EXAMENSBEVIS | *DEGREE CERTIFICATE*

Teknologie masterexamen

Degree of Master of Science (120 credits)

Marco Casagrande

19870917-T733

Stockholm den 1 december 2021
Stockholm, Sweden 1 December 2021

på rektors vägnar
on behalf of the President

Dag Andersson

Examenshandläggare
Degree Officer

Sigbritt Karlsson
rektor, Kungliga Tekniska högskolan, KTH
President, KTH Royal Institute of Technology

Marco Casagrande　　　　　　　　　　　　　　**19870917-T733**
Namn/*Name*　　　　　　　　　　　　　　　　　Personnummer/ *Personal identity number*

har fullföljt masterprogram, ICT innovation och därmed i enlighet med högskoleförordningen (1993:100) om studier på avancerad nivå avlagt teknologie masterexamen inom huvudområdet datalogi och datateknik, 120 högskolepoäng, med följande betyg:

has, within the Master's Programme, ICT Innovation and in accordance with the Swedish Higher Education Ordinance (1993:100) concerning studies at second cycle, been awarded the Degree of Master of Science (120 credits) with a major in Computer Science and Engineering, with the following grades:

Kod *Code*	Kurs *Course*	Högskolepoäng *Credits*	Betyg *Grade*	Datum *Date*
Från Kungliga Tekniska högskolan, KTH ***From KTH Royal Institute of Technology, Sweden***				
AH2915	Laserskanning *Laser Scanning Technology*	7,5	Utmärkt [1] *Excellent*	2020-10-23
ME2096	Innovationsprojekt inom IKT *ICT Innovation Study Project*	6,0	Mycket bra [1] *Very Good*	2020-12-10
EL2805	Förstärkande inlärning *Reinforcement Learning*	7,5	Bra [1] *Good*	2021-01-14
II2202	Forskningsmetodik och vetenskapligt skrivande *Research Methodology and Scientific Writing*	7,5	Utmärkt [1] *Excellent*	2021-01-15
DA258X	Examensarbete inom datalogi och datateknik med inriktning mot ICT innovation, avancerad nivå *Degree Project in Computer Science and Engineering, specialising in ICT Innovation, Second Cycle*	30,0	Utmärkt [1] *Excellent*	2021-10-29
Från Technische Universität Berlin, Tyskland ***From Technische Universität Berlin, Germany***				
	Innovation Management & Entrepreneurship Basics, 6,0 Credits [2] *Innovation Management & Entrepreneurship Basics*		1,0	2020-02-11
	Sustainable Innovation, 6,0 Credits [2] *Sustainable Innovation*		1,3	2020-02-24
	Discrete Event Systems, 6,0 Credits [2] *Discrete Event Systems*		1,0	2020-02-25
	Robotics, 6,0 Credits [2] *Robotics*		1,3	2020-02-26
	Machine Intelligence I, 6,0 Credits [2] *Machine Intelligence I*		1,7	2020-03-03
	Venture Campus - ICT Innovation, 9,0 Credits [2] *Venture Campus - ICT Innovation*		1,0	2020-07-14
	Event-based Robot Vision, 6,0 Credits [2] *Event-based Robot Vision*		1,0	2020-07-22
	Hybrid Systems, 6,0 Credits [2] *Hybrid Systems*		2,3	2020-07-30
	Applications of Robotics and Autonomous Systems, 9,0 Credits [2] *Applications of Robotics and Autonomous Systems*		1,3	2020-09-01
	EIT Digital Summer School, 4,0 Credits [2] *EIT Digital Summer School*		2,3	2020-11-04

Examensarbete
Degree Project

Relative pose estimation of a plane on an airfield with automotive-class solid-state LiDAR sensors
Relative pose estimation of a plane on an airfield with automotive-class solid-state LiDAR sensors

Noter/*Notes*

1   Betygsskala: Utmärkt (A), Mycket bra (B), Bra (C), Tillfredsställande (D), Tillräcklig (E)
     Grading scale: Excellent (A), Very Good (B), Good (C), Satisfactory (D), Sufficient (E)
2   Betygsskala: 1,0; 1,3; 1,5/ Mycket bra, 1,7; 2,0; 2,3; 2,5/ Bra, 2,7; 3,0; 3,3; 3,5/ Tillfredsställande, 3,7; 4,0/ Tillräckligt,
     BE/Godkänd
     Grading scale: 1,0; 1,3; 1,5/ Very Good, 1,7; 2,0; 2,3; 2,5/ Good, 2,7; 3,0; 3,3; 3,5/ Satisfactory, 3,7; 4,0/ Fair, BE/Passed

1.5 högskolepoäng motsvarar en veckas heltidsstudier och 60 högskolepoäng motsvarar ett års heltidsstudier.
1 högskolepoäng motsvarar 1 ECTS credit.

1.5 credits represent one week of full-time studies and 60 credits are equivalent to one year of full-time studies.
1 credit is equivalent to 1 ECTS credit.

DIPLOMA SUPPLEMENT

This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international "transparency" and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. Information identifying the holder of the qualification
1.1 Family name(s) Casagrande
1.2 Given name(s) Marco
1.3 Date of birth (day/month/year) 17 September 1987
1.4 Student identification number or code (if available) 19870917-T733

2. Information identifying the qualification
2.1 Name of qualification and (if applicable) title conferred (in original language)
Teknologie masterexamen (Degree of Master of Science (120 credits))
2.2 Main field(s) of study for the qualification
Computer Science and Engineering
2.3 Name and status of awarding institution (in original language)
Kungliga Tekniska högskolan (KTH Royal Institute of Technology).
State higher education institution with status of university.
2.4 Name and status of institution (if different from 2.3) administering studies (in original language)
Not applicable.
2.5 Language(s) of instruction/examination
Mainly English.

3. Information on the level of the qualification
3.1 Level of qualification
Avancerad nivå/Second-cycle QF-EHEA SeQF 7/EQF 7.
For information on the Swedish higher education system, see section 8.
3.2 Official length of programme
120 högskolepoäng (credits)/120 ECTS. Duration of 2 years of full-time studies. A normal 40-week academic year corresponds to 60 credits (högskolepoäng). One credit corresponds to 1 ECTS credit.
3.3 Access requirement(s)
There are general and (additional) specific entry requirements that should be fulfilled for access to higher education within all cycles. The general entry requirements for second-cycle studies are a first-cycle qualification of at least 180 credits, or a corresponding foreign qualification. An applicant may also be accepted on the basis of a comparable level of learning outcomes obtained through other education, practical experience or other circumstances.

Specific entry requirements: Any specific entry requirement imposed shall be totally essential for a student to be able to benefit from the course or study programme. The specific requirements for degree programmes are to be found on KTH website, www.kth.se.

4. Information on the contents and results gained
4.1 Mode of study
Full-time equivalent.
4.2 Programme requirements
The Swedish Higher Education Act takes account of 1) courses and study programmes based on scholarship or artistic practice and on proven experience, and 2) research and artistic research as well as development work. Reference to research below also applies to artistic research.

According to the Swedish Higher Education Act, second-cycle courses and study programmes shall (in addition to the requirements for first-cycle courses and study programmes): further develop the ability of students to integrate and make autonomous use of their knowledge; develop the ability to deal with complex phenomena, issues and situations; and develop the potential for professional activities that demand considerable autonomy, or for research and development work. (For further information, see The Swedish Higher Education Act and The Higher Education Degree Ordinance: www.uhr.se/en)

The text on the degree certificate states the educational programme completed by the student.

4.3 **Programme details (e.g. modules or units studied), and the individual grades/marks/credits obtained (if this information is available on an official transcript this should be used here)**

A Degree of Master (120 credits) is awarded after the student has completed the courses required to gain 120 credits with a defined specialisation determined by each higher education institution itself, of which at least 60 credits are for specialised study in the principal field (main field of study) of the study programme. In addition the prior award of a Degree of Bachelor, a Degree of Bachelor of Fine Arts, a professional or vocational qualification of at least 180 credits or a corresponding qualification from abroad is required.

A requirement for the award of a Degree of Master (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.
For more information, see Degree Certificate/Official Transcript.

4.4 **Grading scheme and, if available, grade distribution guidance**

There is no national grading system in Sweden. Higher education institutions may determine which grading system is to be used. For more information, see Degree Certificate/Official Transcript.

4.5 **Overall classification of the qualification (in original language)**

Not applicable for Swedish qualifications, since no overall grade is awarded for a degree and students are not ranked. For example, Grade Point Average (GPA) and other ranking systems are not used in Sweden.

5. Information on the function of the qualification

5.1 **Access to further study**

The degree gives access to third-cycle studies (doctoral studies)

5.2 **Professional status (if applicable)**

The Degree of Master corresponds to the qualification level referred to in point (e) of Article 11 of Directive 2005/36/EC.

6. Additional information

6.1 **Additional information**

The EIT Digital Masters Programme (ICT Innovation) is a two-year programme with eight technical majors and a Minor in Innovation and Entrepreneurship. EIT Digital is a KIC (Knowledge and Innovation Community) set up by the European Institute of Innovation and Technology, as an initiative of the European Union, with the mission to drive European leadership in ICT innovation for economic growth and quality of life.

6.2 **Further information sources**

Kungliga Tekniska högskolan, SE-100 44 Stockholm, http://www.kth.se

The Swedish Council for Higher Education (Universitets- och högskolerådet) has been commissioned to act as the Swedish NARIC and is also part of ENIC. The ENIC-NARIC office provide information on education in Sweden. Please see: http://www.uhr.se

For information on Professional Qualifications Directive, Swedish National Assistance Centre for the Recognition of Professional Qualifications (Professional Qualifications Directive 2005/36/EC): pqinfo@uhr.se

For information on quality assurance, Swedish Higher Education Authority: http://english.uka.se

7. Certification of the supplement

7.1 **Date** 1 December 2021

7.2 **Signature**

7.3 **Capacity** Degree Officer

7.4 **Official stamp or seal**

Please see 7.2

8. Information on the national higher education system

See attached information on the The Swedish higher education system.

The Swedish higher education system

According to legislation **after** 1 January 2007.
The following description is approved by the Swedish Council for Higher Education.

The Swedish higher education system is based on the Swedish Higher Education Act (SFS 1992:1434) and the 1 January 2007 amendments to the Higher Education Ordinance (1993:100). The following description is a short summary based on the legislation regulating the Swedish higher education system.

Qualifications from all higher education institutions (universities, university colleges and independent higher education providers) that are recognized by the Government are of equal official value. The same legislation governs all state higher education institutions. All Swedish degrees are issued in accordance with the same degree ordinances.

Quality assurance

The Swedish Higher Education Authority has been responsible for the quality assurance system for all higher education since 1 January 2013. For more information, please visit www.uka.se. Evaluation reports are available to the public.

National Qualification Frameworks

The Swedish Higher Education Act and the Higher Education Ordinance have been amended in accordance with the agreements reached as part of the Bologna Process, including the Qualifications Frameworks in the European Higher Education Area (QF-EHEA). Legislation for a three-cycle structure of higher education started to apply in July 2007, and is now the only one in use in all Swedish higher education. Transitional provisions apply to courses and programmes that started prior to this. For more information, please visit www.uhr.se/en or enic-naric.net.

In 2015, the Swedish Government decided on a national qualifications framework (SeQF), based on the European Qualifications Framework for Lifelong Learning (EQF). The SeQF has eight levels that are in accordance with the EQF levels. Higher education qualifications are at levels six to eight. For more information, please visit www.seqf.se.

Credit system

Sweden has a system of credits (högskolepoäng); a normal 40-week academic year corresponds to 60 credits. The system is compatible with ECTS credits.

Grading system

There is no national grading system in Sweden. Higher education institutions may determine which grading system is to be used. No overall grade is awarded for a degree and students are not ranked. For example, Grade Point Average (GPA) and other ranking systems are not used in Sweden.

Access and admission

There are general and specific entry requirements for access to higher education within all cycles. The specific entry requirements vary according to the field of higher education and/or should be essential for students to be able to benefit from the course or study programme. The number of places is limited on all study programmes and courses.

The general entry requirements for first-cycle studies are the same for all higher education. General entry requirements can be attained by completing an upper-secondary school programme, via adult education at upper-secondary school level or the applicants achieving a comparable level of learning outcomes through other education, practical experience or other circumstances.

The general entry requirements for second-cycle studies are a first-cycle qualification of at least 180 credits, or a corresponding foreign qualification. An applicant may also be accepted on the basis of a comparable level of learning outcomes obtained through other education, practical experience or other circumstances. →

The general entry requirements for third-cycle studies are a second-cycle qualification, or completed courses worth at least 240 credits (of which 60 credits are at second-cycle level) or the equivalent level of knowledge acquired in Sweden or abroad. Furthermore, for entry to third-cycle studies, the applicant must be deemed able to benefit from the education.

Qualifications

All courses, study programmes and qualifications are on one of three levels: first-, second- or third-cycle. In the Higher Education Ordinance, the Government has determined which qualifications may be awarded, as well as their scope, requirements and intended learning outcomes. There are three categories of qualifications: general; the fine, applied and performing arts; and professional qualifications. For some more information, please see below.

General qualifications

First-cycle (SeQF/EQF 6)

Högskoleexamen (Higher Education Diploma) requires 120 credits and an independent project (degree project).

Kandidatexamen (Degree of Bachelor) requires 180 credits. At least 90 credits must be completed in the main field of study, including an independent project (degree project) worth 15 credits.

Second-cycle (SeQF/EQF 7)

Magisterexamen (Degree of Master (60 credits)) requires 60 credits. At least 30 credits must be completed in the main field of study, including an independent project (degree project) worth 15 credits. In addition, the student must normally hold a kandidatexamen, or a professional degree of at least 180 credits, or an equivalent foreign degree.

Masterexamen (Degree of Master (120 credits)) requires 120 credits. At least 60 credits must be completed in the main field of study, including an independent project (degree project) worth at least 30 credits. In addition, the student must normally hold a kandidatexamen, or a professional degree of at least 180 credits or an equivalent foreign degree.

Third-cycle (SeQF/EQF 8)

Licentiatexamen (Degree of Licentiate) requires at least 120 credits, including a research thesis worth at least 60 credits. A higher education institution may decide that a licentiatexamen can be awarded as a separate qualification or as a step on the way to doktorsexamen (see below).

Doktorsexamen (Degree of Doctor) requires 240 credits, including a research thesis (doctoral thesis) worth at least 120 credits. The thesis must be presented at a public defence.

Qualifications in the fine, applied and performing arts

Qualifications in the fine, applied and performing arts are awarded at all three cycles and corresponding SeQF levels. At first-cycle level: konstnärlig högskoleexamen (Higher Education Diploma) and konstnärlig kandidatexamen (Degree of Bachelor of Fine Arts). At second-cycle level: konstnärlig magisterexamen (Degree of Master of Fine Arts (60 credits)) and konstnärlig masterexamen (Degree of Master of Fine Arts (120 credits)). Two third-cycle qualifications are awarded: konstnärlig licentiatexamen (Degree of Licentiate) and konstnärlig doktorsexamen (Degree of Doctor).

Professional qualifications

Professional qualifications are offered at either first- or second-cycle level and corresponding SeQF levels. These qualifications may stretch over two cycles and are awarded in areas that include engineering, health care, agriculture, law, and education. Professional qualifications are regulated by national legislation and are considered regulated education subject to the Professional Qualifications Directive 2005/36/EC.

Titles of qualifications

Translations into English of all titles of qualifications are regulated at the national level. Higher education institutions may decide to add a prefix to a qualification title e.g. filosofie kandidatexamen or medicine doktorsexamen or/and add a major field of studies e.g. civilingenjörsexamen i maskinteknik.