PROGRAMME DESCRIPTION

Computer Science - master

120 ECTS credits

Campus Tromsø

The program description has been approved by the Studieutvalget at the Faculty of Science and Technology on 05.09.2018

Study programme name	Computer Science - master
Obtained degree	Master of Science in Computer Science
Target group	Computer Science Master is suitable for those interested in computers, computer systems and programming. The candidates want to develop new technology for the benefit of society and business industry, and preferably in cooperation with people who have their competence in other disciplines such as health science, science, engineering, economics, education/pedagogy, etc. The master candidates are well prepared to act as a reliable computer science experts and are able to develop computer solutions for relevant and complex problems in the private or public sector. They are also prepared for teaching and consultancy tasks, and for further studies up to the doctorate in computer science. The education, together with the interest in maintaining and further developing of their own academic insight and competence, will form an important basis for their professional career. Most of our graduates go to engineering positions in the private or public sector. During the career there are many who gradually get management positions with different combinations of management and technical tasks.
Admission requirements, required prerequisite knowledge, recommended prerequisite knowledge	Admission to the Master's programme in Computer Science requires a Bachelor's degree (180 ECTS) or equivalent qualification, with a major in Computer Science of minimum 80 ECTS. The minimum average grade needed: • Applicants who hold a bachelor's degree or equivalent issued in Norway, Europe, Canada, USA, Australia and New Zealand: An average grade C as a minimum requirement, or the corresponding numerical mark/percentage score is to be eligible for admission to master's level study programmes. • Applicants who hold a bachelor's degree or equivalent issued in countries other than the above mentioned region/countries: An average grade B as a minimum requirement, or the corresponding numerical mark/percentage score to be eligible for admission to master's level study programmes. Excellent programming skills, (preferably in C, Python) at systems level, and knowledge of operating systems is strongly required. Students are expected to have skills equivalent to the prerequisites the courses in the study programme are build upon. **Applicants from Norway or Nordic countries:** • The application deadline for Norwegian and other Nordic applicants is April 15th for admission to the autumn semester • Online application, study code 4008. **Applicants from outside the Nordic countries:** • The application deadline for international applicants is 1 December for admission to the autumn semester. • Online application, study code 2017. • Applicants from outside the Nordic countries must enclose an overview on their practical programming skills and what large implementation projects they have been involved in. The applicants

	should give examples (refer to URLs) of such projects and their own contribution (the programming part) to these projects. • Applicants from outside the Nordic countries must enclose source code for a solution of this programming task: *[Link til programmeringsoppgaven].*
Academic content and description of the study programme	Computer Science Master is a full-time study programme offered at UiT's campus in Tromsø. The study programme supply you with a solid foundation in computer science, combined with deeper and more detailed understanding and skills within your chosen area of specialization in the master thesis. The study programme consists of four mandatory courses in computer science, a total of 40 ECTS credits, and 20 ECTS credits of elective courses. The elective courses may be within topics such as economics, management, psychology and entrepreneurship. The programme concludes with a master thesis of 60 ECTS credits. Since the study programme is very experimental with a lot of practical programming exercises and laboratory work emphasis is placed on that the students are acquiring computer science and engineering skills. The computer science courses are directly connected to the on-going research carried out by the academic staff at the department. For the master thesis you will apply broad skills in computer science, combined with deeper insights in your selected specialty to solve difficult problems within the particular area you are pursuing. The theme of your master's thesis will reflect and shall contribute to ongoing research activities at the department within the broad areas of computer systems research and/or medical informatics and applications. Current topics include software architectures, distributed systems, parallel systems, exascale computing, computer security, programming methodologies, dependable systems, real-time systems, operating systems, performance measurements and evaluation, large scale visualization, feature-rich large-scale search, computer networks and communication, handling of massive data, web-services and -architectures, collaborative editing, bioinformatics, social media, analysis of social data, medical informatics and technological issues in health sciences. The student may also specify the master thesis based on his/her own interests or write a thesis for a company.

Table: programme structure	Semester	10 credits	10 credits	10 credits	
	Semester 1	*INF-3200 Distributed Systems Fundamentals*	*INF-3201 Parallel Programming*	*Optional course*	
	Semester 2	*INF-3203 Advanced Distributed Systems*	*INF-3701 Advanced Databases*	*Optional Course*	
	Semester 3	*INF-3990 Master's Thesis in Computer Science*			
	Semester 4				

The study programme's Learning Outcome	***Knowledge – The candidate has…*** • a broad solid foundation in computer science • considerable depth of understanding of a selected area of specialization

	• a deep understanding on state of the art distributed and parallel software architectures • a solid knowledge about risks and threats in computer systems and their related security measures • a solid understanding of system and application development relevant to the chosen specialty *Skills – The candidate can…* • work independently on a significant non-trivial problem over a longer time-period • analyze a problem and plan how to work towards a solution • plan, organize and execute the work required to solve the problem. Adapt to changes and limitations. • demonstrate the feasibility of the solution by implementing key parts • collect and analyze relevant metrics characterizing the problem and the solution • write a well-structured and clearly formulated report describing the thesis work and reflecting on its results *General competence – The candidate …* • has an interest for the continued development of computer science as a dynamic field under the influences of advances in the discipline, changes in technology, and in application areas, business models, and businesses. • can communicate effectively, orally and in writing, within the field, and with the public as well as experts in other fields • can pursue life-long learning and development • is aware of relevant social and ethical issues and apply this awareness to their professional conduct
The study programme's relevance	Computer science is today's most expansive, innovative and applied dicipline and technology. Knowledge of computer science methods and tools is currently included in most areas of knowledge production and other value creation in today's society. Application in other diciplines also concerns because computer science is an important factor for the further development of these. The study programme leads to a degree as a Master of Science in Computer Science and qualifies for admission to the PhD programme in Science, assuming satisfactory grade level.
Work scope and learning activities	To complete the study programme until the master's degree requires motivation and targeted work effort. To achieve the learning outcomes for the study programme, students must expect to spend more than 40 hours a week in the study from the study start, including lectures, group hours, laboratory work and self-taught self-study. The study programme offers a varied teaching programme while most courses are intensive and project oriented. In lectures, theory and academic theme are examined. In the group work, students are expected to be active in discussions of issues in the subject matter. Students work in laboratories where compulsory assignments are solved to acquire practical skills in designing, building and maintaining computer systems, either individually or in teams with other students.

| | In addition to collaborating with other informatics students, the students will also work with people who have knowledge in other areas. In order to train this, it is important that the student takes an active role, is present and contributes to the learning environment, both in organized teaching and otherwise during the weeks where the students cooperate and largely learn from each other.

All academic staff who teach the study programme are active researchers in various research projects. The courses are based on relevant research and are related to the departments research activity. As a student, you will be able to engage in projects in the research laboratories along the way. Special curriculum and master theses are often part of a larger project context, in a working community in a research group. In the work on these assignments, individual guidance is provided from the department's academic staff. The Master's thesis may by agreement also be conducted in, or in cooperation with, a company. |
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| Examination and assessment | Mandatory coursework is given to each course. Approved assignments give access to the exam. The examination structure differs between the courses; from written examination to project work reports, presentation of scientific work or oral examination. And often a combination of these methods. Details on assessment methods and access to any types of exams in the teaching free semester are stated in course descriptions. |
| For master's theses/ independent work in master's degrees | The master's degree thesis consists of an independent scientific work of two semesters, equivalent to 60 ECTS credits. The thesis must be done individually, as group collaboration usually is not permitted. A supervision contract for the thesis is set up before the start-up, which regulates rights, obligations and resource use and resource access for the parties involved. Assessment form is submission of a master thesis and final oral exam. |
| Language of instruction and examination | The language of instruction is English and all of the syllabus material is in English. Examination questions will be given in English, but may be answered either in English or a Scandinavian language.

Also the Master's thesis may be written either in English or a Scandinavian language. |
| Internationalisation and student exchange | Exchange stays at other educational institutions in Norway or abroad can by agreement be included in the programme. The Department of computer science has subject-specific exchange agreements (Erasmus +) with several universities in Europe where the agreements with the Technical University of Munich, Germany and Vrije Universiteit Amsterdam, Netherlands are recommended. An overview of the departments exchange agreements can be found at the Department of Computer Science's web pages.

Students can carry out an exchange stay in the second semester of the study. The courses scheduled for completion during the exchange period must be pre-approved in consultation with the department. The department will in each case assess how and to what extent external courses can replace mandatory subjects in the student's education plan at UiT.

Students wishing to carry out an exchange stay as part of the study programme must contact the department administration in good time before leaving, no later than the semester start of the semester before departure. The pre-approved courses are included as part of the study at UiT. If the student do not accomplish the pre-approved arrangemnent this may lead to extended study time. |

	The amount of work should be representative of the period during which the student is on exchange stays.
	Since the study is English-thought, there will be international students from different parts of the world.
	The academic staff at the department associated with the study programme has active cooperation with leading research communities internationally, and this also benefits the students in the form of guest lectures.
Administrative responsibility and academic responsibility	Programme management with the academic responsibility of the Computer Science - Master has been added to the department board at the Department of Computer Science. The Department of Computer Science at the Faculty of Science and Technology is administratively responsible for the study programme.
Quality assurance	The study programme is evaluated annually. The courses included in the study programmes are evaluated at least every third time they are given. Course evaluation is normally conducted as a dialogue between the students and the teacher, combined with the assessment of available data. An overview of the courses to be evaluated each semester can be found on the faculty's web pages.
	Annually, each class on the study programme elects a representative who can be spokesperson towards the academic community in various study-related cases.
	The courses of the study programme change as a result of the development of computer science as a dicipline, the relevant technologies available and the department academic staffs evaluation in dialogue with the business industry.
	For good quality assurance of learning outcomes, exam questions are evaluated against national quality standards in computer science as practiced at the universities of Oslo, Bergen, Trondheim and Tromsø. Well-qualified external examiner are used in accordance with UiT regulations.
Other regulations	Faculty of Science and Technology has prepared *Supplementary provisions for the two years master's degree programme* (120 credits).