the associated rights. Certificates of pre-Master admission are valid for a limited term (generally one year). Students who are not fully admitted during this term must re-apply for admission.

4.   Issuing a certificate of admission with additional requirements

The admissions board may attach additional requirements to a certificate of admission (also to conditional and pre-Master admissions). These additional requirements do not impact the right to enrol, sit interim examinations or have the final assessment conducted. They do, however, impact the regulations governing successful conclusion of the Master's programme final assessment. With this admission decision, the admissions board establishes additional requirements for the course programme to satisfy in order to successfully pass the Master's programme final assessment. Naturally, the additional requirements will be limited to the extent that the student will still be able to complete the programme with a study load of 120 credits. The additional requirements placed on the course programme are referred to as "homologation".

5.   Issuing a certificate of admission with a requirements waiver

Article 13.3 of the Teaching and Examination Regulation stipulates that the Examination Board may not honour requests for exemptions based on results earned as part of a Bachelor's programme. However, the Examination Board may waive a requirement placed on the course programme in recognition of the results earned as part of a Bachelor's programme and, consequently, permit the student to successfully pass the Master's programme final assessment with a course programme that does not satisfy all the formal requirements. Students who wish to have a waiver for requirements placed on the course programme based on their undergraduate education should submit a request to the admissions board. The admissions board will render a decision on the request on behalf of the Examination Board. If granted, it will issue a certificate of admission with a waiver for requirements, thereby granting the student the right to have the Master's programme final assessment conducted without meeting all the formal requirements. Such a waiver will never affect the Master's programme study load. A study load requirement of less than 120 credits is not permitted.

B. Transitional Arrangements appendix to the Teaching and Examination Regulations of the Master's programmes Computer Science and Telematics

Article B.1 - Transitional arrangements

1. The transitional arrangements appendix forms an integral part of these regulations. The regulations in this appendix are part of the teaching and examination regulations of the Master's programmes Computer Science and Telematics of the Faculty of Electrical Engineering, Mathematics and Computer Science of the University of Twente.

2. Regulation 2013-2014 regarding Software Engineering specialization
Occasion: This regulation is necessary because the specialization Software Engineering is discontinued starting from September 1, 2013.
Term of validity: until September 1, 2017.
Contents of the regulation Students who have their course programme approved before September 2013 can still finish this specialization.
MSc Computer Science Specialization Software Engineering

basic course:
192340041 -   Software management

at least 25 ECTS of the following basic subjects:
191520751 -   Graph theory
191580752 -   Deterministic models in OR
192111092 -   Advanced logic
192111233 -   Aspect oriented programming
192111332 -   Design of software architectures
192140122 -   System Validation
192170015 -   Testing Techniques
192320820 -   Design science methodology
192330301 -   Specification of information systems

at least 20 ECTS of the following advanced courses:
192110280 -   Advanced programming concepts
192135310 -   Modelling and analysis of concurrent systems 1
192135320 -   Modelling and analysis of concurrent systems 2
192135400 -   Advanced Design of Software Architectures - Product Line Engineering
192135450 -   Advanced Design of Software Architectures - Model Driven
                   Engineering
192320850 -   Advanced requirements engineering

elective courses:
Other courses to obtain the minimally required number of 120 credits may be chosen from the courses offered by other specializations.

mandatory (45 EC):
191612680 -   Computer Ethics (5 EC)
192199508 -   Research Topics (10 EC)
192199978 -   Final Project (30 EC)

Attainment targets for this specialization

Apart from the general attainment targets for the CS Master, SE graduates demonstrate their specialist knowledge as follows:

SE-1: graduates have a thorough knowledge of and understand the different phased of the software lifecycle (ranging from requirements engineering over architectural and detailed design to construction and quality assurance) as a scientific and design discipline.

SE-2: graduates have a thorough knowledge of, understand and gain practical experience with the application of software engineering methods and tools in the development large scale systems.

SE-3: graduates know the trade-offs between alternatives software engineering techniques and can make educated decisions throughout the software lifecycle.

SE-4: graduates have knowledge of and understand various aspects of Software Engineering including a mathematical background, software management, quality assurance, requirements engineering, architectural design, detailed design, software construction and programming languages.

SE-5: graduates have specialist knowledge and understanding of one or more sub-fields or aspects of the software engineering discipline, e.g. Programming Languages, Software Composition, Service-Oriented Architectures, Model-Driven Engineering, Model Checking.

SE-6: graduates have practical experience conducting scientific research into software engineering methods, contribute to such research, apply the results, follow the trends of this sub-field and contribute to its further development.

3.   Regulation 2010-2011 regarding Embedded Computing Systems specialization
Occasion: This regulation is necessary because the specialization Embedded Computing Systems is discontinued starting from September 1, 2010.
Term of validity: until September 1, 2014.
Contents of the regulation Students who have their course programme approved before September 2010 can still finish this specialization:
MSc Computer Science Specialization Embedded Computing Systems

3 basic courses:

191210001	-	Instrumentation for embedded systems
192130022	-	Design of digital systems
192130112	-	Distributed systems

at least 3 of the following 10 basic courses:

191210341	-	Physical systems modelling of embedded systems
191520751	-	Graph Theory
191560561	-	Introduction to mathematical system theory
201100109	-	Signals and transformations or Signalen en systemen (191561800)
192111301	-	Ubiquitous computing
192130122	-	Energy-efficient Embedded Systems
192140122	-	System Validation
192170015	-	Testing Techniques

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192620000      -          Telematics networks
192620300      -          Performance evaluation
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at least 20 ECTS of the following advanced courses:
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191210441      -          Control Engineering
191210590      -          Embedded signal processing
192111332      -          Design of software architectures
192130092      -          Faulttolerant digital systems
192130200/30210 -   Real-time systems 1/2
192130240/30250 -   Embedded computer architectures 1/2
192135310/35320 -   Modelling and analysis of concurrent systems 1/2
192620010 /20020 -  Mobile & Wireless Networking 1/2
192111233      -          Aspect oriented programming
191210940      -          Advanced Digital signal Processing
191210770      -          Digital control engineering
191211320      -          Testable Design and Test of Integrated systems
and
192199968                 traineeship (except for HBO students who have to choose at least 20
                          ECTS more from courses listed above)
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elective courses:
Other courses to obtain the minimally required number of 120 credits may be chosen from
the courses offered by other specializations.

mandatory (45 EC):
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191612680 -               Computer Ethics (5 EC)
192199508 -               Research Topics (10 EC)
192199978 -               Final Project (30 EC)
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4.   Regulation 2010-2011 regarding Computer Ethics
        Occasion: This regulation is necessary because Computer Ethics (191612680, 5 EC)
        is a mandatory item in the course programmes of all M-CSc and TEL students,
        starting 1 September 2010.
        Term of validity: until September 1, 2014.
        Contents of the regulation: Students who have their course programme approved
        before 1 September 2010 can take the degree without Computer Ethics as a unit in
        their programme. Programmes submitted for approval after 1 September 2010, must
        contain Computer Ethics (191612680, 5 EC) as a unit.

5.   Regulation 2011-2012 regarding MTV
        The requirements w.r.t. the programme of the specialization MTV are changed per 1
        September 2012. Students who have their course programme approved before 1
        September 2012 can take the degree based on that approved programme.

6.   Regulation 2011-2012 regarding DECS
        The requirements w.r.t. the programme of the specialization DECS are changed per
        1 September 2012. Students who have their course programme approved before 1
        September 2012 can take the degree based on that approved programme.

7.   Regulation 2013-2014 regarding the course192111700 Computability and
        Computational Complexity
        The course192111700 Computability and Computational Complexity will not be
        offered in 2013-2014. Students who have their course programme approved
        containing the course 192111700 Computability and Computational Complexity will
        have to replace this course by 201300042 Limits to Computing.

8.   Regulation 2013-2014 regarding the course 192110860 XML & Databases 2
        The course 192110860 XML & Databases 2 will not be offered in 2013-2014.
        Students who have their course programme approved containing the
        course192110860 XML & Databases 2 will have to replace this course by 201300074
        Research Experiments with Data and Information retrieval.

9.   Regulation 2013-2014 regarding programme changes
        Occasion: This regulation is necessary because of several small changes (shifting of
        courses, changes in EC) in some specialization programmes.
        Term of validity: until September 1, 2016.
        Contents of the regulation: Students who have their course programme approved
        before 1 September 2013 and whose course programme is affected by changes
        should contact their programme mentor for an appropriate solution.

10.   Finally, the Dean draws up regulations (transitional arrangements) governing the
        admission of students to one of the Master's programmes who, prior to
        1 September 2003, were enrolled in the single cycle *ingenieur* programme on which
        the Master's programme is based. These transitional arrangements are outlined in the
        course guide for single cycle academic programmes. (A single cycle *ingenieur*
        programme is a four or five year course in engineering, with a diploma at Master's
        level, in which a Bachelor's programme is included, but without a separate Bachelor's
        diploma.)

C. Graduate research programme appendix to the Teaching and Examination Regulations of the Master's programmes Computer Science and Telematics

Article C.1 - graduate research programmes

The graduate research programme appendix forms an integral part of these regulations. The regulations in this appendix are part of the teaching and examination regulations of the Master's programmes Computer Science and Telematics of the Faculty of Electrical Engineering, Mathematics and Computer Science of the University of Twente.

Article C.2. graduate research programmes intermediate leading to the diploma

The following course programmes embedded a graduate research programmes are leading to the diploma:

1. Graduate School Programme Dependable and Secure Computing

Basic courses:

192130092	-	Faulttolerant Digital Systems
192140122	-	System Validation
192194200	-	Verification of Security Protocols (TU/e, 6EC)
192111332	-	Design of Software Architectures
191210341	-	Physical Systems Modelling of Embedded Systems

Advanced courses depending on choice of specialization :

Track Dependability Modeling and Evaluation (DME):

192135310	-	Modeling and Analysis of Concurrent Systems 1
192135320	-	Modeling and Analysis of Concurrent Systems 2
192135450	-	Advanced Design of Software Architectures Model Driven Engineering
191580752	-	Deterministic Models of OR
201200006	-	Quantitative Evaluation of Embedded Systems

or
Track Secure Networks (SN):

192654000	-	Network Security
192110940	-	Secure Data Management
192620010	-	Mobile and Wireless Networking 1
192194100	-	Cryptography 1 (TU/e) (6EC)
201100022	-	Cyber-crime Science
192130300	-	Performance Evaluation

or
Track Dependable Software Synthesis (DSS):

192661001	-	Patterns of Software Development
192111233	-	Aspect Oriented Programming
192170015	-	Testing Techniques

192135450	-	Advanced Design of Software Architectures Model Driven Engineering
192114300	-	Program Verification
192135310	-	Modeling and Analysis of Concurrent Systems 1

Elective courses:
These consist of:
- courses in the other tracks of "Dependable and Secure Computing"
- courses from the following list
- other courses in consultation with the programme mentor

listed courses:
192111092	-	Advanced Logic (FMT)
192110280	-	Advanced Programming Concepts (SE)
192111700	-	Computability and Computational complexity (HMI)
191210441	-	Control Engineering
192130112	-	Distributed systems (PS)
191520751	-	Graph Theory (DMMP)
192653100	-	Internet Management and Measurement (DACS)
191210900	-	Introduction to Biometrics (SAS)
191560561	-	Introduction to Mathematical Systems Theory (MSCT)
192140700	-	The Numbers tell the Tale
192620020	-	Mobile and Wireless Networking 2 (DACS)
191211090	-	Real-Time Software Development (EL)
192620000	-	Telematics Networks (DACS)
191211080	-	Systems Engineering (EL)

Mandatory (50 EC):

- 191612680 Computer Ethics
- International Research Orientation/Internship (15 EC)
- Master Thesis (including Research Proposal) (30 EC)

2.   Graduate School Programme Service Sciences

Basic courses:
192320111	-	Architecture of Information Systems
192110902	-	Advanced Database Systems
192320501	-	Electronic Commerce
192111332	-	Design of Software Architecture

Advanced courses:
four courses in Track A: Services technologies:
192652150	-	Service-Oriented Architecture with Web Services
192110982	-	Database Transactions and Processes
192330301	-	Specification of Information Systems
192135450	-	Advanced Design of Software Architectures - Model Driven Engineering
192110961	-	XML & Databases 1

five courses in Track B: Services in business:
192376500	-	Business Process Integration Lab
201100051	-	Information Services
194108040	-	Business Development in Networks

| 192320201 | - | Data Warehousing & Data Mining |
| 192320820 | - | Design Science Methodology |

Elective courses:
a. Compulsory courses from the other tracks.
b. Courses from the following list:

192320220	-	Advanced Architecture of Information Systems
192320850	-	Advanced Requirements Engineering
192376000	-	Business Case Development for IT-projects
192340070	-	Computer Supported Cooperative Work
192404600	-	E-Government: communication and organization
192350200	-	E-Strategizing
192360021	-	ICT Management
192340101	-	Implementation of IT in Organizations
194105070	-	Information Systems for the Financial Services Industry
193163010	-	Information and Knowledge Management
191863970	-	Information Systems Design Methodologies

193190000	-	Managing Service Organizations
192631000	-	Mobile E-health Applications and Services
191852640	-	Production & Logistics Information Systems
201100022	-	Cyber-crime Science
192330301	-	Specification of Information Systems
195810200	-	Supply Chain Management & ICT
192140122	-	System Validation
192110961	-	XML & Databases 1

Mandatory (55 EC):
- Individual specialization assignment for Track A or B (5 EC)
- 191612680 Computer Ethics (5 EC)
- 201100203   Research Orientation (15 EC)
- Master thesis (including research proposal) (30 EC)

3. Graduate School Programme Wireless and Sensor Systems

Homologation courses for bachelor TI (10 EC):
| 191210001 | - | Instrumentation for Embedded Systems (5 EC) |
| 191561800 | - | Signals and Systems (5 EC) |

Homologation courses for bachelor EE (10 EC):
| 192135050 | - | Programming 2 (5 EC) |
| 192110452 | - | Operating Systems (5 EC) |

Homologation courses for bachelor CT (10 EC):
192131102	-	Computer Organisation (3 EC)
192110542	-	Computer Systems (5 EC)
192110452	-	Operating Systems (5 EC)

And at least three of the following Basic courses:
192620010   -   Mobile and Wireless Networking I (5 EC)
201000075   -   Wireless Sensor Networks (5 EC)
191211590   -   System-on-Chip for ES (5 EC)
192111301   -   Ubiquitous Computing (5 EC)

Advanced courses:
192130112   -   Distributed Systems (5 EC)
191211030   -   Mobile Radio Communications (5 EC)
192620300   -   Performance Evaluation (5 EC)
192620020   -   Mobile and Wireless Networking II (5 EC)
201300116   -   Embedded Signal Processing (7 EC)
192110880   -   Sensor Data Management (5 EC)
191211650   -   MDDP (10 EC)
201100072   -   Introduction to Information Security (5 EC)

and:
Other courses to obtain the minimally required number of 120 credits may be chosen from
the courses offered by other specializations in masterprogramme's of Computer Science,
Electrical Engineering, Telematics and Embedded Systems.

Mandatory (65 EC):
191211749   -   Individual Project (10 EC)
191612680   -   Computer Ethics (5 EC)
191211208   -   International research orientation or internship (20 EC)
                        (not for HBO   students)
192199978   -   Final Project (30 EC)

4.   Graduate School Programme Human-centered interaction technologies, based on: 2. MSc Computer Science Specialization Information and Software Engineering

A special way to fulfill the requirements of HCID specialization is by successfully completing
the course programme on HCID in the EITICT Masterschool where the second year is done
at University Twente. Details on the programme are found on:
http://eitictlabs.masterschool.eu/programme/majors/hcid/