



Chapter 9

The programme specific part of the curriculum for:

MASTER OF SCIENCE (MSc) IN ENGINEERING (SOFTWARE ENGINEERING)

Curriculum 2013, Version 1.1

Applicable to students admitted September 2013 onwards

The curriculum is divided into general provisions (Chapters 1-8), a programme specific part (Chapter 9) and the module descriptions of the programme's individual course modules. Students should familiarise themselves with all three parts in order to get a complete overview of the provisions regulating the programme.

§1 Job Profiles

With an extensive knowledge in the field of software engineering the graduate engineer in Software Engineering is qualified for a wide variety of jobs in many different industries that use, integrate and develop software or products incorporating software. It could, for example, be in industry, finance, health, defence and security, telecommunications, transport, education, or administration.

Graduates are qualified for work in companies and organisations that develop software, including large and complex software systems. The graduate is qualified to independently take responsibility for and contribute to software development; i.e. the development of new software and customisation, integration and further development of existing software. The graduate is qualified to consider the technological, user-oriented as well as the organisational aspects of software development.

With the programme's emphasis on innovation and internationalisation, the graduate will also appeal to the many companies that develop software in a global context and use software as the basis for innovation and product development.

The graduate engineer will be qualified for a range of job functions in public and private companies, such as executive functions as software developer, system developer, system designer, system integrator, IT and system architect, product manager; organisational functions such as project manager, software quality engineer, IT strategy manager, head of project; or consulting functions such as IT consultant or system consultant. Furthermore, the graduate is qualified for jobs in research and education, for example scientific research assistant or teacher. Especially well-qualified graduates will be able to continue as PhD students in a relevant research field.

§2 Competence Profile for the Programme

The objective of the MSc in Engineering (Software Engineering) is to, on a scientific basis, educate engineers who can independently take responsibility for and contribute to the development of new software as well as to the customisation, integration and further development of existing software in a way that considers scientific theories in the subject field, user-oriented and organisational aspects, software as an innovative element, and the impact of globalisation on software and software development (and vice versa).

The graduate must be able to independently take responsibility for and participate in the investigation of the need for the software, identification of requirements, analysis, software design, interaction design, programming and testing, as well as project management, change and configuration management, and quality management.

The graduate must be able to work systematically with large and complex software systems to control functionality (incl. security), life cycle, and software qualities important to operations (incl. user-friendliness), software development and software maintenance.

The graduate must be able to organise a well-defined process resulting in a software product with the right qualities, to the right price and at the right time. The graduate must be able to develop and deliver quality software as project manager, through individual work and as part of a team. Moreover, he or she must be able to reconcile conflicting project objectives and find acceptable compromises with limitations such as costs, time, knowledge, existing systems, organisation and environment.

Knowledge, skills and competencies within the scientific fields related to the programme

The competencies characterising the MSc in Software Engineering are based on and improve the skills acquired on the bachelor programme in software engineering.

The graduate software engineer:

- possesses knowledge of software engineering, which in certain areas are based on highest international research, and understands and can reflect on the knowledge in the subject field, and can identify scientific issues
- masters the scientific methods and tools of software engineering and masters the general skills related to employment in software engineering
- can assess and choose between the scientific theories, methods, tools and general skills in software engineering and can on a scientific basis develop new analysis models and solutions
- masters science-based methods and tools for systematic development and maintenance of large and complex software systems
- possesses the academic skills to develop software of an international standard
- can analyse problems of social relevance and develop software solutions that contribute to solving these problems
- can analyse and assess the technical qualities of a software-related solution

- masters methods of survey design to evaluate the effect of software solutions in the problem domain
- is aware of the socio-technological and socio-cultural conditions that govern the market penetration of software solutions
- is familiar with the management of software as a product and has knowledge about the various business models for software delivery
- can conduct life cycle assessments for software systems and evaluate the derived consequences for life expectancy
- can assess and choose between the scientific theories, methods and tools of the subject field
- have knowledge of the specific features of software patents in emerging markets
- can communicate research-based knowledge and discuss professional and scientific problems with both scientific peers and non-specialists.

Broad engineering competencies

The programme is structured in accordance with the educational concept 'The Engineering Education Model of the University of Southern Denmark' or, in Danish, 'Den Syddanske Model for Ingeniøruddannelser' (DSMI). DSMI is based on a pedagogical/didactic approach which promotes a learning environment where students during their studies acquire a variety of engineering competencies in addition to the knowledge and skills related to the specific programme.

The broad competencies that characterise the MSc in Engineering programme builds on the broad engineering competencies acquired on the bachelor programme.

The graduate:

- can manage work and development situations that are complex, unpredictable and require new approaches
- can independently initiate and implement specialist and interdisciplinary cooperation and assume professional responsibility
- masters analytical methods to examine and uncover socio-technological contexts in socially relevant issues where interaction between technology and society are deciding factors in the development of usable solutions
- can analyse conditions and obstacles to the development of innovative solutions to societal problems and effectively carry out its implementation
- masters methods to assess the effect and value of solutions to non-trivial problems as well as compare and choose between alternative solutions
- can manage and participate in global and multicultural development projects
- can plan major development projects in collaboration with other professions
- have knowledge of intellectual property right (IPR), patents and software copyright, and their significance in the development of new products and services

- can facilitate innovation processes and assess the level of innovation in products and services through novelty searches in patent and research databases in the relevant subject fields
- can acquire research results and translate them into new products and services
- can independently take responsibility for own academic learning and specialisation.

§3 The Subject Columns of the Programme

The competencies of the students are developed through subjects structured within the first three semesters of the master programme and finally in the master thesis (4th semester):

During the **1st half of 1st semester** the students' knowledge of and practice in software engineering and project management is consolidated on an introductory course and, at the same time, students are introduced to scientific methods as the basis for further studies.

During the **2nd half of the 1st semester** and during the **2nd semester** it is possible to specialise in software engineering within the three academic groups: Scalable software solutions, software intelligence and software evolution

During the **3rd semester** the students' academic competencies are put into use through the study of social and research-relevant issues through a focus on innovation and development processes that can result in socially relevant products.

The master thesis, which demonstrates the students' complete engineering skills in a relevant, limited, engineering subject within software engineering, is either started on the 3rd or on the 4th semester.

§4 Semester Themes

Semester		Content
4th semester		Master Thesis
3rd semester		Master Thesis or In-Company period Innovation and development
2nd semester		Intelligence in Software Systems Software Evolution and pervasive computing
1st semester	2nd half	Scalable Software Solutions
	1st half	Software Engineering and Scientific Methods

§5 Programme Structure and Modules with 30 ECTS thesis

SEMESTER		MODULE																													
4th semester		Master Thesis																													
3rd semester		SM-ISS Innovative Software Solutions															F-VF In-Company Period or Elective														
2nd semester		SM-INT / SM-INTP Intelligence in Software Systems <i>Data mining</i> <i>Tools in artificial intelligence</i>										Elective or project					SM-EVO / SM-EVOP Software Evolution Ubiquitous Computing Software customization										Elective or project				
1st semester	2nd half	SM-SCA / SM-SCAP Scalable Software Solutions <i>Decentralised software systems</i> <i>Information and knowledge management</i>										Elective or project																			
	1st half	SM-SDT Software System Design and – Technologies										SM-SCM Scientific Methods																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

*) Alternatively, choose exchange period at a foreign university

§5 Programme Structure and Modules with 40 ECTS thesis

SEMESTER		MODULE																													
4 th semester		Master Thesis																													
3 rd semester *)		SM-ISS Innovative Software Solutions										Master Thesis										Elective									
2nd semester		SM-INT / SM-INTP Intelligence in Software Systems <i>Data mining</i> <i>Tools in artificial intelligence</i>										Elective or <i>project</i>					SM-EVO / SM-EVOP Software Evolution Ubiquitous Computing Software customization										Elective or <i>project</i>				
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*) Alternatively, choose exchange period at a foreign university

§6 Semester Description

Academic groups and modules

Teaching directly linked to the active research is offered on the 1st and 2nd semester in blocks of 5 ECTS, which are integrated in pairs in three academic groups. Each of these three academic groups is presented to the student as a single semester based module of 10 ECTS. Each of these modules can be extended to 15 ECTS by adding a project of 5 ECTS. Instead of the projects, students can choose an elective course of 5 ECTS.

1st semester

- SM-SDT Software System Design and –Technologies (10 ECTS)
- SM-SCM Scientific Methods (5 ECTS)
- SM-SCA Scalable Software Solutions (10 ECTS) and Elective (5 ECTS)
or
SM-SCAP Scalable Software Solutions with a Project (15 ECTS)

2nd semester

- SM-INT Intelligence in Software Systems (10 ECTS) and Elective (5 ECTS)
or
SM-INTP Intelligence in Software Systems with a project (15 ECTS)
- SM-EVO Software Customization and Ubiquitous Computing (10 ECTS) and Elective (5 ECTS)
or
SM-EVOP Software Customization and Ubiquitous Computing with a Project (15 ECTS)

3rd semester

- SM-ISS Innovative Software Solutions (15 ECTS)
- And
- Either
 - Master Thesis (10 ECTS out of 40 ECTS) and
 - Elective (5 ECTS)**Or**
 - In-Company Period (15 ECTS)**Or**
 - Elective (15 ECTS)

§7 Qualifying Exams for Admission

1. Bachelors with automatic claim for admission

Bachelor (BSc) in Engineering (Software Engineering)

Bachelors of Science (BSc) in Engineering (Software Engineering) from the Faculty of Engineering at the University of Southern Denmark have an automatic claim for admission on the MSc in Engineering (Software Engineering) programme.

2. Other qualifying bachelor exams from the University of Southern Denmark

Bachelor of Engineering in Information and Communication Technology and Bachelor in Computer Science

Bachelors of Engineering in Information and Communication Technology from the Faculty of Engineering and Bachelors in Computer Science with the elective subject Software Engineering from the Faculty of Science, both University of Southern Denmark, are eligible for admission provided they meet the requirements of specific elective courses¹.

Bachelor (BSc) in Engineering (Robot Systems)

Bachelors of Science (BSc) in Engineering (Robot Systems) from the Faculty of Engineering at the University of Southern Denmark are entitled to admission up to and including the autumn intake of 2014.

3. Other qualifying exams

Bachelors and Bachelors of Engineering from other universities

Bachelors and Bachelors of Engineering from other Danish and foreign universities or applicants with a similar educational background may be admitted to the programme, provided their technical qualifications correspond to those of admission-eligible Bachelors or Bachelors of Engineering from the Faculty of Engineering at the University of Southern Denmark.

¹ At present: SB4-KOM and SB5-TEK

§8 External Examiners and Study Board

The study programme belongs under the Academic Study Board of the Faculty of Engineering and the Danish corps of external examiners for engineering programmes. Modules offered by the Faculty of Science belong under the corps of external examiners for science.

§9 Entry into Force

1. Approved by the Academic Study Board of the Faculty of Engineering and the Director of Studies on behalf of the Dean of the Faculty of Engineering on 18 April 2013.
2. Amendments approved by the Academic Study Board of the Faculty of Engineering and the Director of Studies on behalf of the Dean of the Faculty of Engineering on 13 November 2013 (Version 1.0).
3. Amendments approved by the Academic Study Board of the Faculty of Engineering and the Director of Studies on behalf of the Dean of the Faculty of Engineering on 13 December 2013 (Version 1.0).
4. Amendments approved by the Academic Study Board of the Faculty of Engineering and the Director of Studies on behalf of the Dean of the Faculty of Engineering on 23 June 2014 (Version 1.1).