Kristiania

Programme description

Master of Applied Computer Science

120 credits
2023-2025

Full time (two years) or
Part time (first 60 credits with 50% progression, last 60 credits with 100% progression)

The programme is accredited by NOKUT 19.09.2013
The programme is re-accredited by The board 18.10.2022
The programme description is approved by
The Education Committee 30.09.2022 (UU/EIT-case no. 122/22)

1. Introduction

The study programme Master of Applied Computer Science (MACS) is an advanced programme for students who aim for a career in applied computer science. The programme focuses on the solicitation of classic and leading-edge computing concepts and technologies, applied at different levels from system development to project analysis, project management and consulting.

Applied computing is both a professional discipline and an academic field, aiming to bridge the technical capabilities of IT with organizations' needs. Applied Computing is the application of classic and leading-edge computing concepts and technologies to different current problem areas. These concepts and technologies can be applied at the different levels of system development from project analysis and implementation to project management and maintenance. MACS aims at educating the next generation of technical leaders, architects, developers, innovators, and entrepreneurs as they learn how to turn research findings into practical applications. Candidates will achieve an advanced knowledge in the areas of architecture, integration and modern software systems, in terms of theories, knowledge claims, research methods and professional standards. They will be able to apply this knowledge, and to reflect on how applied computing systems contribute to bridge the gap between business and societal aims.

Candidates will take responsibility for solving complex tasks and conducting a research project at a high standard in an organisation/company. This includes the ability to choose the appropriate research approach, to choose or develop a solution, to handle relationships ethically and professionally, and to evaluate and communicate the results in a systematic

A successful solution requires competence in tools, technology and business. With a Master´s degree in Applied Computer Science, you can work in many roles such as:

- Chief Technology Officer (CTO)
- Project Manager
- Architect
- Consultant
- System Developer
- IT Expert

After completing the Master's programme, the candidate is also formally qualified for a PhD study in a related area of research.

1.1 Prerequisites

Applicants must meet the following requirements:

- Bachelor's degree in technology or a related field with an average grade of minimum C.
- Relevant practices, or other special considerations, may in some cases weigh up for non-compliant grade requirements.
- The applicants must also write a motivational letter of 500 words max in English.

Language requirements:
Non-Scandinavian applicants must document their proficiency in English, in terms of speaking and writing English fluently documented by a TOEFL test (score 98) or an IELTS test (score 6.5).

For more information about admission requirements check our website:
https://www.kristiania.no/en/studies/masters-degree/applied-computer-science-software-integration/

2. Learning outcomes

All study programmes at Kristiania University College have adopted overarching learning outcomes that each student is expected to have achieved having completed the course. The learning outcomes describe what the student is expected to be able to do as a result of the learning acquired throughout the course. The academic outcome is divided into three categories: Knowledge, Skills and General competence.

Knowledge

The candidate ...

- has an advanced knowledge of applied computing as a research field, in terms of theories, knowledge claims, research methods, processes, tools, technologies and professional standards.
- can apply this knowledge and reflect on how applied computing contributes to increase interaction.
- has thorough knowledge about how to utilize research findings for the benefit of individual- and organisational needs and develop new knowlegde for societal aims.
- can analyze and explain professional issues based on the development of applied computer science, it's history and importance in society

Skills

The candidate ...

- can describe, construct and critically discuss key technologies and software artefacts
- has strong skills in analyzing, problem solving and evaluating complex individual- and organizational problems, research issues and technology innovation opportunities.
- can critically evaluate how to solve individual-, organizational- and societal problems, and carry out independent research and expertise within chosen research area.
- has strong skills in applying research approaches and methods and can carry out an independent research or development project under supervision.

General Competence

The candidate ...

- can take responsibility for solving complex tasks and conduct research-based information technology project at a high standard, in at professional an ethical way
- can critically assess and select the appropriate research approach to choose and/or develop a solution.
- can present the results from extensive independent work, mastering the terminology of the field.
- can communicate outcomes of the research project to professionals and to the general public with the goal of contributing to innovation.
- can analyse, design, develop and evaluate solutions through independent and team-based projects, and contribute to innovation processes.

3. Programme structure and content

Master of Applied Computer Science is run over two years (full-time) or three years (part-time) with a total of 120 ECTS credits, of which 90 credits is comprised of compulsory courses, and 30 credits comprised of optional (elective courses). The courses are thought as modules, meaning that the students usually will complete one module before starting the next.

The programme runs over four (full-time) or six (part-time) semesters, and is built up as follows:

Semester	Master of Applied Computer Science, full-time			
1. semester	**Systems Development** 7,5 ECTS	**Big Data** 7,5 ECTS	**Integration Oriented Architectures** 7,5 ECTS	**Ethics, sustainability and society** 7,5 ECTS
2. semester	**Visual Analytics** 7,5 ECTS	**Mobile Computing and Internet of Things** 7,5 ECTS	**Research Methods** 7,5 ECTS	**Proposal Development** 7,5 ECTS
3. semester	Elective 30 ECTS			
	Student exchange/practice 30 ECTS			
4. semester	**Master Thesis** 30 ECTS			

Table 1. Courses matrix (full time)

Compulsory courses	Elective courses

Semester	Master of Applied Computer Science, part-time		
1. semester	**Systems Development** 7,5 ECTS	**Integration Oriented Architectures** 7,5 ECTS	
2. semester	**Visual Analytics** 7,5 ECTS	**Research Methods** 7,5 ECTS	
3. semester	**Big Data** 7,5 ECTS	**Ethics, sustainability and society** 7,5 ECTS	
4. semester	**Mobile Computing and Internet of Things** 7,5 ECTS	**Proposal Development** 7,5 ECTS	
5. semester	Elective 30 ECTS		
	Student exchange/practice 30 ECTS		
6. semester	**Master Thesis** 30 ECTS		

Table 2. Courses matrix (part time)

Compulsory courses	Elective courses

3.1 Academic progression

The first year (first and second year for part-time students) provides the students with knowledge and skills in Applied Computer Science, including systems development, big data, emerging technologies, innovation, architecture, mobile computing and interactive / intelligent systems.

In the last year, one semester is for electives or exchange before the thesis. During the thesis, the student will be able to draw on and integrate all these resources.

Especially for part-time studentes there is a possibility during the third semester to do practical work or preparation for conducting the masters thesis at the students worksplace/the industry.

The academic progression is described according to the full-time programme. Part-time students spend two years completing the first 60 credits (50% progression), while the last 60 credits are completed within one year (100% progression). See tables above for an overview of progress of study for full- and part time progression.

3.2 Courses

Course name	Credits	Description
Specialization courses		
Systems Development	7,5	Students will gain knowledge of models, theories, and frameworks for information systems development from the research traditions of Action Research, Design Science, Scandinavian Participatory Design, and Engaged Scholarship. Students will obtain an overview of the technologies, tools, and platforms central to the upcoming courses Master programme. Students will also gain knowledge of software documentation, data collection, data analysis, and technical writing.
Big Data	7,5	Students will gain advanced knowledge of key theories and concepts of big data and machine learning. They will acquire specialised problem-solving skills, being able to bring together several key technologies used in manipulating, storing, and analysing big data. They shall take responsibility to conduct the planning and implementation of activities and evaluate the organisations value of big data. Students will learn how to extract and identify useful features that best represent the data, learn about the most important machine learning algorithms as well as evaluating the performance of the chosen machine learning algorithm.
Visual Analytics	7,5	Students will gain knowledge about theoretical principles of and computational techniques for visual analytics. The course will enable students to design, develop, and evaluate information dashboards for organizations. The students shall be able to reflect upon the different models, theories, and frameworks for technology integration from a visual analytics perspective.
Integration Oriented Architecture	7,5	This course introduces interaction-oriented software architectures, to provide the students with analytical skills, development methodologies and technological skills that are necessary to analyse, plan and implement architectures for integration projects. The course will be taught in the context of enterprise systems and distributed systems, which means that issues of network protocols, scalability and security will be emphasized.
Mobile Computing and Internet of Things	7,5	Students will gain in depth knowledge of mobile computing and introduce the Internet of Things (IoT). Students will further acquire knowledge of theories/models of mobile and pervasive computing applications, technologies and common research paradigms in mobile and pervasive computing such as context awareness, computing in an environment with limited resources, sensor-based interaction, and smart-device management. They will acquire skills in application design, architecture and implementation. Students will be expected to be able to analyse, discuss and critically reflect upon theories and research issues in mobile computing and internet of things.
Common courses		

Ethics, sustainability and society	7,5	The main aim of this course is to provide students with the fundamental knowledge of ethics and sustainability necessary for responsible innovation and the development of new information technologies (IT) in the modern society. The central topics include the role of ethics in responsible innovation and IT development; social, economic, and environmental impacts of innovations and new ITs; and how IT development and innovation can contribute to achieving the UN Sustainable Development Goals. In covering ethical and sustainability issues, the course addresses the perspectives of various stakeholders at the individual level (IT developers, innovators, consumers, investors), the organizational level (commercial, public, and non-governmental organizations), and the societal level (local and regional communities, nations, international society). Group work on possible solutions to real-life ethical and sustainability challenges constitutes an essential part of the course.
Research Methods	7,5	This course is intended as an introduction to research methodology and the research process. This introduction gives the students an overview of the basic concept, methods, and practice of research. Research is a cyclical process where new and carefully planned investigations build and extend on established work. The aim is to provide students with a fundamental understanding of research as a conceptual, empirical, and practical approach to gathering new insight and knowledge. The content provides a broad overview of how researchers work within the fields of economy, innovation, and technology. It presents students with relevant methods from these domains, along with their possibilities and limitations. Students will learn a systematic approach to empirical investigation, including literature search, research design and methodology, qualitative and quantitative analyses, and the presentation and evaluation of results. At completion of the course, students will be able to study and interpret existing research on a topic and suggest approaches to broaden or deepen knowledge within a given topic.
Proposal Development	7,5	The overall objective of this course is to help students conceptualize and prepare a timely and relevant research proposal, and to nurture a sense of inquisitiveness and active participation in research. The course aims at offering insight into the process behind a successful research project. It has an applied approach that involves collaborative and reciprocal partnerships between the university (faculty, staff, and/or students) and external communities for the mutually beneficial exchange of knowledge and resources. The research proposal forms the basis for the master thesis and the allocation of supervisor(s).

3.3 Electable courses

Which elective courses that may be offered may be subject to change.

Courses	Credits	Description
Prototype development	15	Students will gain the opportunity to do an in-depth analysis of a problem and produce a prototype to solve the problem.
Consulting and Leadership	7.5	This course focuses on the soft skills in management of information systems. Students will gain advanced knowledge of theories on leadership, change agents, ethics and required skills within IT-consultancy. They will acquire specialized problem-solving skills, being able to master the personal and organizational

		techniques required to participate in a change process, practicing leadership and developing professional skills within consulting. They shall take responsibility to conduct a minor consulting project thru an agreement, plan and evaluation.
Emerging Technologies	7.5	The student will during a lecture series, study, read, digest and process academic literature in an advanced area not offered by other existing courses. The course explores the current and potential future impacts of new, emerging, and rapidly evolving technologies in human-computer interaction and computer science. Students will gain insights into these technologies and how society, organizations and people are coping (or not) with the resulting disruption. The student will demonstrate their mastery of the material by a combination of oral discussions with the faculty members and co-students; exercises set by the faculty member accompanying the readings; and a written summary synthesizing the material that the student learned. Overall, the student will gain a broader and deeper perspective of the emerging areas in the fields.
Agile Project Management	7,5	Organizations need to develop project managers who can complete projects on time and within budget and this course addresses challenges such as the ability to manage projects and stakeholders, risk assessment and agile planning. Students will gain advanced knowledge of the key theories of project management and agile development. They will acquire specialized problem-solving skills, being able to plan and run a time-boxed iteration, and to use a project management tool. They shall take responsibility to conduct plan, organize and control an agile IS project.
Interactive Technologies	7,5	The aim of the course is to design, develop and evaluate interactive technologies with a focus on the enterprise context of use. Students will be immersed in a pedagogical experience that covers the full spectrum of design, development, use and evaluation of innovative and interactive enterprise technologies using smartphones, tablets, motion controllers, touch tables, and touch walls. Natural User Interfaces (NUI) will be a special focus of the course. Students will use state-of-the-art mobile eye-tracking solutions to evaluate the applications/products designed and developed.

3.4 Master Thesis (30 credits)

Courses	Credits	Description
Master Thesis	30	The master thesis is a research project in which students will apply the knowledge acquired during their studies. It is a crafted scholarly document presenting research questions and original arguments based on scientific methods under the guidance of an advisor. The thesis gives the student the opportunity to demonstrate expertise in their chosen research area. Students will acquire specialized problem-solving skills, being able to plan and conduct the steps in the research and/or development process at a high methodological standard. They shall take responsibility to conduct a well planned and executed project.

4. Teaching methods

The individual courses, except the thesis, are structured in block mode for four weeks. The first two weeks will be a combination of lectures, case studies, in-class presentations and lab work. Guest lectures will be organized on chosen topics. Students work in groups under supervision. The two last weeks are for self-study, project work and oral exam. The master thesis is a self-organized period of study where the students draw upon plenary lectures, individual supervision and self-organized group work.

The programme uses a number of varied forms of teaching in order to encourage learning.

- Lectures, to introduce theoretical issues and domain knowledge
- Seminars and group work, to give the students the opportunity to discuss different perspectives, integrate with previous knowledge, and practice analytical assessment with case materials.
- Practical assignments and lab work, to develop hands-on technical skills
- Directed and student-selected readings, to develop a solid knowledge base
- Technical demonstrations, to present and convey the technical workings and user interaction aspects of an IT artefact
- Oral presentations, to develop personal communication skills
- Essay and thesis writing, in order to synthesise knowledge and present analyses and results
- Supervision, to provide detailed feedback and discussion of student projects in close interaction with Kristiania University Collage researchers.

4.1 Forms of assessment

Regarding assessment forms, the students will write essays, technical reports, articles, reflection documents, poster, and similar written hand-ins. In addition, oral presentations, poster demonstrations, product demonstrations, prototyping, and lab work are examples of other assessment forms. There are usually one or two assessments in each module and it will alternate between individual assignments and group-based assignments. For the Master Thesis in the last year, there will be both a written thesis document and an oral presentation.

5. Internationalization and student exchange

With reference to *Studietilsynsforskriften* of February 2017 (§2-2, sections 7 and 8), the study has arrangements for internationalization and international student exchange.

5.1 Internationalization

Internationalization means the collective efforts regarding international activities. The internationalisation efforts at SEIT includes research collaborations, staff- and student exchange, participation in international conferences, publications, competitions, displays, etc. The students are actively involved in our international network and its activities at Kristiania University College enabling them to gain valuable insights and experiences. Scientific staff is given options for participating in their international networks to keep their knowledge up to date, gain valuable experiences and share and learn new pedagogical techniques. Our membership in networks such as Erasmus+ and Nordplus, give students and academic staff rich opportunities.

For the specific courses in the programme, they are all taught in English, thereby facilitating for incoming exchange students. Historically, approximately one third of the class size are international students which encourages an international student environment. Further, in a number of courses there are guest lectures delivered by international visiting staff. Some of the courses are also delivered by international staff in adjunct positions from our partner institutions such as Copenhagen Business School, Denmark and Brunel University, UK. Through coursework and assignments, the students will work on cases from international actors and companies, relating their reflections, discussions and hand ins to a global IT industry and its professional community.

For specific internationalization schemes, see the subject description of the study.

5.2 International student exchange

As regards to arrangements for international student exchange, Kristiania University College has the following mobility program;
- Nordplus in the Nordic region or the Baltic States
- ERASMUS + in Europe
- "Study Abroad", for students in and outside Europe

Kristiania University College has agreements on student exchanges and academic relevance secured by the academic field of study. Exchange courses from partners are approved by academic staff, for admission to the program, with an equivalent of 30 credits.

For nominations for student exchange, requirements are set for grades and motivation applications. For some study programs there are requirements for documentation of creative work/portfolios.

For students at Master of Applied Computer Science student exchange is possible during the third semester. For outgoing students, Kristiania University College, has established student exchange agreements with the following institutions:

- Kingston University, UK: Master Programme
- Seoul, South Korea: Seoul National University of Science and Technology
- England: University of Hertfordshire, UK
- New Zealand: Otago Polytechnic New Zealand (1 student only)

Changes to approved universities may occur. Information about possible exchange stays for the relevant year is therefore published online and on the learning platform.