

MSc in Computer Science and Engineering – Study Lines 2011/2012

Introduction

The MSc in Computer Science and Engineering program covers areas such as safe and secure systems, system integration, distributed and embedded systems, networks, software engineering, algorithms and logic, system-on-chip and digital systems.

Besides the following five study lines it is also possible to compose your own syllabus (study plan).

- Digital Systems
- Efficient and Intelligent Software
- Embedded and Distributed Systems
- Reliable Software Systems
- Software Engineering

Please see the study handbook for the detailed curriculum, rules and regulations

Director of Studies

Jørgen Villadsen

DTU Informatics

Study Line: Digital Systems

Electronic systems and devices typically contain complex digital hardware. This may be in the form of system-on-chip (SoC), embedded computer-based systems or heterogeneous multiprocessor platforms. Digital systems form the platforms in which hardware and software components are integrated. These systems span a vast range of applications from super-computers to ultra-low-power body-implantable medical devices. The design process of digital systems must therefore address a number of different aspects such as performance, power dissipation, reliability, and price.

Study Line Requirements

One of the following two general competences courses is mandatory (only one can count as general competences course):

42435 Knowledge-Based Entrepreneurship (5 ECTS)

42490 Technology, Economics, Management and Organization (10 ECTS)

The course 02243 Access Control and Distributed Systems can count as general competences course if taken in January 2010 or earlier.

The student must obtain at least 15 ECTS points among the following general competences courses:

02205 Principles of System-on-Chip Design (5 ECTS)

02206 Design of Integrated Circuits (7.5 ECTS) - Terminated

02207 Advanced Digital Design Techniques (5 ECTS) - Terminated

02220 Distributed Systems (7.5 ECTS)

02221 Principles of Distributed Systems (5 ECTS) - Terminated

02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)

02291 System Integration (5 ECTS)

The student must supplement with the following courses such that the general competences courses comprise 30 ECTS points altogether:

02222 Distributed Systems (10 ECTS) - Terminated

02239 Data Security (7.5 ECTS)

02242 Program Analysis (7.5 ECTS)

02249 Computationally Hard Problems (7.5 ECTS)

02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)

The student must obtain at least 15 ECTS points among the following technological specialization courses:

02204 Design of Asynchronous Circuits (5 ECTS)

02208 Test of Digital Systems (7.5 ECTS)

02211 Advanced Computer Architecture (5 ECTS)

02217 Design of Arithmetic Processors (5 ECTS)

Requirements continue

Furthermore the course 02223 can wholly or partly count towards these 15 ECTS points instead of counting towards the 15 ECTS points listed above as general competences courses for the study line.

The student must supplement with the following courses such that the technological specialization courses comprise 30 ECTS points altogether:

02205 Principles of System-on-Chip Design (5 ECTS)
02206 Design of Integrated Circuits (7.5 ECTS) - Terminated
02207 Advanced Digital Design Techniques (5 ECTS) - Terminated
02220 Distributed Systems (7.5 ECTS)
02221 Principles of Distributed Systems (5 ECTS) - Terminated
02222 Distributed Systems (10 ECTS) - Terminated
02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)
02224 Real-Time Systems (5 ECTS)
02225 Real-Time Systems (7.5 ECTS) - Terminated
02228 Safety-Critical Embedded Systems (7.5 ECTS)
02231 Advanced Modelling and Analysis of Embedded Systems (5 ECTS)
02232 Applied Cryptography (5 ECTS) - Terminated
02233 Network Security (5 ECTS)
02234 Current Topics in System Security (5 ECTS)
02238 Biometric Systems (5 ECTS)
02239 Data Security (7.5 ECTS)
02241 Robust Software Systems (5 ECTS)
02242 Program Analysis (7.5 ECTS)
02243 Access Control and Distributed Systems (5 ECTS)
02244 Language-Based Security (7.5 ECTS)
02246 Model Checking (7.5 ECTS)
02249 Computationally Hard Problems (7.5 ECTS)
02261 Usability Engineering (5 ECTS) - Terminated
02263 Formal Aspects of Software Engineering (5 ECTS)
02264 Requirements Engineering (10 ECTS)
02265 Advanced Topics in Software Engineering (5 ECTS)
02266 User Experience Engineering (5 ECTS)
02267 Software Development of Web Services (5 ECTS)
02281 Data Logic (5 ECTS)
02283 Algorithms for Massive Data Sets (5 ECTS)
02284 Knowledge-Based Systems (5 ECTS)
02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02286 Logic in Computer Science, Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02291 System Integration (5 ECTS)

The general competences courses and technological specialization courses overlap (for such courses the ECTS points can be split but they can count only once).

The master thesis must count 30, 35, 40, 45 or 50 ECTS points and the subject of the thesis must be approved by the director of studies for the program.

Finally the student must have passed a sufficient number of electives to bring the total number of ECTS points up to 120 for the entire program (information about electives can be found in the study handbook).

Study Line: Efficient and Intelligent Software

The naive algorithm often suffices for solving small scale problems, but in many real-life settings advanced algorithms and logic-based artificial intelligence are needed for robust, efficient and intelligent software. A simple search engine can easily index the contents of a drive on a personal computer but indexing the web is much more difficult. Similarly a robot can plan its actions optimally by an exhaustive state space search only if the number of possible actions and states is very limited. Software developers must be able to work with intrinsically hard problems and large, complicated data collections.

Study Line Requirements

One of the following two general competences courses is mandatory (only one can count as general competences course):

42435 Knowledge-Based Entrepreneurship (5 ECTS)

42490 Technology, Economics, Management and Organization (10 ECTS)

The course 02243 Access Control and Distributed Systems can count as general competences course if taken in January 2010 or earlier.

The student must obtain at least 17.5 ECTS points among the following general competences courses:

02220 Distributed Systems (7.5 ECTS)

02221 Principles of Distributed Systems (5 ECTS) - Terminated

02249 Computationally Hard Problems (7.5 ECTS)

02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)

02291 System Integration (5 ECTS)

The student must supplement with the following courses such that the general competences courses comprise 30 ECTS points altogether:

02205 Principles of System-on-Chip Design (5 ECTS)

02206 Design of Integrated Circuits (7.5 ECTS) - Terminated

02207 Advanced Digital Design Techniques (5 ECTS) - Terminated

02222 Distributed Systems (10 ECTS) - Terminated

02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)

02239 Data Security (7.5 ECTS)

02242 Program Analysis (7.5 ECTS)

The student must obtain at least 12.5 ECTS points among the following technological specialization courses (note that the course 02284 is given in even years only):

02281 Data Logic (5 ECTS)

02283 Algorithms for Massive Data Sets (5 ECTS)

02284 Knowledge-Based Systems (5 ECTS)

02286 Logic in Computer Science, Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)

Requirements continue

Furthermore the course 02285 can wholly or partly count towards these 12.5 ECTS points instead of counting towards the 17.5 ECTS points listed above as general competences courses for the study line.

The student must supplement with the following courses such that the technological specialization courses comprise 30 ECTS points altogether:

02204 Design of Asynchronous Circuits (5 ECTS)
02205 Principles of System-on-Chip Design (5 ECTS)
02206 Design of Integrated Circuits (7.5 ECTS) - Terminated
02207 Advanced Digital Design Techniques (5 ECTS) - Terminated
02208 Test of Digital Systems (7.5 ECTS)
02211 Advanced Computer Architecture (5 ECTS)
02217 Design of Arithmetic Processors (5 ECTS)
02220 Distributed Systems (7.5 ECTS)
02221 Principles of Distributed Systems (5 ECTS) - Terminated
02222 Distributed Systems (10 ECTS) - Terminated
02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)
02224 Real-Time Systems (5 ECTS)
02225 Real-Time Systems (7.5 ECTS) - Terminated
02228 Safety-Critical Embedded Systems (7.5 ECTS)
02231 Advanced Modelling and Analysis of Embedded Systems (5 ECTS)
02232 Applied Cryptography (5 ECTS) - Terminated
02233 Network Security (5 ECTS)
02234 Current Topics in System Security (5 ECTS)
02238 Biometric Systems (5 ECTS)
02239 Data Security (7.5 ECTS)
02241 Robust Software Systems (5 ECTS)
02242 Program Analysis (7.5 ECTS)
02243 Access Control and Distributed Systems (5 ECTS)
02244 Language-Based Security (7.5 ECTS)
02246 Model Checking (7.5 ECTS)
02249 Computationally Hard Problems (7.5 ECTS)
02261 Usability Engineering (5 ECTS) - Terminated
02263 Formal Aspects of Software Engineering (5 ECTS)
02264 Requirements Engineering (10 ECTS)
02265 Advanced Topics in Software Engineering (5 ECTS)
02266 User Experience Engineering (5 ECTS)
02267 Software Development of Web Services (5 ECTS)
02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02291 System Integration (5 ECTS)

The general competences courses and technological specialization courses overlap (for such courses the ECTS points can be split but they can count only once).

The master thesis must count 30, 35, 40, 45 or 50 ECTS points and the subject of the thesis must be approved by the director of studies for the program.

Finally the student must have passed a sufficient number of electives to bring the total number of ECTS points up to 120 for the entire program (information about electives can be found in the study handbook).

Study Line: Embedded and Distributed Systems

Embedded systems are now everywhere: from medical devices to vehicles, from mobile phones to factory systems, almost all the devices we use today are controlled by networked embedded computers. Embedded systems often have to fulfill a wide range of competing constraints: low computational resources, high availability, adequate security, reliable communication. This requires the right balance between the hardware and software components. In this context, designing embedded systems becomes both increasingly important and increasingly difficult.

Study Line Requirements

One of the following two general competences courses is mandatory (only one can count as general competences course):

42435 Knowledge-Based Entrepreneurship (5 ECTS)

42490 Technology, Economics, Management and Organization (10 ECTS)

The course 02243 Access Control and Distributed Systems can count as general competences course if taken in January 2010 or earlier.

The student must obtain at least 15 ECTS points among the following general competences courses:

02220 Distributed Systems (7.5 ECTS)

02221 Principles of Distributed Systems (5 ECTS) - Terminated

02222 Distributed Systems (10 ECTS) - Terminated

02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)

02291 System Integration (5 ECTS)

The student must supplement with the following courses such that the general competences courses comprise 30 ECTS points altogether:

02205 Principles of System-on-Chip Design (5 ECTS)

02206 Design of Integrated Circuits (7.5 ECTS) - Terminated

02207 Advanced Digital Design Techniques (5 ECTS) - Terminated

02239 Data Security (7.5 ECTS)

02242 Program Analysis (7.5 ECTS)

02249 Computationally Hard Problems (7.5 ECTS)

02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)

The student must obtain at least 15 ECTS points among the following technological specialization courses:

02211 Advanced Computer Architecture (5 ECTS)

02224 Real-Time Systems (5 ECTS)

02225 Real-Time Systems (7.5 ECTS) - Terminated

02228 Safety-Critical Embedded Systems (7.5 ECTS)

02231 Advanced Modelling and Analysis of Embedded Systems (5 ECTS)

Requirements continue

Furthermore the course 02223 can wholly or partly count towards these 15 ECTS points instead of counting towards the 15 ECTS points listed above as general competences courses for the study line.

The student must supplement with the following courses such that the technological specialization courses comprise 30 ECTS points altogether:

02204 Design of Asynchronous Circuits (5 ECTS)
02205 Principles of System-on-Chip Design (5 ECTS)
02206 Design of Integrated Circuits (7.5 ECTS) - Terminated
02207 Advanced Digital Design Techniques (5 ECTS) - Terminated
02208 Test of Digital Systems (7.5 ECTS)
02217 Design of Arithmetic Processors (5 ECTS)
02220 Distributed Systems (7.5 ECTS)
02221 Principles of Distributed Systems (5 ECTS) - Terminated
02222 Distributed Systems (10 ECTS) - Terminated
02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)
02232 Applied Cryptography (5 ECTS) - Terminated
02233 Network Security (5 ECTS)
02234 Current Topics in System Security (5 ECTS)
02238 Biometric Systems (5 ECTS)
02239 Data Security (7.5 ECTS)
02241 Robust Software Systems (5 ECTS)
02242 Program Analysis (7.5 ECTS)
02243 Access Control and Distributed Systems (5 ECTS)
02244 Language-Based Security (7.5 ECTS)
02246 Model Checking (7.5 ECTS)
02249 Computationally Hard Problems (7.5 ECTS)
02261 Usability Engineering (5 ECTS) - Terminated
02263 Formal Aspects of Software Engineering (5 ECTS)
02264 Requirements Engineering (10 ECTS)
02265 Advanced Topics in Software Engineering (5 ECTS)
02266 User Experience Engineering (5 ECTS)
02267 Software Development of Web Services (5 ECTS)
02281 Data Logic (5 ECTS)
02283 Algorithms for Massive Data Sets (5 ECTS)
02284 Knowledge-Based Systems (5 ECTS)
02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02286 Logic in Computer Science, Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02291 System Integration (5 ECTS)

The general competences courses and technological specialization courses overlap (for such courses the ECTS points can be split but they can count only once).

The master thesis must count 30, 35, 40, 45 or 50 ECTS points and the subject of the thesis must be approved by the director of studies for the program.

Finally the student must have passed a sufficient number of electives to bring the total number of ECTS points up to 120 for the entire program (information about electives can be found in the study handbook).

Study Line: Reliable Software Systems

IT systems form the infrastructure of society. There is a push towards making services available only via the web, sometimes not even offering human interaction. This puts strong demands on the ability to conceive, design and implement useful IT systems quickly and reliably. These systems must be designed around sound security concerns right from the start. Ensuring the confidentiality of banking or health data and maintaining the integrity of essential documents are vital to protect against a "big brother" society or one that can be brought to a stand-still by "denial of service" attacks.

Study Line Requirements

One of the following two general competences courses is mandatory (only one can count as general competences course):

42435 Knowledge-Based Entrepreneurship (5 ECTS)

42490 Technology, Economics, Management and Organization (10 ECTS)

The course 02243 Access Control and Distributed Systems can count as general competences course if taken in January 2010 or earlier.

The student must obtain at least 17.5 ECTS points among the following general competences courses:

02220 Distributed Systems (7.5 ECTS)

02221 Principles of Distributed Systems (5 ECTS) - Terminated

02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)

02242 Program Analysis (7.5 ECTS)

02291 System Integration (5 ECTS)

Furthermore if taken in January 2010 or earlier the course 02243 can wholly or partly count towards these 17.5 ECTS points instead of counting towards the 12.5 ECTS points listed below as technological specialization courses for the study line.

The student must supplement with the following courses such that the general competences courses comprise 30 ECTS points altogether:

02205 Principles of System-on-Chip Design (5 ECTS)

02206 Design of Integrated Circuits (7.5 ECTS) - Terminated

02207 Advanced Digital Design Techniques (5 ECTS) - Terminated

02222 Distributed Systems (10 ECTS) - Terminated

02239 Data Security (7.5 ECTS)

02249 Computationally Hard Problems (7.5 ECTS)

02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)

The student must obtain at least 12.5 ECTS points among the following technological specialization courses:

02232 Applied Cryptography (5 ECTS) - Terminated

02241 Robust Software Systems (5 ECTS)

02243 Access Control and Distributed Systems (5 ECTS)

02244 Language-Based Security (7.5 ECTS)

02246 Model Checking (7.5 ECTS)

Requirements continue

The student must supplement with the following courses such that the technological specialization courses comprise 30 ECTS points altogether:

02204 Design of Asynchronous Circuits (5 ECTS)
02205 Principles of System-on-Chip Design (5 ECTS)
02206 Design of Integrated Circuits (7.5 ECTS) - Terminated
02207 Advanced Digital Design Techniques (5 ECTS) - Terminated
02208 Test of Digital Systems (7.5 ECTS)
02211 Advanced Computer Architecture (5 ECTS)
02217 Design of Arithmetic Processors (5 ECTS)
02220 Distributed Systems (7.5 ECTS)
02221 Principles of Distributed Systems (5 ECTS) - Terminated
02222 Distributed Systems (10 ECTS) - Terminated
02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)
02224 Real-Time Systems (5 ECTS)
02225 Real-Time Systems (7.5 ECTS) - Terminated
02228 Safety-Critical Embedded Systems (7.5 ECTS)
02231 Advanced Modelling and Analysis of Embedded Systems (5 ECTS)
02233 Network Security (5 ECTS)
02234 Current Topics in System Security (5 ECTS)
02238 Biometric Systems (5 ECTS)
02239 Data Security (7.5 ECTS)
02242 Program Analysis (7.5 ECTS)
02249 Computationally Hard Problems (7.5 ECTS)
02261 Usability Engineering (5 ECTS) - Terminated
02263 Formal Aspects of Software Engineering (5 ECTS)
02264 Requirements Engineering (10 ECTS)
02265 Advanced Topics in Software Engineering (5 ECTS)
02266 User Experience Engineering (5 ECTS)
02267 Software Development of Web Services (5 ECTS)
02281 Data Logic (5 ECTS)
02283 Algorithms for Massive Data Sets (5 ECTS)
02284 Knowledge-Based Systems (5 ECTS)
02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02286 Logic in Computer Science, Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02291 System Integration (5 ECTS)

The general competences courses and technological specialization courses overlap (for such courses the ECTS points can be split but they can count only once).

The master thesis must count 30, 35, 40, 45 or 50 ECTS points and the subject of the thesis must be approved by the director of studies for the program.

Finally the student must have passed a sufficient number of electives to bring the total number of ECTS points up to 120 for the entire program (information about electives can be found in the study handbook).

Study Line: Software Engineering

Software plays a central role in almost all aspects of daily life, e.g. in finance, health care, government, and telecommunications. The use of software systems has grown dramatically as has their complexity. Enormous amounts of money are spent every day on software development yet the resulting software does not always meet the user's requirements and is not always reliable. This study line aims to give you the skills required to develop high-quality software products. It teaches well-founded methods, techniques, and tools for the modeling, construction, analysis and verification of software systems.

Study Line Requirements

One of the following two general competences courses is mandatory (only one can count as general competences course):

42435 Knowledge-Based Entrepreneurship (5 ECTS)

42490 Technology, Economics, Management and Organization (10 ECTS)

The course 02243 Access Control and Distributed Systems can count as general competences course if taken in January 2010 or earlier.

The student must obtain at least 15 ECTS points among the following general competences courses:

02220 Distributed Systems (7.5 ECTS)

02221 Principles of Distributed Systems (5 ECTS) - Terminated

02222 Distributed Systems (10 ECTS) - Terminated

02239 Data Security (7.5 ECTS)

02291 System Integration (5 ECTS)

The student must supplement with the following courses such that the general competences courses comprise 30 ECTS points altogether:

02205 Principles of System-on-Chip Design (5 ECTS)

02206 Design of Integrated Circuits (7.5 ECTS) - Terminated

02207 Advanced Digital Design Techniques (5 ECTS) - Terminated

02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)

02242 Program Analysis (7.5 ECTS)

02249 Computationally Hard Problems (7.5 ECTS)

02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)

The student must obtain at least 15 ECTS points among the following technological specialization courses:

02263 Formal Aspects of Software Engineering (5 ECTS)

02264 Requirements Engineering (10 ECTS)

02265 Advanced Topics in Software Engineering (5 ECTS)

02266 User Experience Engineering (5 ECTS)

02267 Software Development of Web Services (5 ECTS)

Requirements continue

Furthermore if taken in spring 2011 or earlier the course 02225 can count towards these 15 ECTS points.

The student must supplement with the following courses such that the technological specialization courses comprise 30 ECTS points altogether:

02204 Design of Asynchronous Circuits (5 ECTS)
02205 Principles of System-on-Chip Design (5 ECTS)
02206 Design of Integrated Circuits (7.5 ECTS) - Terminated
02207 Advanced Digital Design Techniques (5 ECTS) - Terminated
02208 Test of Digital Systems (7.5 ECTS)
02211 Advanced Computer Architecture (5 ECTS)
02217 Design of Arithmetic Processors (5 ECTS)
02220 Distributed Systems (7.5 ECTS)
02221 Principles of Distributed Systems (5 ECTS) - Terminated
02222 Distributed Systems (10 ECTS) - Terminated
02223 Fundamentals of Modern Embedded Systems (7.5 ECTS)
02224 Real-Time Systems (5 ECTS)
02225 Real-Time Systems (7.5 ECTS) - Terminated
02228 Safety-Critical Embedded Systems (7.5 ECTS)
02231 Advanced Modelling and Analysis of Embedded Systems (5 ECTS)
02232 Applied Cryptography (5 ECTS) - Terminated
02233 Network Security (5 ECTS)
02234 Current Topics in System Security (5 ECTS)
02238 Biometric Systems (5 ECTS)
02239 Data Security (7.5 ECTS)
02241 Robust Software Systems (5 ECTS)
02242 Program Analysis (7.5 ECTS)
02243 Access Control and Distributed Systems (5 ECTS)
02244 Language-Based Security (7.5 ECTS)
02246 Model Checking (7.5 ECTS)
02249 Computationally Hard Problems (7.5 ECTS)
02261 Usability Engineering (5 ECTS) - Terminated
02281 Data Logic (5 ECTS)
02283 Algorithms for Massive Data Sets (5 ECTS)
02284 Knowledge-Based Systems (5 ECTS)
02285 Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02286 Logic in Computer Science, Artificial Intelligence and Multi-Agent Systems (7.5 ECTS)
02291 System Integration (5 ECTS)

The general competences courses and technological specialization courses overlap (for such courses the ECTS points can be split but they can count only once).

The master thesis must count 30, 35, 40, 45 or 50 ECTS points and the subject of the thesis must be approved by the director of studies for the program.

Finally the student must have passed a sufficient number of electives to bring the total number of ECTS points up to 120 for the entire program (information about electives can be found in the study handbook).

Important

- Consult the study handbook and the course base for more information on courses, grades and deadlines.
- Contact the director of studies, associate professor Jørgen Villadsen, DTU Informatics, in case of questions regarding the program.
- It is not mandatory to follow a study line and there is no registration in advance for a study line but the director of studies must be notified before the thesis is handed in.
- It is only possible to obtain a diploma supplement for a single study line even if more than one study line has been followed.

Links

Program: http://www.imm.dtu.dk/English/Teaching/MSc/Computer_Science_and_Engineering

Course Base: <http://www.kurser.dtu.dk/index.aspx?menulanguage=en-gb>

Study Handbook: <http://shb.dtu.dk/default.aspx?language=en-gb>