KTH ROYAL INSTITUTE
OF TECHNOLOGY

EXAMENSBEVIS | *DEGREE CERTIFICATE*

Civilingenjörsexamen

Degree of Master of Science in Engineering

Alexander Engman

19900108-4939

Stockholm den 5 november 2020
Stockholm, Sweden 5 November 2020

på rektors vägnar
on behalf of the President

Keivan Hamidian

Examenshandläggare
Degree Officer

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

Alexander Engman
Namn/*Name*

19900108-4939
Personnummer/ *Personal identity number*

har fullföljt civilingenjörsutbildning i materialdesign och därmed i enlighet med högskoleförordningen (1993:100) om studier på avancerad nivå avlagt civilingenjörsexamen, 300 högskolepoäng, med följande betyg:

has, within the Degree Programme in Materials Design and Engineering and in accordance with the Swedish Higher Education Ordinance (1993:100) concerning studies at second cycle, been awarded the Degree of Master of Science in Engineering 300 credits, with the following grades:

Kod *Code*	Kurs *Course*	Högskolepoäng *Credits*	Betyg *Grade*	Datum *Date*
SF1625	Envariabelanalys *Calculus in One Variable*	7,5	Mycket bra [1] *Very Good*	2015-10-27
SF1624	Algebra och geometri *Algebra and Geometry*	7,5	Bra [1] *Good*	2016-01-13
MH1070	Perspektiv på materialdesign *Perspectives on Materials Design*	13,5	Mycket bra [1] *Very Good*	2016-03-11
SG1130	Mekanik I *Mechanics I*	9,0	Bra [1] *Good*	2016-03-21
KD1260	Materialens kemi *Chemistry of Materials*	7,5	Mycket bra [1] *Very Good*	2016-04-06
SF1626	Flervariabelanalys *Calculus in Several Variables*	7,5	Tillfredsställande [1] *Satisfactory*	2016-06-07
SK1110	Elektromagnetism och vågrörelselära *Electromagnetism and Waves*	7,5	Tillfredsställande [1] *Satisfactory*	2016-06-13
SF1633	Differentialekvationer I *Differential Equations I*	6,0	Tillräcklig [1] *Sufficient*	2016-10-24
SF1518	Numeriska metoder och grundläggande programmering *Numerical Methods and Basic Programming*	9,0	Tillräcklig [1] *Sufficient*	2016-11-21
MH1028	Termodynamisk modellering för materialdesign *Computational Thermodynamics for Materials Design*	6,0	Bra [1] *Good*	2017-03-14
MH1024	Materiallära metalliska material *Fundamentals of Materials Science- Metallic Materials*	6,0	Tillfredsställande [1] *Satisfactory*	2017-03-16
MH1027	Materials Termodynamik *Thermodynamics of Materials*	6,0	Mycket bra [1] *Very Good*	2017-05-02
LS2436	Franska B2 för ingenjörer *French B2 for Engineers*	7,5	Godkänd [2] *Pass*	2017-05-18
MH1020	Keramteknologi *Ceramics*	6,0	Bra [1] *Good*	2017-05-29
MH1025	Profilering inom Materialdesign *Design, Profiling Course*	6,0	Bra [1] *Good*	2017-05-29
KF1050	Polymera material *Polymeric Materials*	7,0	Mycket bra [1] *Very Good*	2017-05-31
MH1022	Framställningsprocesser av metaller och fiberbaserade material *Fabrication Processes of Metals and Bio Fibres*	7,0	Bra [1] *Good*	2017-10-25
MH2017	Mikro-och nanostrukturer *Micro and Nanostructures*	6,0	Mycket bra [1] *Very Good*	2017-11-24
MH2050	Materialens mekaniska egenskaper *Mechanical Properties of Materials*	6,0	Mycket bra [1] *Very Good*	2018-01-12
SE1020	Hållfasthetslära, grundkurs *Solid Mechanics, Basic Course*	9,0	Tillräcklig [1] *Sufficient*	2018-01-13
MH1018	Transportfenomen *Transport Phenomena*	6,0	Bra [1] *Good*	2018-01-15
ME1003	Industriell ekonomi, grundkurs *Industrial Management, Basic Course*	6,0	Tillräcklig [1] *Sufficient*	2018-03-14

Kod *Code*	Kurs *Course*	Högskolepoäng *Credits*	Betyg *Grade*	Datum *Date*
MH101X	Examensarbete inom material och processdesign, grundnivå *Degree Project in Materials and Process Design, First Cycle*	15,0	Godkänd [2] *Pass*	2018-06-27
MH1026	Materialfysik *Materials Physics*	6,0	Bra [1] *Good*	2018-07-09
SK2771	Fasta tillståndets fysik *Solid State Physics*	5,0	Mycket bra [1] *Very Good*	2018-10-24
SK2770	Introduktion till nanoteknik *Introduction to Nanotechnology*	5,0	Mycket bra [1] *Very Good*	2018-10-26
SK2772	Kemi för nanoteknik *Chemistry for Nanotechnology*	5,0	Mycket bra [1] *Very Good*	2018-11-01
IH2652	Analysmetoder och analysinstrument *Methods and Instruments of Analysis*	7,5	Mycket bra [1] *Very Good*	2019-01-11
SK2901	Kvantiserade material och komponenter *Quantum Materials and Devices*	7,5	Bra [1] *Good*	2019-02-08
IH2659	Tillverkningstekniker för nanokomponenter *Nanofabrication Technologies*	7,5	Utmärkt [1] *Excellent*	2019-03-12
IH1611	Halvledarkomponenter *Semiconductor Devices*	7,5	Bra [1] *Good*	2019-03-14
IH2657	Design av nanohalvledarkomponenter *Design of Nano Semiconductor Devices*	7,5	Mycket bra [1] *Very Good*	2019-05-15
EK2350	Mikrosystemteknik *Microsystem Technology*	7,5	Mycket bra [1] *Very Good*	2019-06-03
SF1921	Sannolikhetsteori och statistik *Probability Theory and Statistics*	6,0	Tillräcklig [1] *Sufficient*	2019-06-05
SK2822	Sammansatta halvledare och fotoniska komponenter *Compound Semiconductors and Photonic Devices*	7,5	Mycket bra [1] *Very Good*	2019-10-24
AK2036	Vetenskapsteori och vetenskaplig metodik med tillämpningar (naturvetenskap) *Theory and Methodology of Science with Applications (Natural and Technological Science)*	7,5	Bra [1] *Good*	2019-10-24
EK2360	Projektkurs i mikrosystemteknik *Hands-On Microelectromechanical Systems Engineering*	7,5	Utmärkt [1] *Excellent*	2020-01-17
IH2653	Simulering av halvledarkomponenter *Simulation of Semiconductor Devices*	7,5	Mycket bra [1] *Very Good*	2020-01-21
IA249X	Examensarbete inom teknisk fysik med inriktning mot nanoteknik, avancerad nivå *Degree Project in Engineering Physics, specialising in Nanotechnology, Second Cycle*	30,0	Godkänd [2] *Pass*	2020-09-10

Examensarbete
Degree Project

Development and 3D Printing of Intrinsically Stretchable Materials for Microsupercapacitors
Development and 3D Printing of Intrinsically Stretchable Materials for Microsupercapacitors

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: Godkänd (P)
Grading scale: Pass (P)

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.

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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) Engman

1.2 Given name(s) Alexander

1.3 Date of birth (day/month/year) 8 January 1990

1.4 Student identification number or code (if available) 19900108-4939

2. Information identifying the qualification

2.1 Name of qualification and (if applicable) title conferred (in original language)
Civilingenjörsexamen (Degree of Master of Science in Engineering)

2.2 Main field(s) of study for the qualification
Materials Design and Engineering

2.3 Name and status of awarding institution (in original language)
Kungliga Tekniska högskolan (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 Swedish within the first cycle of qualification. Mainly English within the second cycle of qualification.

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
300 högskolepoäng (credits)/300 ECTS. Duration of 5 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 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.
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 requirement for the award of a Degree of Master of Science in Engineering is completion by the student of an independent project (degree project) for at least 30 credits.
The Master of Science in Engineering programmes are comprised of three consecutive blocks. The first consists of a basic block of courses in Natural Sciences and Mathematics. This is followed by a block of courses in Applied Engineering Sciences. The third block includes optional and compulsory courses within a chosen area of specialisation.

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)

Civilingenjörsexamen (Degree of Master of Science in Engineering) constitutes regulated education and training as defined in Article 3(1)(e) of Directive 2005/36/EC. The provisions of Article 13(2) last paragraph of Directive 2005/36/EC apply for the holders of the Civilingenjörsexamen (Degree of Master of Science in Engineering).
The Degree of Master of Science in Engineering 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

None.

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 5 November 2020

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.

Swedish Council for Higher Education

europass

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.