Examination Regulations for the Computer Science, Applied Computer Science and Socio-Informatics Master Programs and European Master in Software Engineering at the Technical University of Kaiserslautern

From 9 September 2009, last amended on 29 July 2016 (merged version)

In accordance with §7 Section 2, No. 2 and Section 3, Clause 1and §86 Section 2, No. 3 of the University Act as amended on 19 November 2010 (GVBl. P.463), BS 223-41 the Computer Science Department of Kaiserslautern University (TU Kaiserslautern) concluded in the faculty council meeting of 25 November 2009 the following combined examination regulations for the Computer Science and Applied Computer Science master's degree programs and European Master in Software Engineering. On 3 July 2013 the last amendment was concluded. Together with the amendment made on 2 July 2013 the department council included the degree course "Socio-Informatics" in the regulations. This amendment was approved by the President of the TU Kaiserslautern in writing on 15 July 2016.

The following is a translation of the regulations to help non-German speakers, however the German version is legally binding.*

§1 Scope of Regulations, Responsibilities

(1) These regulations specify the examination requirements and the examination procedure for the master programs in Computer Science, Applied Computer Science, Socio-Informatics and the European Master in Software Engineering at the TU Kaiserslautern. Interdisciplinary examination rules for these master's degree programs were adopted in the general master's examination regulations of the TU Kaiserslautern (AMPO) on December 22, 2005; the AMPO includes further specific requirements on the following points:

- Credit point system, course achievements (§5 AMPO)
- Examination board and examination office (§6 AMPO)
- Examiners and observers (§7 AMPO)
- Approval of study periods, coursework and examinations (§8 AMPO)
- Oral and written exams (§9 and §10 AMPO)
- Passing and failing the master's (§20 AMPO)
- Certificate, diploma supplement, master's certificate (§§21&22 AMPO)
- Invalidation of the master's examination (§24 AMPO)
- Students' rights to information (§25 AMPO)

(2) The master's examination board of the Computer Science Department is responsible for making decisions on examination matters concerning the master's programs.

§2 Nature and Objectives of the Programs

(1) By doing a master degree students can gain a further vocational and research qualifying degree. It is based on the bachelor degree course with the same name.

(2) During the master's programs, knowledge and skills gained at bachelor's degree level are broadened to state-of-the-art research. Students are prepared for doing independent

research and demanding tasks in Computer Science and versed in the use of scientific methods and knowledge to solve various Computer Science problems.

(3) In the Computer Science master's program, students acquire special skills in foundation-oriented computer science research.

(4) In the Applied Computer Science master's program students in particular acquire skills for application-oriented computer science research in one of their areas of application.

(5) In the Socio-Informatics master's programme students in particular acquire skills in the specification and empirical evaluation of software systems as well as in the realisation of software development projects taking the social context into particular consideration.

(6) In the master's program "European Master in Software Engineering", students gain advanced skills in the development of correct software systems under time and cost constraints regarding the project development and implementation.

(7) Graduating with a master's degree shows that students have acquired well-grounded scientific knowledge in Computer Science and are in a position to do basic and application-oriented research.

§3 International Scope

(1) Courses and examinations for the master's program may be done in German or English.

(2) The department guarantees that there is a sufficient offer of English courses for foreign students so that the master programmes Computer Science and the European Master in Software Engineering can be completed predominantly in English. In the master programmes Applied Computer Science and Socio-Informatics a good level of German is required for most lectures from other departments.

§4 Admission to the Master's Programs

(1) Applicants who fulfill the general admission requirements of the TU Kaiserslautern and who qualify after being assessed by the criteria described in Appendix A are accepted onto the master's program. Admission may include additional requirements (see 2 and 3).

(2) With regard to the assessment procedure, the examination board may limit the choices of an applicant by binding admission to particular restrictions when compiling the examination schedule (see §7).

(3) If the applicant's bachelor's degree is not equivalent to a bachelor's degree of the TU Kaiserslautern, courses of up to a maximum of 60 additional ECTS performance points (CPs for short) from bachelor courses can be required to be done. Proof of the additional ECTS performance points is a prerequisite for admission to the Master's thesis. (see § 10, Section 3). They are not part of the master's program and therefore are not included in the calculation of the overall grade of the master's program. The completion of any additional courses is subject to the respective bachelor examination regulations.

(4) In exceptional well-founded cases students can be admitted to master degree courses with the approval of the examination board if they are registered for the corresponding bachelor degree course in the Department of Computer Science at the TU Kaiserslautern and only have to achieve a maximum of 25 further credits to successfully achieve their bachelor degree. They must also fulfill all other requirements mentioned in Section 1.

The enrolment is no longer valid if proof of the successful completion of the bachelor degree isn't given by the end of the first semester.

§5 Degree structure and prescribed period of study

(1) The master programs in Computer Science, Applied Computer Science, Socio-Informatics and the European Master in Software Engineering are divided into blocks that are again subdivided into modules and modules are allocated to courses. Courses consist of lectures (with or without exercise classes), seminars and projects and practical labs.

(2) Modules carry a certain weight, which corresponds to the expected time and effort students put into them. One ECTS credit point (CP) corresponds to about 30 hours of work.

(3) In the appendix to these examination regulations t can be seen which compulsory and elective examinations have to be taken in each master programme.

(4) The way the courses are allocated to the modules is specified in the module handbook of the Computer Science Department. The faculty council of the Computer Science Department determines the module handbook. For every module, in addition to the respective lectures, choice possibilities within the module are also indicated (where applicable). Furthermore it is also possible to indicate which examination admission requirements need to be conformed to for that particular module (see §6 Section 5) and which kind of examination is applicable to the module (see §6 Section 3).

(5) The standard period of study up to the completion of the master's exam is 4 semesters for all programmes.

§6 Course achievements and Examinations

(1) Coursework is made up of tutorials, seminars, projects and practical labs; in order to succeed the following has to be achieved:

- In exercise classes: solving exercises and/or taking semester examinations.

- In seminars: written solutions on prearranged subjects and an oral presentation is expected, as well as joining in discussions about topics presented by other seminar participants.

- For practical labs and projects, the evaluation of the solutions worked on and their presentation is important.

The lecturer or professor responsible should have certified the coursework within four weeks of the end of the course. Coursework can be marked according to §16 AMPO; however these grades do not count towards the overall grade (see §11 Section 3).

(2) For exercise classes, seminars, practical labs and projects, regular attendance can be important for successful completion. Full details of the criteria for coursework have to be announced by the lecturer or professor responsible for the course by the first meeting at the latest.

(3) Graduating with a master's degree requires writing and handing in a master's thesis and passing the appropriate module exams. With examiners from the Department of Computer Science the student has the choice of doing exams in German or English. The following requirements must be fulfilled:

- The master's thesis has to be completed and handed in before the given deadline. It is marked on its content and its presentation in its final written.

- Module examinations are usually either a written exam or an oral exam. In well-founded exceptional cases the module exam can be split up into separate tests. Exams are done for modules, which are allocated to the appropriate lectures. Written exams should last for 10-20 minutes per CP, but should be at least one

hour and at most 4 hours long. Oral exams should last for 3-8 minutes per CP, but should be at least 15 minutes and at most one hour long.

The examiner responsible marks all examinations according to §16 in the AMPO stipulations. The assessment of written exams and of the master's thesis should all be completed within 4 weeks of the exam, or of handing in the master's thesis.

(4) The module handbook can specify whether an exam will be oral or written. In any other case the form of the exam has to be announced by the first lecture at the latest.

(5) It may be necessary to satisfy requirements laid down in the module handbook before admittance to a modular exam is granted. Detailed information on fulfillment of admission prerequisites has to be announced by the first lecture of the module at the latest.

(6) Concerning the authorized study period laid down in §9 and to determine the date of the graduation certificate the dates for the examinations in Section 3 are defined as follows:

- For the master's thesis, the date when the final version is handed in at the examination office is applicable.
- For modular exams, the date of the last module exam applies.

For other coursework, the date they are assessed applies.

(7) A period of study abroad or an external practical activity which complements the master's is good reason to be granted academic leave of absence. Approval of study and examination requirements in these cases is regulated by §8 of the AMPO.

§7 Examination Planning and Mentoring System

(1) Students have to present an examination schedule to the examination office by the end of their first semester at the latest, which lists the courses for study achievements and examinations they plan to accomplish to pass their master's. When putting the examination schedule together, the requirements from §4 Section 2 and 3 have to be incorporated. For the master's program in Computer Science, the specialization and also the minor subject should be stated, as stipulated in the study plan. For the Applied Computer Science master's program, the field of application should be stated. For the European Master in Software Engineering, course achievements and examinations that were earned at a partner university (see appendix E, section 3) and are approved for the master program have to be listed.

(2) The examination schedule can be updated in later semesters. However, changes in the examination schedule can only apply to modules, which haven't been examined yet.

(3) The examination office formally checks whether the examination schedule adheres to the corresponding appendices B, C, D and E of these regulations, to the degree programme as well as to the legal examination requirements in the module handbook. The examination schedules are not allowed to contain any modules that were already placed in a previously completed bachelor's degree course. The examination board decides which additional previous study achievements are accepted as equivalent.

(4) The examination board allocates each student to a professor who acts as mentor for compiling and refining the examination schedule. The mentor is able to access information on the student's study and examination progress from the examination office. He or she should advise the student and should supervise the progress of his or her studies. The examination board has the final say over any differences of opinion between students and mentors, or if a mentor is changed.

(5) The mentors are responsible for the authorization of examination schedules with regard to content, if they are the same or differ only marginally from the ones in the study plans. In cases of larger differences, approval from the examination board is necessary. Differences are counted as marginal when they refer to modules of a maximum of 12 CP.

§8 Examination Procedure

(1) Application for admission to the master's examination must be done in writing at the latest before registering for the first modular exam at the Computer Science examination office. The application has to include explanations in keeping with §14 Section 2 of the AMPO. The examination board decides on admission as per §13 Section 2 of the AMPO.

(2) Students must register for every exam at the examination office, especially in the case of retakes. Registration for an exam, which is relevant to passing the master's program, can only be done if the module is on the examination schedule. . Students have to register for exams at least 2 weeks before the examination, but at the earliest 12 weeks before the examination. Registering a master's thesis is regulated by §10 Section 3.

(3) Students can withdraw from a modular exam without stating a reason if they keep to the deadlines under the terms of §9 Section 4 and 5. Notice of withdrawal from a modular exam has to be done at the examination office, either in person or in writing at least one week before the examination date.

(4) The examination board sets the date of the modular examinations in coordination with the examiners responsible. Written examination dates are posted on the website of the examination office at least four weeks before the exam. In the case of oral examinations, students may make suggestions for examination dates.

(5) If a student does not turn up to an examination he or she is registered for, then this exam counts as failed. Further regulations about unexcused absence, withdrawal, deception and breach of regulations are stipulated in §19 AMPO.

(6) Every compulsory module examination that has been attempted must be passed eventually. (cf. also §9, Section 1).

(6) Examinations of modules from other faculties are done according to the guidelines of the respective faculty. Specifically, the faculty concerned can regulate the admission requirements for the exam, the form of the exam (written/oral), the examination date, the duration of the exam, the execution of the exam, the notification of the results, all of which may differ from these regulations. Furthermore, the external faculty can require that a student must do an additional oral exam. Coursework and examinations have to be verified by the respective computer science examination office in conjunction with the student.

§9 Retaking Examinations, Deadlines, Failing the Master's

(1) Students are allowed to resit failed module examinations twice. If students fail the second resit they lose their right to take this exam again for good. Retaking an exam that has already been passed (i.e. to improve the grade) is not allowed. In the case of a second written resit in the form of exams, the grade "poor" (grade 5,0) can only be given after an additional oral exam. After the additional oral exam a decision is made if the student is to be awarded the grade 4,0 or worse. The oral exam is an individual exam which should last about 15-30 minutes and should be carried out as soon as possible after the written exam by at least 2 examiners. Before the additional oral examination students should be allowed to look at the graded written exam. The examiners notify students about the exam dates and deadline for registration for the additional oral exam at the very latest when the exam results are announced. Students have to resister for the additional oral exam by the dead-

line provided. If they fail to do this they automatically fail. Students who didn't resit their written exam or who left the university before the additional oral exam are excluded from the oral exam.

(2) When retaking written exams, the remaining two repeat exams have to be taken from the next three exam dates offered; failure to meet the deadline as stated in Clause 1 means the retake counts as failed. For each written module exam at least two examination dates should be offered per year.

(3) Retaking an oral exam has to be done between at least one month and at most six months after the failed attempt.

(4) The examination period of a semester lasts until the first day of lectures in the following semester. All exams and course achievements have to be registered by the end of the examination period of the tenth semester.

Examinations for which the registration deadline was missed by at least 2 semesters are considered failed (§19 Section 2 AMPO), which means Sections 2 and 3 apply when retaking the exams. §4 Section 4 AMPO regulates the observance of deadlines for the overall length of study.

(5)If the right to take the exam is completely cost, the chairperson of the examination board will issue a written notification with legal instructions.

§10 Master's Thesis

(1) A master's thesis should show that the student can solve a computer science problem using scientific methods with the assistance of a supervisor within a specific time period and also present it and defend it orally.

(2) The subject of the master's thesis is defined and supervised by a lecturer of the Computer Science department and should be equal to 30 CP. This lecturer and a second examiner mark the master's thesis. The second examiner can be anyone from §7 Section 2 AMPO and specifically a research assistant from the Department of Computer Science. For external master's theses the examination board can name external examiners to be second reviewers.

(3) Students must register their master's thesis at the appropriate examination office before beginning the thesis, specifying the subject, the name of the main examiner and the commencement date. The examination office informs the main examiner about the registration of the thesis. A prerequisite for registering a thesis is that the student should already have at least 60 CP for the master's program at the time of registration. Students admitted to the master's degree under the conditions according to §4 Section 3 must provide proof of performance points before they can do their master's thesis. Students who cannot provide corresponding proof cannot be admitted to the master's thesis.

(4) The maximum time period for a master's thesis is six months. Three copies of the written work have to be handed in at the relevant examination office before the end of that period. In addition, in accordance with the Computer Science Department an electronic version of the work should be handed in to check for plagiarism. If the thesis is not handed in before the deadline, it counts as failed. The chairperson of the examination board can give extensions of up to a maximum of three months upon written substantiated request. Applications for extensions must be made to the examination office at least one month before the end of the processing time.

(5) In order to check that the work done for a master's thesis was done independently a colloquium takes place where the examiners of the thesis have to be present. The colloquium should take place four weeks after handing in the thesis at most.

(6) The examiners must write reviews on the master's thesis for their final assessment, which should be handed into the examination office. The reviews should in particular include information about the independent preparation of the thesis, the results achieved, the didactical layout of the final work as well as the talk given. If both examiners agree on their rating of the thesis, then only one joint review is necessary.

(7) Should there be misgivings about the independence of the work in the thesis, then the examination board rules on the matter after giving the student and examiner a hearing on whether the thesis can be accepted and reviewed, or if the case of §19 Section 5 Clause 1 AMPO applies.

(8) Further regulations, especially regarding returning, assessment and retaking can be found in §11 AMPO.

§11 Degree Title and Certificate

(1) On successful completion of the master's degree the title "Master of Science"or "M.Sc." for short, is awarded.

(2) Apart from the final grade the certificate also contains the grades and credit points of all the module exams taken, as well as the grade and subject of the master's thesis. In addition the certificate contains the titles of the seminars, projects and practical labs done, without the grades, but with the respective credit points. For the Computer Science program the subject majored in and the minor subject are also noted on the certificate; for the Applied Computer Science program the chosen field of application is also noted on the certificate. For the programme "European Master in Software Engineering", the partner university (see appendix, section 3) and the degree and examinations achieved there have to be indicated. Furthermore, particulars from §21 Section 1 AMPO are listed. If additional courses were made during the admission process, see §4 Section 3, then these can also be included in the certificate, at the student's request.

(3) The total grade given in the certificate is made up of a weighted arithmetic mean from the master's thesis and the grades of the module exams. Additional courses (conditions) according to §4 Section 3 are not counted. The weighting here are the credit points of the corresponding modules. When assigning the weighted averages only the first decimal place after the point counts, all other decimals are discarded and not rounded up.

(4) The total grade is supplemented by a relative ECTS-grade, which is included in the Diploma-Supplement. The ECTS-scale takes statistical considerations into account in which the group of graduates who have passed the master's is graded and divided up as follows:

- Grade A goes to the best 10 % of the graduates
- Grade B goes to the next 25% of the graduates.
- Grade C goes to the next 30% of the graduates.
- Grade D goes to the next 25% of the graduates.
- Grade E goes to the last 10% of graduates.

. Calculations are carried out by the examination office based on the statistical analysis of the examination results. The evaluation is based on a period of three years. As long as the

relevant databases are still being developed, the responsible examination board decides on an appropriate system in order to determine the relative total grades.

§12 Date of Effect

These examination regulations come into effect upon their publication in the Staatsanzeiger (government gazette) and are also applicable to students who are already enrolled onto a program and for their current examinations. Students who are already enrolled have the possibility of applying, stating reasons, to be examined under the old regulations.

A   Assessment

(1) The assessment procedure described here evaluates the personal aptitude and expertise of an applicant to be admitted to the consecutive master programs in Computer Science, Applied Computer Science, Socio-Informatics as well as for the European Master in Software Engineering. Admittance to the European Master in Software Engineering is carried out jointly with the partner universities from section 3 of the appendix.

(2) After receiving applications from students who are interested in the master's courses in Computer Science, assessment is organized by the examination board of the department. The application procedured is announced on the department webpage, which also advises on application deadlines.

(3) The aptitude of a candidate is assessed using the following documents in German or English, which need to be included in the application:

1. A graduate certificate from the previous program and further documents which show the final grade, length of study and courses taken (e.g. in the form of an academic transcript, transcript of records or corresponding performance records),

2. a description of the contents of the courses as listed under 1),

3. a statement including motive for the proposed admittance to the program and an explanation of study goals,

4. a career and personal background description (CV) with explanations about practical knowledge and experience where necessary,

5. letters of recommendation from at least 2 university lecturers; the letters of recommendation should include evidence on how well the applicant did in relation to other graduates on the same course,

6. proof of adequate German and English language skills

Graduate candidates from the TU Kaiserslautern only need to provide the documents described in No. 1, 3, 4 and 6.

(4) The assessment procedure for the consecutive master's program "Computer Science", "Applied Computer Science" and Socio Informatics is done in 2 steps. For the non-consecutive master's program "European Master in Software Engineering", only the second step applies:
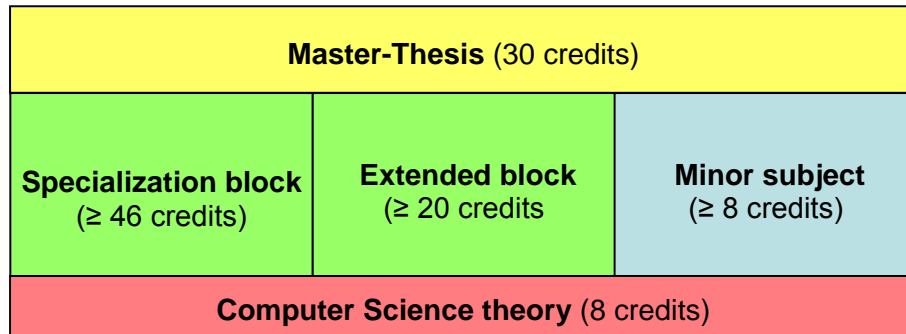
- When verifying the equivalence of the level of the previous degree its range, content and orientation is compared to the respective bachelor program of Computer Science or Applied Computer Science of the TU Kaiserslautern. If the degree is deemed equivalent, then the verification of equivalence counts as passed. In other cases the examination board can make the candidate do up to a maximum of 60 CP which have to be done as additional courses as required by §4 Section 3. If the level of study cannot be achieved in such a way through additional courses, then the candidate is deemed not eligible for the program.

- Technical and personal assessment is done using the following criteria:
  - Knowledge of German and English
  - Achievements during the previous degree
  - Practical knowledge and experience which is beneficial to the master's
  - Sufficient motivation to study
  - Ability to study quickly and effectively

(5) Assessment of a candidate concludes in an evaluation and is recorded as "suitable" or "not suitable". Should the aptitude of the candidate not be easy to ascertain, the examination office may ask for further documentation or invite the candidate to give an introductory talk to the examination board members.

(6) Should the assessment result in "not suitable" the candidate must wait at least one year before reapplying.

(7) The outcome of the assessment is sent to the candidate in writing with instructions on the right to appeal. A record is made of the assessment procedure. §25 Section 2 AMPO regulates granting access to the records.

B Master Computer Science

Master-Thesis (30 credits)		
Specialization block (≥ 46 credits)	Extended block (≥ 20 credits	Minor subject (≥ 8 credits)
Computer Science theory (8 credits)		

(1) The master's degree Computer Science is made up of the following
- computer science theory block (8 credits)
- specialization block (≥ 46 credits)
- minor subject block (≥ 8 credits)
- extended block (≥ 20 credits)
- Master thesis (30 credits).

The total from specialization block and the minor subject block must be at least 62 credits.

(2) The block computer science theory is allocated to a single foundation oriented compulsory area (8 credits). The modules which can be taken are determined by the study plan.

(3) Students choose one of the following specialization blocks:
- Algorithmics
- Computer Graphics and Visualisation
- Embedded systems
- Information Systems
- Intelligent Systems
- Communication Systems
- Robotics
- Software Engineering
- Verification

In the specialization block students have to choose one seminar module (4 credits) and one project module (8 credits). The allocation of seminar and project modules to specialization blocks is determined in the study plan. The module „Guided Research (project)" can replace the project module or modules from an elective area in the specialization block. The module "Scientific Publication" can replace a seminar module or module from an elective area in the specialization block.

The structure of the specialization blocks is determined in sections 7 to 15.

(4) The extended block contains freely selectable computer science modules from teaching areas (cf. module guide) from which no modules are chosen in the specialization block. In addition this block can contain lectures of up to 8 credits from an interdisciplinary degree course.

(5) Students choose one of the following minor subject blocks:
- Architecture, Space and Environmental Planning, Civil Engineering
- Biology
- Electrical Engineering
- Mechanical Engineering
- Mathematics
- Physics
- Psychology
- Social Sciences
- Economics

In well-founded cases the examination board can approve other minor subjects within the credit limits mentioned below.

The minor subject block contains modules of up to a total of at least 16 credits. If the student does the module „Guided Research (project)" in the specialization block together with a further project module from the specialization block, the volume of the minor block can be reduced to up to 8 credits (with the approval of the mentor in consideration of section (1), clause 2) and the volume of the specialization block can be increased accordingly.

The structure of the minor subject blocks is determined in sections 14 to 21.

(6)The specialization and minor subject blocks are subdivided into compulsory and elective areas (objects of examination as defined by the University Act) up to a total of at least 34 credits or 16 credits.

In order to study a block students have to select
- all compulsory areas and
- elective areas within the specified minimum and maximum number.

The allocation of the modules to the areas is determined in the study plan. The study plan can apply credit restrictions for individual areas.

(7) The specialization block „Algorithmics" is made up of the following examination areas
- compulsory areas
  - Methodical and Theoretical Foundations
- elective areas
  - Algorithmics
  - Modelling
  - Automata Theory and Formal Languages

(8) The specialization block „Computer Graphics and Visualisation" is made up of the following examination areas:
- compulsory areas
  - Methodical and Theoretical Foundations
  - Computer Graphics
- elective areas (only one area can be chosen)
  - Robotics
  - Scientific Computing
  - Software Engineering

(9) the specialization block „Embedded Systems" is made up of the following examination areas:

- compulsory areas
  - Methodical and Theoretical Foundations

- elective areas (a maximum of two areas can be chosen)
  - Reliable Embedded Systems
  - Architecture
  - Software Engineering
  - System Software
  - Intelligent Systems and Robotics

(10) The specialization block Information Systems is made up of the following examination areas:

- compulsory areas
  - Methodical and Theoretical Foundations
  - Information Systems

- elective areas
  - Intelligent Systems
  - Communication Systems
  - Software Systems
  - Embedded Systems

(11) The specialization block „Intelligent Systems" is made up of the following examination areas:

- compulsory areas
  - Methodical and Theoretical Foundations
  - Intelligent Systems

- elective areas
  - Distributed and networked systems
  - Algorithmics
  - Robotics

(12) The specialization block Communication Systems is made up of the following examination areas:

- compulsory areas
  - Methodical and Theoretical Foundations
  - Communication Systems

- elective areas
  - Information Systems
  - Software Systems
  - Embedded Systems

(13) The specialization block „Robotics" is made up of the following examination areas:

- compulsory areas
  - Methodical and Theoretical Foundations
  - Robotics

- Embedded Systems

- elective areas (a maximum of two areas can be chosen)
  - Graphics
  - Communication systems
  - Intelligent systems
  - Software systems

(14) The specialization block „Software Engineering" is made up of the following examination areas: :

- compulsory areas
  - Specification and Transformation of Software
  - Process Management and Development Methods
  - Quality Assurance and Management

- elective areas (only one area can be chosen)
  - Embedded Systems
  - System Engineering
  - Visualisation
  - Information Systems

(15) The specialization block „Verification" is made up of the following examination areas:

- compulsory areas
  - Advanced Foundations

- elective areas (a maximum of two areas can be chosen)
  - Concurrency
  - Semantics of Programming Languages
  - Reliability
  - Areas of Application

(16) The minor subject block "Architecture, space and environmental planning, civil engineering" is made up of the following examination areas:

- elective areas (only one area can be chosen)
  - Architecture
  - Space and Environmental Planning
  - Civil Engineering

(17) The minor subject block "Biology" is made up of the following examination areas:

- elective areas (only one area can be chosen)
  - Cell Biology/Physiology
  - Ecology/Biodiversity
  - Biotechnology/Microbiology

(18) The minor subject block Chemistry is made up of the following examination areas:

- compulsory area „Theoretical Chemistry"

(19) The minor subject block „Electrical Engineering" is made up of the following examination areas:

- elective areas (only one area can be chosen)
  - Automation
  - Communication
  - Microelectronics
  - Signal processing Signal Processing and Automation

(20) The minor subject block „Mechanical Engineering" is made up of the following examination areas: compulsory areas

  - Measurement technology and control engineering
  - Aspects of mechanical engineering

(21) The minor subject block "Mathematics" is made up of the following examination areas:

- elective areas (only one area can be chosen)
  - Algebra, Logic and Number Theory
  - Algebra, Geometry and Computer Algebra
  - Optimisation and statistics
  - Mathematics of Finance and Probability Theory
  - Technomathematics

(22) The minor subject block „Physics" is made up of the following examination areas:

- elective areas (only one area can be chosen)
  - „Quantum Mechanics"
  - „Experimental Physics"

(23) The minor subject block Psychology is made up of the following examination areas:

- elective areas
  - Psychology
  - Linguistics

(24) The minor subject block „Social Sciences" is made up of the following examination areas:

- elective areas (two of the four areas have to be chosen)
  - Sociology
  - Political science
  - Psychology
  - Philosophy

(25) The minor subject block „Economics" is made up of the following examination areas:

- elective areas (a maximum of three areas can be chosen)required modules
  - Work and organisation
  - Personnel management
  - Finance and bank management
  - Controlling
  - Production management
  - International management
  - Sustainable Development, resources, environment and energy

- Intangible assets and economic law
- Marketing
- Business Information Technology
- Entrepreneurship

C   Master Applied Computer Science

Master thesis (30 credits)			
Advanced Computer Science (24 - 36 credits)	**Research projects** Project (8 credits) Seminar (4	**Interdiscipl. degree** (8 credits)	**Advanced application** (24 - 36 credits)
Modelling and Simulation (12 credits)			

(1) The master's degree Applied Computer Science is made up of the following blocks:

- One modelling and simulation block (≥ 12 credits
- One advanced computer science block(24-36 credits)
- One advanced application block (24-36 credits
- One interdisciplinary degree block (≤ 8 credits)
- One research project block made up of one seminar (4 credits) and one project (8 credits)
- Master thesis (30 credits)

The blocks are determined by the selection of one of the following applications:

- Ambient systems
- Embedded systems
- Vehicle technology
- Information management
- Communication systems
- Life sciences
- Mathematical modelling
- Production and construction

The structure of the individual application blocks is determined in sections 2 to 9. The significance of the division into compulsory and elective areas is explained in appendix B, section 6. The selection of a seminar and project in the block research projects is made in agreement with the mentor.

The module "Guided research (project)" can replace the project module in one of the research project blocks or interdisciplinary degree. The module "scientific publication" can replace modules from advanced computer science.

(2) The application Ambient Systems offers the following options:

- advanced computer science block (24-36 credits)
  - elective areas (two areas must be chosen)
    - Networking

- - Systems Machine intelligence
- advanced application block (24 to 36 credits)
  - elective areas
    - Automation
    - Signal Processing
    - Communication Technology
    - Microelectronics
- modelling and simulation block (min 12 credits)
  - compulsory area modelling and simulation
    - interdisciplinary degree block (one area must be chosen)
    - interdisciplinary project
    - Topics not related to the subject

(3) The application Embedded Systems offers the following options:

- advanced computer science block (24-36 credits)
  - compulsory area Processory Architecture
  - elective areas
    - Reliable Embedded Systems
    - Architecture
    - Software Engineering
    - System Software
    - Intelligent Systems and Robotics
- Advanced application block (24 -36 credits)
  - compulsory area Formal Foundations
  - elective areas
    - Hardware Development
    - Analogue Technology
    - Signal Processing
    - Control Engineering
- Modelling and simulation block (min 12 credits)
  - compulsory areas
    - Computer Science Models
    - Application Models
- Interdisciplinary degree block (min 8 credits)
  - elective areas (one of the two areas must be chosen)
    - Interdisciplinary project
    - Topics not related to the subject

(4) The application Vehicle Technology offers the following options:

- Advanced computer science block (24-36 credits)
  - compulsory area Autonomous systems
  - elective areas
    - Hardware-Platform

- - Software Systems
    - Image Processing
  - Advanced application block (24 – 36 credits)
    - elective areas
      - Vehicle Technology
      - Drive Technology
      - Commercial Vehicle Technology
      - Human Machine Interaction
      - Control
      - Construction and Production

  - Modelling and simulation block (min 12 credits)
    - compulsory areas
      - Computer Science Models
      - Application Models

  - Interdisciplinary degree block (min 8 credits)
    - elective areas (one of the two areas must be chosen)
      - Interdisciplinary project
      - Topics not related to the subject

(5) The application Computer Science in Life Sciences offers the following options:
  - Advanced computer science block (24-36 credits)
    - compulsory area Bioinformatics
    - elective areas
      - Algorithmics
      - Visulisation
      - Data management
      - Self-organisation

  - Advanced application block (24 – 36 credits)
    - compulsory area biology and chemistry
    - elective areas
      - Microbiology
      - Biotechnology
      - Genetics
      - Zoology
  - Modelling and simulation block (min 12 credits)
    - compulsory areas
      - Computer science models
      - Application models
  - Interdisciplinary degree block (min 8 credits)
    - elective areas (one of the two areas must be chosen)
    - Interdisciplinary project
      Topics not related to the subject

(6) The application Information Management offers the following options:

- Advanced computer science block (24-36 credits)
  - compulsory areas
    - Information Systems
    - Intelligent Systems
  - elective areas
    - Software Engineering
    - Communication and Distributed Systems
- Advanced application block (24 – 36 credits)
  - compulsory area business studies and management
  - elective areas (a maximum of three areas can be chosen)
    - Work and Organisation Personnel Management
    - Finance and Bank Management
    - Controlling
    - Production management
    - International management
    - Sustainable Development, Resources, Environment and Energy
    - Marketing
    - Business Information Technology
    - Quantitative Methods
- Modelling and simulation block (min 12 credits)
  - compulsory areas
    - Computer Science Models
    - Application Models

- Interdisciplinary degree block (min 8 credits)
  - elective areas (one of the two areas must be chosen)
    - Interdisciplinary project
    - Topics not related to the subject

(7) The application Communication Systems offers the following options:

- Advanced computer science block (24-36 credits)
  - compulsory area communication
  - elective areas
    - Distributed systems
    - Architectures
- Advanced application block (24 – 36 credits)

  - compulsory area Signal Transmission
  - elective areas
    - Communication Systems
    - Real-time Systems and Signal Processing
- Modelling and simulation block
  - compulsory area modelling and simulation

- Interdisciplinary degree block
  - elective areas (one of the two areas must be chosen)
    - Interdisciplinary project
    - Topics not related to the subject

(8) The application Mathematical Modelling offers the following options:

- Advanced computer science block (24-36 credits)
  - compulsory area Formal Foundations
  - elective areas
    - Visualisation
    - CAD
    - Human Computer Interaction
    - Scientific Computing
- Advanced application block (24 – 36 credits)
  - elective areas (a maximum of two areas can be chosen).
    - Business Mathematics
    - Optimisation
    - Numerical Modelling
- Modelling and simulation block (min 12 credits)
  - compulsory areas
    - Computer Science Models
    - Application Models
- Interdisciplinary degree block (min 8 credits)
  - elective areas (one of the two areas must be chosen)
    - Interdisciplinary project
    - Topics not related to the subject

(9) The application Production and Construction offers the following options:

- Advanced computer science block (24-36 credits)
  - compulsory area „Visualisation"
  - elective areas
    - Software Engineering
    - System Platform
- Advanced application block (24 – 36 credits)
  - elective areas
    - Formal Foundations
    - Production
    - Human Computer Interaction
- Modelling and simulation block (min 12 credits)
  - compulsory areas
    - Computer science models
    - Application models

- Interdisciplinary degree block (min 8 credits)
  - elective areas (one of the two areas must be chosen)
    - Interdisciplinary project
    - Topics not related to the subject

D   Master Socio-Informatics

Master thesis (30 credits)		
Socio-Informatics (34 credits)		
Economics and society (18 credits)	Computer Science (24 credits)	Psychology (14 credits)

Illustration 3: block structure of the master course Socio-Informatics

(1) The master degree course Socio-Informatics is made up of
- Computer science block (24 credits)
- Economics and Society block (18 credits)
- Psychology block (14 credits)
- Socio informatics block (34 credits)
- Master thesis (30 credits)

The structure of individual application blocks is determined in sections 2-5. The organisation into compulsory and elective areas is explained in appendix B, section 6.

 (2) The following compulsory areas are part of the Computer Science block
- Software Engineering
- Intelligent Systems

(3) The following elective areas are part of the Economics and Society block. A maximum of two areas can be chosen.
- Business Studies
- E-Business
- Formation Management
- Law
- Philosophy

(4) The following compulsory area is part of the Psychology block.
- Psychology

(5) The following compulsory areas are part of the Socio-Informatics block.
- Formal System Modelling
- Elective Module
- Research Projects

E   European Master on SW Engineering (EMSE)

Master Thesis (30 credits)				Research studies block
EMSE-I (8-14 credits)	EMSE-TS (0-8 credits)	EMSE-ATSE (4-12 credits)	EMSE-FC (12 credits)	
Foundations	EMSE-TS (4-16 credits)	EMSE-ATSE (12-24 credits)		Foundation course
EMSE-VV (8-12 credits) / EMSE-ESER (8-10 credits) / EMSE-SPPM (8-16 credits) / EMSE-RDSS (8-14 credits)				

Illustration 4: blocks European Master in Software Engineering EMSE

(1) The European Master on Software Engineering (EMSE) is made up of a

- Foundation course block (60 credits)
- Research studies block (30 credits)
- Master thesis (30 credits)

The options within the blocks are explained in sections 2 and 3. The organisation into compulsory and elective areas is explained in appendix B, section 6.

 (2) The foundation course block is made up of the following examination areas amounting to a total of at least 60 credits.

- compulsory areas
    - Verification and Validation (EMSE-VV, 8-12 ECTS credits)
    - Empirical Software Engineering Research (EMSE-ESER, 8-10 ECTS credits)
    - Software Process and Project Management (EMSE-SPPM, 8-16 credits)
    - Requirements and Design of Software Systems (EMSE-RDSS, 8-14 credits)
    - Transversal Skills (EMSE-TS, 4-16 credits)
- elective areas (Selected Advanced Modules I in illustration 4):
    - Object Orientation and Component-based SE (4-12 credits)
    - SW Architecture and Product Lines (4-12 credits)
    - SW Quality Management (4-12 credits)

- System Engineering (4-12 credits)
- Formal Approaches (4-12 credits)
- Distributed Systems (4-12 credits)
- Embedded Systems (4-12 credits)
- Information Systems (4-12 credits)

(3) The research studies block is made up of the following examination areas amounting to a total of at least 30 credits.

- compulsory areas
  - Internship (= A project in the area software engineering (EMSE-I, 8-14 credits))
  - Transversal Skills (EMSE-TS, 0-8 credits))

- elective areas (Selected Advanced Modules II in illustration 4):
  - Advanced Topics in Software Engineering (EMSE-ATSE, 4-12 credits)
    - Object Orientation and Component-based SE (4-12 credits)
    - SW Architecture and Product Lines (4-12 credits)
    - SW Quality Management (4-12 credits)
    - System Engineering (4-12 credits)
    - Formal Approaches (4-12 credits)
    - Distributed Systems (4-12 credits)
    - Embedded Systems (4-12 credits)
    - Information Systems (4-12 credits)
  - Free Choice (EMSE-FC, 12 credits)

(4) The master degree course is part of an International European Master which is offered at three European partner universities:

- Blekinge Tekniska Högskola
- Libera Università di Bolzano
- TU Kaiserslautern
- Universidad Politécnica de Madrid
- University of Oulu

Further associated partner universities may be added later. They will be incorporated by the three universities named above.

Applications must be sent to the coordinator of International European Masters.

Students are expected to complete the master degree course in four semesters although the foundation course is taken at a different partner university from the research studies course. At least 52 credits should be successfully completed at each university.

(5) Admission to the International European Master in Software Engineering is carried out by an international selection committee which is made up of one representative from each of the three participating universities. The representative from the TU Kaiserslautern is appointed by the master examination board. In terms of content, admission is in accordance with the aptitude assessment procedure in appendix A.

(6) Results from partner universities are recognized with the following restrictions:

- Modules from the area foundations are recognized but can't be replaced by other modules.

- Modules from the areas Transversal Skills, Advanced Topics in Software Engineering und Free Choice can be replaced by any modules with lectures from partner universities which aren't from the area foundations.

(7) The degree certificate includes a clause mentioning that the degree was carried out within the framework of the International European Master Program. The modules are listed with a note mentioning the university at which the credits were achieved.