

EXAMENSBEVIS | *DEGREE CERTIFICATE*

# Teknologie doktorsexamen

inom ämnet informationsoch kommunikationsteknik  
med inriktning mot programvaruteknik och datorsystem

*Degree of Doctor of Philosophy  
in the subject area of Information and Communication Technology  
specialised in Software and Computer Systems*

César Soto Valero

19890919-0616

Stockholm den 14 juni 2023  
*Stockholm, Sweden 14 June 2023*

på rektors vägnar  
*on behalf of the President*



Helena Björk

Examenshandläggare  
*Degree Officer*



Anders Söderholm  
rektor, Kungliga Tekniska högskolan, KTH  
*President, KTH Royal Institute of Technology*

har i enlighet med bestämmelserna i högskoleförordningen (1993:100) om utbildning på forskarnivå avlagt teknologie doktorsexamen. I utbildningen ingår utöver kurser att författa och vid en offentlig disputation försvara en vetenskaplig avhandling.

*has, in accordance with the Swedish Higher Education Ordinance (1993:100) concerning third-cycle studies, been awarded the Degree of Doctor of Philosophy, having passed the examinations included in the educational programme and publicly defended a scientific thesis.*

Kod Code	Kurs Course	Högskolepoäng Credits	Betyg Grade	Datum Date
FEO3120	Från forskning till Impact <i>From Research to Impact</i>	3,0	Godkänd <sup>1</sup> Pass	2018-12-19
FIL3606	Konsten att forska som doktorand <i>The Art of Doctoral Research</i>	7,5	Godkänd <sup>2</sup> Pass	2019-08-05
FLH3000	Grundläggande kommunikations- och undervisningslära <i>Basic Communication and Teaching</i>	3,0	Godkänd <sup>2</sup> Pass	2019-10-23
FEP3370	Avancerad etisk hackning <i>Advanced Ethical Hacking</i>	8,0	Godkänd <sup>2</sup> Pass	2019-10-25
FDT3303	Kritiska perspektiv på datavetenskap och maskininläring <i>Critical Perspectives on Data Science and Machine Learning</i>	7,5	Godkänd <sup>2</sup> Pass	2020-01-08
FBB3110	Python för beräkningsvetenskaper <i>Computational Python</i>	5,0	Godkänd <sup>2</sup> Pass	2021-11-12
	Doktorsavhandling <i>Doctoral thesis</i>		Godkänd <sup>1</sup> Pass	2023-06-01

#### Tillgodoräknade studier på forskarnivå *Transferred postgraduate studies*

Autonomous Systems, part 2, Learning, Knowledge, Interaction and Collaboration, Fall 2018 <sup>3</sup> <i>Autonomous Systems, part 2, Learning, Knowledge, Interaction and Collaboration, Fall 2018</i>	2019-03-12
The 4th WASP Summer School 2019, Security for Autonomous Systems <sup>3</sup> <i>The 4th WASP Summer School 2019, Security for Autonomous Systems</i>	2019-08-23
Software Engineering and Cloud Computing, Spring 2019 <sup>3</sup> <i>Software Engineering and Cloud Computing, Spring 2019</i>	2019-09-30
WASP Project Course, Fall 2019 <sup>3</sup> <i>WASP Project Course, Fall 2019</i>	2020-01-14
Autonomous Systems, part 1, Sensing, Perception, Control and Decision making, Spring 2020 <sup>3</sup> <i>Autonomous Systems, part 1, Sensing, Perception, Control and Decision making, Spring 2020</i>	2020-08-19

#### Avhandlingens titel *Title of thesis*

Debloating Java Dependencies  
*Debloating Java Dependencies*

#### Noter/Notes

- 1 Betygsskala: Godkänd (G)  
*Grading scale: Pass (G)*
- 2 Betygsskala: Godkänd (P)  
*Grading scale: Pass (P)*
- 3 Kurs läst vid WASP Graduate School  
*Course taken at WASP Graduate School, Sweden*

## DIPLOMA SUPPLEMENT

The purpose of the Diploma 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 is free from any value judgements, equivalence statements or suggestions about recognition. This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO.

### 1. Information identifying the holder of the qualification

- 1.1 **Last name(s)** Soto Valero
- 1.2 **First name(s)** César
- 1.3 **Date of birth (dd/mm/yy)** 19 September 1989
- 1.4 **Student identification number or code (if available)** 19890919-0616

### 2. Information identifying the qualification

- 2.1 **Name of qualification and (if applicable) title conferred (in original language)**  
Teknologie doktorsexamen (Degree of Doctor of Philosophy)
- 2.2 **Main field(s) of study for the qualification**  
Information and Communication Technology (INFKTEKN)
- 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**  
Swedish and English.

### 3. Information on the level and duration of the qualification

- 3.1 **Level of the qualification**  
Forskarnivå/Third-cycle QF-EHEA SeQF 8/EQF 8. For information on the Swedish higher education system, see section 8.
- 3.2 **Official duration of programme in credits and/or years**  
240 högskolepoäng (credits)/240 ECTS. Duration of 4 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 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.

### 4. Information on the programme completed and the results obtained

- 4.1 **Mode of study**  
Full-time equivalent.
- 4.2 **Programme learning outcomes**  
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, third-cycle courses and study programmes shall be based fundamentally on the knowledge acquired by students in first- and second-cycle courses and study programmes, or its equivalent. In addition, third-cycle study programmes shall develop the knowledge and skills required to be able to undertake autonomous research. (For further information, see The Swedish Higher Education Act and The Higher Education Degree Ordinance: [www.uhr.se/en](http://www.uhr.se/en))

Studies encompass 240 credits. In addition to a scientific dissertation/thesis of at least 120 credits, doctorates include courses of at least 60 credits. The syllabus for the subject may require more credits from the course component. Of the total course component, at least 60 percent must be at third cycle. Courses at undergraduate level within the academic area of engineering may not be included in this degree. For students with qualifying educational programmes other than the engineering background, deviations may be made from this requirement. Students with such educations may, to a certain extent, utilise courses outside the academic area of engineering as replacements for compulsory courses in the syllabus for the subject. This is to be documented in the student's individual course plan. Additional goals within the framework of the Higher Education Ordinance Degree procedures (HF Annex 2) and the goals stated in this local degree procedure are established

by the Faculty Board in the syllabus for the subject at third cycle. For detailed information on programme goals please refer to each syllabus. This degree is entitled Teknologie doktorsexamen (PhD). In individual cases nomenclature other than teknologie may be used. Such decisions are to be taken by the Faculty Board.

#### **4.3 Programme details, individual credits gained and grades/marks obtained**

A Degree of Doctor is awarded after the third-cycle student has completed a study programme of 240 credits in a subject in which third-cycle teaching is offered.

For the Degree of Doctor the third-cycle student shall have been awarded a pass grade for a research thesis (doctoral thesis) of at least 120 credits.

For more information, see Degree Certificate/Official Transcript.

#### **4.4 Grading system and, if available, grade distribution table**

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**

Not applicable. Doktorsexamen is the highest degree in the Swedish higher education system.

#### **5.2 Access to a regulated profession (if applicable)**

Not applicable.

### **6. Additional information**

#### **6.1 Additional information**

The education has been arranged within the PhD programme: Information and Communication Technology

#### **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): [pjinfo@uhr.se](mailto:pjinfo@uhr.se)

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

### **7. Certification of the supplement**

#### **7.1 Date** 14 June 2023

#### **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**

#### **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 (UKÄ), a member of the European Association for Quality Assurance in Higher Education (ENQA), has been responsible for the quality assurance system for all higher education since 1 January 2013. Before 2013 The Swedish National Agency for Higher Education was the responsible agency. For more information, please visit [www.uka.se](http://www.uka.se). Evaluation reports are available to the public.

#### **National Qualifications Framework**

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](http://www.uhr.se/en) or [www.enic-naric.net](http://www.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](http://www.seqf.se).

### **Credit system**

Sweden has a system of credits (högskolepoäng, hp); a normal 40-week academic year corresponds to 60 credits. The system is compatible with European Credit Transfer System (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 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 some specific second-cycle professional qualifications are a prior specific qualification or a specific professional registration.

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.

### **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 (for example "filosofie kandidatexamen") and add a major field of studies (for example "civilingenjörsexamen i maskinteknik").

	QUALIFICATIONS	SeQF	EQF	Bologna
Forskarnivå (third-cycle)	<p>General Qualifications  Doktorexamen (Degree of Doctor), 240 hp/ECTS credits  Licentiatexamen (Degree of Licentiate), 120 hp/ECTS credits</p> <p>Qualifications in the fine, applied and performing arts  Konstnärlig doktorexamen (Degree of Doctor), 240 hp/ECTS credits  Konstnärlig licentiatexamen (Degree of Licentiate), 120 hp/ECTS credits</p>	8	8	3
Avancerad nivå (second-cycle)	<p>General Qualifications  Masterexamen (Degree of Master, 120 credits), 120 hp/ECTS credits  Magisterexamen (Degree of Master, 60 credits), 60 hp/ECTS credits</p> <p>Qualifications in the fine, applied and performing arts  Konstnärlig masterexamen (Degree of Master of Fine Arts, 120 credits), 120 hp/ECTS credits  Konstnärlig magisterexamen (Degree of Master of Fine Arts, 60 credits), 60 hp/ECTS credits</p> <p>Professional qualifications  Degree of Master*, 60 hp/ECTS credits, 240–360 hp/ECTS credits  Postgraduate Diploma*, 60–90 hp/ECTS credits</p> <p>*Degrees and diplomas within different professional fields.</p>	7	7	2
Grundnivå (first-cycle)	<p>General Qualifications  Kandidatexamen (Degree of Bachelor), 180 hp/ECTS credits  Högskoleexamen (Higher Education Diploma), 120 hp/ECTS credits</p> <p>Qualifications in the fine, applied and performing arts  Konstnärlig kandidatexamen (Degree of Bachelor of Fine Arts), 180 hp/ECTS credits  Konstnärlig högskoleexamen (Higher Education Diploma), 120 hp/ECTS credits</p> <p>Professional qualifications  Degree of Bachelor*, 180–210 hp/ECTS credits  Higher Education Certificate*, 60 hp/ECTS credits</p> <p>*Degrees, diplomas and certificates within different professional fields.</p>	6	6	1