

# COMPUTER SCIENCE 2011 (2012, 2013)

## **Academic regulations for the Master's degree programme in Computer Science 2011 at Science and Technology**

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### **1. Framework conditions for the academic regulations**

The academic regulations were prepared by the Board of Studies, Master's Degree Programmes.

The academic regulations were approved by the Dean of the Faculty of Science and Technology on 5 July 2011.

The academic regulations take effect on 1 August 2011.

A completed Master's degree programme provides graduates with the title Master of Science (MSc) in Computer Science, specifying elective subjects (subsidiary subjects) taught at upper secondary schools, if applicable.

#### **Academic line and main subject areas of the degree**

The Master's degree programme in Computer Science is a research-based study programme that – based on a qualifying Bachelor's degree – consists of advanced studies within Computer Science. The Master's degree programme also includes study components from other subject areas, profiling the programme according to the student's individual interests and desired competence profile.

#### **Academic skills and qualifications**

The aim of the Master's degree programme is to develop the academic and personal skills the student acquired during the previous Bachelor's degree programme, so that the Master:

- obtains qualifications for employment in private and public sector companies and organisations – both in Denmark and abroad – where a high level of expertise in Computer Science is required.
- acquires the necessary prerequisites for further studies, including a PhD degree programme.

Compared with Bachelors, Masters have expanded on their academic knowledge, analytical skills and independence to the extent that the Master is able to independently apply scientific theory and methodology within the field of Computer Science. By completing the degree programme, the Master

obtains skills in the following overall competence goals:

- The Master has general knowledge of Computer Science and detailed knowledge of key disciplines, methodologies, theories and concepts within Computer Science.
- The Master can independently plan, manage and implement projects and apply the results in scientifically relevant decision processes.
- The Master can assess the applicability and appropriateness of theoretical, experimental and practical methodologies for the analysis and solution of scientific questions and issues.
- The Master can structure his/her own competence development independently and critically.
- The Master is able to systematically and critically familiarise himself/herself with new subject areas.
- The Master can relay and communicate academic questions and issues to both a scientific and a general audience.
- The Master can collaborate constructively on a scientific basis to solve subject-related issues.
- The Master has an understanding of and insight into the connection between Computer Science and the other scientific subject areas, and has qualified knowledge regarding the interaction between Computer Science and society at large.

### **Standard ECTS credits**

The Master's degree programme in Computer Science amounts to 120 ECTS credits. If Computer Science is combined with an elective subject (subsidiary subject) taught at upper secondary schools, with a view to teaching at upper secondary schools, this amount can be extended to 150 ECTS credits, if the subsidiary subject is Sport Sciences or is outside the science subject area.

### **Authority**

The academic regulations for the Master's degree in Computer Science are determined in accordance with:

The Danish Ministry of Science, Technology and Innovation's Executive Order no. 814 of 29 June 2010 regarding the Bachelor's and Master's degree programmes at universities (the Education Executive Order) with subsequent amendments.

The Danish Ministry of Science, Technology and Innovation's Executive Order no. 864 of 5 July 2007 regarding an amendment to the Bachelor's and Master's degree programmes at universities (binding submission deadline for Master's theses and new Master's titles) with subsequent amendments.

The Danish Ministry of Science, Technology and Innovation's Executive Order no. 233 of 24 March 2011 regarding admission, etc. to Bachelor's and Master's degree programmes at universities (the Admission Executive Order) with subsequent amendments.

The Danish Ministry of Science, Technology and Innovation's Executive Order no. 857 of 1 July 2010

regarding university degree programme examinations (the Examination Executive Order) with subsequent amendments.

The Danish Ministry of Science, Technology and Innovation's Executive Order no. 250 of 15 March 2007 regarding the marking scale and other assessments of university degree programmes (the Grading Scale Executive Order) with subsequent amendments.

The Danish Ministry of Science, Technology and Innovation guidelines no. 5 of 18 January 2006 regarding university degree programmes aimed at teaching at upper secondary schools.

Additional rules relating to degree programmes are available in Aarhus University's electronic rules and regulations at <http://www.au.dk/en/about/organisation/index/>.

### **Number of places available and admission procedures**

Admission and registration regarding the Master's degree programme in Computer Science take place on a continuous basis. Applications received by 1 June and 1 December ensure admission by mid-August and mid-January, respectively, provided all admission requirements are met.

### **Admission requirements and prerequisites**

The following Bachelor's degrees qualify students for admission to the Master's degree programme in Computer Science:

- A Bachelor of Science degree in Computer Science from Aarhus University, the University of Southern Denmark or the University of Copenhagen.
- A Bachelor of Science degree in IT from Aarhus University, specialising in Software Development.

The following other degrees can provide admission to the Master's degree programme in Computer Science:

- Another Bachelor of Science degree with subject components in Computer Science equalling 60 ECTS credits, as well as basic subject components in Mathematics, Probability Theory and Statistics.
- Other qualifications can provide admission to the Master's degree programme, provided the university assesses that their level, extent and content correspond to the degrees mentioned above.

In connection with possible admission, further requirements can be stipulated regarding the composition of the degree programme.

It is a condition that the student's language skills correspond to a B level in English.

### **This degree enables admission to:**

The Master's degree in Computer Science qualifies students for admission to the PhD programme in accordance with relevant regulations.

## **Transitional rules**

## **2. Structure of the degree programme**

### **General content and academic progression provisions of the degree programme**

The study programme for the degree must consist of a combined entity and comply with the following, if there is no combination with an elective subject taught at upper secondary schools:

- The programme consists of advanced study components in Computer Science that amount to at least 90 ECTS credits, including the thesis and the compulsory Master's courses in Computer Science:
  - Translation (10 ECTS credits)
  - Experimental System Development (10 ECTS credits)
  - Optimisation (5 ECTS credits)
  - Combinatorial Search (5 ECTS credits)
- The total amount of study components in Computer Science in the programme, combined with the study components in Computer Science in the qualifying Bachelor's degree programme, must equal at least 180 ECTS credits.
- The programme must include an elective subject other than Computer Science equalling 30 ECTS credits. This requirement can be waived if the scope of the qualifying Bachelor's degree programme is sufficient.
- The programme must include a thesis amounting to 30 ECTS credits for theoretical theses and up to 60 ECTS credits for experimental theses.

If Computer Science is combined with an elective subject taught at upper secondary schools to achieve academic competence in two subjects that target teaching jobs at upper secondary school, the Master's degree programme must comply with the following:

- The programme must contain that part of the elective subject taught at upper secondary schools that is not included in the qualifying Bachelor's degree.
- The programme consists of course activities in Computer Science that amount to at least 75 ECTS credits, including the thesis and the compulsory Master's course in Computer Science:
  - Translation (10 ECTS credits)
  - Experimental System Development (10 ECTS credits)
  - Optimisation (5 ECTS credits)
  - Combinatorial Search (5 ECTS credits)

- Mathematics Education (5 ECTS credits)(see 5. Changes..)
- The total amount of study components in Computer Science in the programme, combined with the study components in Computer Science in the qualifying Bachelor's degree programme, must equal at least 180 ECTS credits.
- The programme must include a thesis amounting to 30 ECTS credits. The thesis must combine Computer Science with the elective subject to the extent possible.

The study programme is composed individually under supervision. When composing the degree programme, the individual student's interests and desired competence profile are taken into account, and this ensures that the academic progression and integrity in the degree programme comply with the requirements of a Master's degree. Approved Bachelor's courses can be included in the programme to a limited extent.

The Master's programme must be approved by the relevant responsible head of study programme prior to commencement.

### **3. Individual degree programme disciplines and examinations**

A detailed description of the degree programme's course components – including the learning goals, prerequisites and compulsory programme, if applicable – is available for each individual course component under the actual range offered in the Course Catalogue and in the list of elective subjects.

Twice a year, prior to course enrolments, the range of education programmes in the Course Catalogue and the list of elective subjects are reviewed and approved. See <http://studerende.au.dk/en/studies/subject-portals/computer-science/supplementary-subjects/>

### **4. Rules in the academic regulations**

#### **Credit and flexibility**

The Board of Studies is able to approve credit from a Danish or foreign higher education institution, cf. the Danish Ministry of Science, Technology and Innovation's Executive Order no. 867 of 19 August 2004 regarding university degree programme examinations (the Examination Executive Order).

The maximum number of credits a student can obtain for the degree programme, however, is 60 ECTS credits.

#### **Examinations**

The method of assessment and examination for the individual courses appears in the course description in the Course Catalogue. The catalogue also indicates the time for the ordinary course examination as well as any re-examination.

The first examination attempt in a course cannot take place during the period for re-examination.

All courses must be completed with one of the following methods of examination:

1. Written examination.
2. Oral examination.
3. Home assignment(s) (written examination).
4. Multiple choice (written examination).
5. Approval of compulsory assignments and/or reports.
6. Active participation in the course. Active participation can be defined as attendance and active involvement in a minimum of 80% of compulsory lessons, seminar contributions, submission (and approval) of compulsory assignments, etc.
7. Combinations of 1–6.

The examination can be with or without the aid of materials.

Information about the materials permitted, including the use of a computer, preparation, etc., is available in the individual course descriptions.

If the university considers it necessary, it can offer special examination conditions for students with a physical or mental disability, and students with similar difficulties, in order to provide such students with the same examination opportunities as other students. It is a requirement that the level of the examination remains unaffected by this offer.

Applications for special examination conditions should be submitted to the Board of Studies no later than four weeks before the start of the examination.

### **Enrolment and cancellation**

Course enrolment takes place via the self-service facility for students ([mit.au.dk](http://mit.au.dk)).

The registration periods are as follows:

Courses in first and second quarters (autumn): enrolment period 1–15 May

Courses in third and fourth quarters (spring): enrolment period 1–15 November

Study plans and a personal timetable for each student are published on the subject portal website at <http://studerende.au.dk/en/studies/subject-portals/computer-science/teaching/> no later than one week prior to commencement of the instruction period.

Students may not enrol in optional courses without prior submission and approval of a study plan that states the expected overall composition of the Master's degree programme. The Master's degree programme must be approved by the Director of Studies, and there should subsequently only be enrolments in courses stated in the approved Master's degree programme.

#### Examination registration

Students are automatically registered for examination when enrolling in a course.

Students are responsible for checking that the examination registration is correct via the self-service facility for students ([mit.au.dk](http://mit.au.dk)) and at <http://studerende.au.dk/en/studies/subject-portals/computer-science/examination/>

Information and guidance regarding examinations at Science and Technology are available at <http://studerende.au.dk/en/studies/subject-portals/computer-science/examination/>. The right to changes is reserved.

### Re-examination registration

The time of re-examinations in a course is stated in the course description. Students register for re-examination via the self-service facility ([mit.au.dk](http://mit.au.dk)) during the following periods:

For courses with re-examination after the second quarter, the registration period is 1–15 November

For courses with re-examination after the fourth quarter, the registration period is 1–15 February or 1–15 May

For courses with re-examination in August, the registration period is 1–15 July

### Cancellation of examination

Cancellation of an examination takes place via the self-service facility for students ([mit.au.dk](http://mit.au.dk)). The deadline for cancellation of a given examination is one week prior to the first day of examination in the course. If students are late in cancelling, the cancellation is not accepted and an examination attempt is recorded in their study programme.

The examination results are published in the self-service facility for students ([mit.au.dk](http://mit.au.dk)) as soon as they have been recorded.

### Illness and other circumstances in connection with an examination

See <http://studerende.au.dk/en/studies/subject-portals/computer-science/examination/reexamination-and-make-up-examination/> for the university's rules and examination guidelines.

## **Spelling and phrasing skills**

In all major written examinations, regardless of the language used in the examination, the student's skills in spelling and expression form part of the assessment. The academic content carries the most weight, but skills in spelling and written expression affect the assessment of whether the student meets the overall aims.

## **Regulations for major written submissions**

### Master's thesis

The Master's degree programme is concluded with a thesis amounting to 30 ECTS credits for theoretical theses and up to 60 ECTS credits for experimental theses. If Computer Science is combined with an elective subject (subsidiary subject) taught at upper secondary schools, the extent of the thesis is 30 ECTS credits. For the Master's thesis, the student works independently on an academic issue, on completion of which the graduate can:

- identify, define and formulate an academic issue on a scientific basis.
- define and present testable hypotheses within a subject-related topic.

- independently plan and complete a major academic project using the subject's scientific methodology.
- analyse, critically discuss and put into perspective an academic issue.
- assess, critically analyse and summarise the scientific literature within a defined topic area.
- relay academic results objectively and concisely to a scientific audience.

The thesis is concluded with the student preparing a thesis report that covers the work carried out in connection with the thesis. This report is submitted for assessment and is included in the thesis examination.

As a general rule, the thesis report must be prepared in Danish or English. In all cases, an English summary must be included. The title of the thesis must appear in Danish and English in preparation for the Master's degree diploma, which is issued in Danish and English. During the period in which they write their thesis, students are affiliated with a main supervisor appointed by the Department of Computer Science. All academic staff with permanent appointments at the Faculty of Science can act as main supervisors. Students can be affiliated with a project supervisor in addition to the main supervisor. The project supervisor can be a member of the academic staff at Aarhus University, another public sector research institution or a private sector research institution/company. In such circumstances, an agreement is drawn up in which the distribution of work between the two supervisors is specified in such a way that the main supervisor ensures that the thesis complies with the applicable norms for theses carried out at the Department of Computer Science. The main supervisor has the formal responsibility for providing academic guidance for the student during the course of writing the thesis, and must take part in the final examination.

#### Thesis contract

A contract is drawn up between the student and the main supervisor on commencement of the thesis. This contract is prepared on a special form and must include:

- Name of the student
- Main supervisor
- Project supervisor, if applicable
- Statement of the task involved in the thesis
- Credits (ECTS)
- Starting date for the thesis
- Submission date for the thesis
- Supervision plan
- Need for resources



- Publication rights

The main supervisor is responsible for making sure that the approved thesis can be completed within the agreed time. The contract is signed by the student and the main supervisor and submitted to the Director of Studies or deputy, who must approve the statement of the task, the supervision plan and the deadline for submission. This deadline can only be changed if unusual circumstances arise that affect the student. If the deadline for submitting the thesis is exceeded, the student is registered as having attempted an examination.

An application for an examination takes place when the thesis contract is entered into. It is not possible to cancel an examination.

If the student does not submit the thesis by the appointed time and thus fails, an altered statement of the task is approved within the same subject, and a new submission deadline of three months is determined. If the student does not submit the thesis within the new deadline and thus fails, a third examination attempt is possible in accordance with the same regulations that apply for the second attempt. The statement of the task and the deadline for the second and third examination attempts must be approved by the Director of Studies. The statement of the task must make allowance for the fact that extra time is provided for the thesis.

#### Thesis examination

The thesis is concluded with an individual examination after submission of the thesis report. The thesis examination consists of a lecture within a selected topic associated with the subject area of the thesis, followed by an oral examination within the topic area of the thesis. The subject of the lecture is agreed between the main supervisor, the project supervisor, if applicable, and the external examiner, and is submitted to the student seven days prior to the examination. The oral examination must be based on the prepared thesis report, as well as the lecture. One hour is set aside for the thesis examination, divided into 30 minutes for each of the two parts of the examination.

The topic area of the thesis is restricted to the literature used, as stated in the reference list for the thesis report or the answer to the thesis assignment.

One single combined mark is awarded in accordance with the Danish 7-point grading scale for the thesis report, lecture and subsequent oral examination. The student's written expression skills must be included in the assessment. An external censor participates in the examination.

The title of the thesis appears in Danish and English on the Master's degree diploma.

The thesis examination must take place at Aarhus University.

The thesis examination must be held no later than two months after submission of the thesis report.

#### **Use of computers at examinations**

A computer can be used for text processing purposes at written examinations if stated in the course description (the method of examination will be described as a computer examination). For further information see

<http://studerende.au.dk/en/studies/subject-portals/computer-science/examination/forms-of-examination-and-formal-requirements/laptop-as-an-aid-at-written-examinations/>

A computer can also be indicated as permitted material at written examinations, e.g. as a pocket calculator or as a note reference tool. It should be noted that, in such cases, a computer can only be used for the mentioned purposes – i.e. not for text processing, printing or submission. The assignment is written by hand.

### **Project-oriented procedures**

Project-oriented training in private sector companies and institutions can form part of the Master's degree programme. The project agreement and formulation are subject to prior approval by the Board of Studies, which also decides on the method of examination for the project-oriented training.

### **Exemptions**

In exceptional circumstances, the Board of Studies can grant exemptions from the rules set out in these academic regulations.

An application for exemption must be submitted to the Board of Studies. If another authority has the power to grant an exemption, the Board of Studies forwards the application to the appropriate authority (e.g. the Dean, Rector or Ministry). An application for exemption must be made in writing, stating reasons, and submitted as soon as possible. For the application to be processed immediately, it must include a precise account of the regulation from which exemption is sought, and what such exemption is intended to achieve (e.g. permission to use special aids, extension of examination time, postponement of time limits). Documentation for the unusual conditions that justify exemption must be enclosed with the application. Normally, no importance is attached to such conditions unless they are documented.

### **Appeals and complaints**

Complaints regarding matters governed by the academic regulations must be submitted to the Board of Studies. A prerequisite for immediate processing is that the complaint must be made in writing, stating reasons.

Complaints regarding examinations, including examination results, must be submitted to the Dean. Students are recommended to contact a student counsellor before submitting a complaint. A complaint must be in writing and specific, stating reasons.

The complaint must be addressed to: Dean of the Faculty of Science, Ny Munkegade 120, Building 1521, 8000 Aarhus C

The complaint must reach the Faculty of Science and Technology no later than 14 days after publication of the examination results.

See also <http://www.au.dk/en/about/organisation/index/5/56/> for university rules and examination guidelines

### **Guidelines for degree programme rules**

Acts and executive orders relating to education are available in the electronic rules and regulations of Aarhus University at <http://www.au.dk/en/about/organisation/index/>.

### **Study plan and student guidance**

The study programme for the Master's degree is individually planned under the supervision of the Department of Computer Science. The Master's programme must be approved by the Director of Studies prior to commencement. Follow-up of the approved study programme takes place at half-yearly status discussions between the student and the Department of Computer Science.

### **5. Changes to the academic regulations**

**September 2013: The Study Board for Aarhus University School of Science decided that Mathematics and computer science education (5 ECTS) is cancelled and replaced with Mathematics Education (5 ECTS). The two courses are equivalent.**