

Qualification descriptor for Degree of Master of Science (120 credits) - Major; Computer Science and Engineering

Teknologie Masterexamen - Huvudområde; Datateknik

Degree regulations of 2007 Second cycle

Specialisations		
Name	Start term	For admitted until
Green Networking and Cloud Computing (Hållbar datorkommunikation och molnbaserad databehandling)	A20	
Pervasive Computing and Communications for Sustainable Development (Distribuerade datorsystem för hållbar utveckling)	A13	
Embedded systems (Inbyggda system)		
Mobile Systems (Mobila system)	A09	
Signals and Systems (Signaler och system)		
Information and Communication Technology (Informations- och kommunikationsteknik)		
Applied AI (Tillämpad AI)	A22	
Distributed Cloud Systems (Distribuerade molnsystem)	A16	A19
Sustainable IT (Sustainable IT)	A09	A11

Established

Qualification descriptor approved on 2006-11-16 by Dekanus TFN. Qualification descriptor updated on 2019-09-12 by Board of the Faculty of Science and Technology.

Examanition Objectives

Higher Education Act

English information is not available

Higher Education Ordinance

Annex 2

Knowledge and understanding

For a Master of Arts/Science (120 credits) the student shall have:

* demonstrated knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and

* demonstrated specialised methodological knowledge in the main field of study.

Competence and skills

For a Master of Arts/Science (120 credits) the student shall have:

* demonstrated the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information

* demonstrated the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work

* demonstrated the ability in speech and writing both nationally and internationally to report clearly and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with

different audiences, and

* demonstrated the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgement and approach

For a Master of Arts/Science (120 credits) the student shall have:

* demonstrated the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work

* demonstrated insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and

* demonstrated the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Detailed objectives for this degree

After completing training, the student will show a very good ability to

- master the technology consisting of computer software, hardware and communication.
- efficiently use computers, software and instrumentation for experimental and scientific work and combine the knowledge and skills from different disciplines.
- actively participate in all phases of development, construction, modification, documentation and operation of
 programs and computer systems as well as digital and computer-based engineering systems.
- explain and evaluate sustainable development investments of the area of computer science and engineering.

Part of education may be located abroad for the students to acquire international experience and gain understanding of other cultures.

Specialisations

Green Networking and Cloud Computing

After completing training, a student within the specialization in Green Networking and Cloud Computing should be able to:

- show in-depth knowledge of sustainable design of computer networks, software, large-scale computer systems and cloud-based services
- demonstrate good theoretical and applied knowledge for research and development work in application areas related to distributed and scalable systems
- show knowledge and ability to relate to equality

Pervasive Computing and Communications for Sustainable Development

ICT for environmental considerations addresses both applications for sustainable development, and the systems themselves. The student will when graduating has knowledge in:

• how to build sustainable networks, software and services, pervasive computing systems and communications minimizing their impact on the environment;

• how to use ICT for resource and energy efficient applications for sustainable development.

Embedded systems

The functionality of modern embedded systems are realized through the interaction of software and hardware components. After the education the student will be familiar with the methods and tools that are used in the industry to design embedded systems, and be capable of deriving requirements and perform system design and implementation, as well as to understand, explain and analyze properties of embedded systems.

Mobile Systems

Wireless communication and small communicating units like handheld devices, sensors etc. enable mobile solutions. The student will when graduating have good knowledge in networked solutions for mobility, programming of mobile units as well as good insight in application areas for Mobile Systems.

Signals and Systems

The student should demonstrate good knowledge in signal processing and/or automatic control, and demonstrate skill and ability to apply knowledge of information technology subjects in the problem formulation, development and implementation of information technology systems for communications, process control and metrology.

Information and Communication Technology

The student should demonstrate a thorough knowledge of system development, computer communications and advanced programming, and demonstrate skills in custom design and simulation of algorithms and computer-based systems, as well as systems for software technology and media applications.

Applied Al

Upon completing the master's degree in computer science with specialization in Applied AI, the student shall be able to:

- Use methods, theories and tools in the field of applied artificial intelligence.
- Apply artificial intelligence methods, theories and tools for targeted solutions.
- Select appropriate artificial intelligence methods, theories and tools for targeted solutions.
- Develop AI learning techniques and systems based on human needs as well as the society's goals for sustainable development.

Distributed Cloud Systems

After completing training, a student within the specialization in Distributed Cloud Systems should be able to:

- demonstrate in depth knowledge in technologies for cloud based computer systems
- demonstrate deep knowledge in both theoretical and applied research and development within the area of distributed and scalable systems

Sustainable IT

Credits

The programme requires 120 credits.

The credits stated indicate the total for all courses leading to the degree. All courses are to have been completed and passed.

Special requirements

Higher Education Ordinance and Luleå University of Technology

Independent project (degree project)

A requirement for the award of a Master of Arts/Science (120 credits) is completion by the student of an independent project (degree project) for at least 30 credits in the main field of study. The degree project may comprise less than 30 credits, however no less than 15 credits, if the student has already completed an independent project in the second cycle for at least 15 credits in the main field of study or the equivalent from a programme of study outside Sweden. (The Higher Education Ordinance, Annex 2 Qualifications ordinance)

Master of Arts/Science (60/120 credits) require a previous degree of Bachelor, Bachelor in fine arts or a professional degree of at least 180 credits or an equivalent foreign degree. (SFS 2006;1053, ch. 6, 5 § also appendix 2, Degree regulations)

A minimum of 90 credits of the education's 120 credits must consist of courses at second cycle level. A requirement for a Master's degree is that a main subject area has been formulated. (Riktlinjer för Bolognaanpassning (Guidelines for Bologna adaptation), LTU Dnr 783-06)

All course requirements for this degree are stated in the official syllabus.

Degree certificate

A degree certificate will be issued upon application to students who fulfil the requirements for a degree.

Course requirements for this degree

Syllabus - Master Programme in Mobile Systems (Utbildningsplan - Mobila system, master)

Syllabus - Master Programme in Applied AI (Utbildningsplan - Tillämpad AI, master)

Syllabus - <u>Pervasive Computing and Communications for Sustainable Development</u> (Utbildningsplan - Distribuerade datorsystem för hållbar utveckling, master)

Syllabus - <u>Master Programme in Computer Science and Engineering - specialization in Distributed Cloud</u> <u>Systems</u> (Utbildningsplan - Datateknik med inriktning mot distribuerade molnsystem, master)

Syllabus - <u>Master Programme in Green Networking and Cloud Computing</u> (Utbildningsplan - Hållbar datorkommunikation och molnbaserad databehandling, master)

Syllabus - <u>Master Programme in Sustainable IT Systems</u> *(Utbildningsplan - Sustainable IT Systems, master)* Syllabus - <u>Master Programme in Computer Science and Engineering</u> *(Utbildningsplan - Datateknik, master)*