#### **CHALMERS**



# CHALMERS TEKNISKA HÖGSKOLA

CHALMERS UNIVERSITY OF TECHNOLOGY GOTHENBURG SWEDEN

# Arash Rouhani-Kalleh

HAR AVLAGT

# TEKNOLOGIE KANDIDATEXAMEN

HUVUDOMRÅDE: DATATEKNIK

HAS BEEN AWARDED THE DEGREE OF

# **BACHELOR OF SCIENCE**

MAJOR SUBJECT: COMPUTER SCIENCE AND ENGINEERING

Göteborg 28 juni 2012

På rektors vägnar On behalf of the President

Christer Marklund Examenshandläggare Officer of Degree



Examensbevis för

Degree diploma awarded to

## Arash Rouhani-Kalleh

#### 901117-1213

Kurser Courses	<b>Hp*</b> Credits	<b>Betyg</b> Grades	<b>Datum</b> <i>Date</i>
Kandidatarbete vid Data- och informationsteknik Bachelor's thesis in Computer science and engineering	15.0	Fyra Four	1 jun 2012
Datastrukturer Data structures	7.5	Fem Five	11 jan 2011
Objektorienterad programmering Object oriented programming	7.5	Fem Five	28 okt 2010
Digitalteknik-syntes Theory and logic design of switching circuits	7.5	Fyra Four	12 apr 2011
Datorsystemteknik Computer system engineering	7.5	Fem Five	24 maj 2011
Datakommunikation Computer communication	7.5	Fem Five	27 maj 2011
Digital- och datorteknik Fundamentals of digital systems and computers	7.5	Fem Five	14 dec 2009
Maskinorienterad programmering Machine oriented programming	7.5	Fem Five	8 mar 2010
Elektriska kretsar och fält Electrical circuits and fields	7.5	Fem Five	28 maj 2010
Reglerteknik Control theory	7.5	Fyга Four	17 dec 2011
Bärkraftig resursanvändning Sustainable use of resources	7.5	Tre Three	27 maj 2010
Matematisk statistik och diskret matematik Mathematical statistics and discrete mathematics	7.5	Fem Five	19 okt 2010
Transformer, signaler och system Transforms, signals and systems	7.5	Fem Five	19 okt 2011
Introduktion till programmering Introduction to programming	1.5	Godkänd Passed	17 sep 2009
Introduction till funktionell programmering Introduction to functional programming	7.5	Fem Five	27 okt 2009
Fysik för ingenjörer Physics for engineers	7.5	Fem Five	20 dec 2010
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<sup>\*</sup> Högskolepoäng (Hp)

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Kurser Courses	<b>Hp*</b> Credits	<b>Betyg</b> Grades	<b>Datum</b> Date
Introduktion till matematik Introduction to mathematics	1.5	Godkänd Passed	29 aug 2009
Matematisk analys Calculus	7.5	Fem Five	12 mar 2010
Inledande diskret matematik Introduction to discrete mathematics	7.5	Fem Five	22 okt 2009
Linjär algebra Linear algebra	7.5	Fem Five	17 dec 2009
Parallell programmering Concurrent programming	7.5	Fem Five	1 apr 2011
Teknikhistoria History of technology	7.5	Fyra Four	19 mar 2012
Flervariabelanalys Mathematical analysis in several variables	7.5	Fem Five	20 okt 2011
Cryptography Cryptography	7.5	Fyra Four	9 jan 2012
Ändliga automater och formella språk Finite automata theory and formal languages	7.5	Fyra Four	25 maj 2012

Examen är på grundnivå och omfattar 180 Hp The degree is within the first cycle and comprises 180 credits

Examensfordringarna var avklarade 2012-06-01 The degree requirements were satisfied on June 1, 2012





#### **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 reason why.

- 1. Information identifying the holder of the qualification
  - 1.1 Family name(s): Rouhani-Kalleh
  - 1.2 Given name(s): Arash
  - 1.3 Date of birth (day/month/year): 17 November 1990
  - 1.4 Student identification number or code (if available): 901117-1213
- 2. Information identifying the qualification
  - 2.1 Name of qualification and (if applicable) title conferred (in original language): Teknologie kandidatexamen
  - 2.2 Main field(s) of study for the qualification: See Degree Certificate/Official Transcript
  - 2.3 Name and status of awarding institution (in original language): Chalmers tekniska högskola (private)
  - 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 / English
- 3. Information on the level of the qualification
  - 3.1 Level of qualification: First cycle. For more information on higher education in Sweden, please see point 8, appendix 2.
  - **3.2 Official length of programme:** 180 credits (180 ECTS). The scope of the education is to be indicated in credits, with full-time studies for a normal 40-week academic year corresponding to 60 credits.
  - **3.3** Access requirement(s): A basic eligibility examination is made to determine whether the applicant has completed a national programme at high school, has the equivalent Swedish or foreign education or has acquired the equivalent knowledge through another process.

The applicant should have the necessary knowledge in the language of the course programme. This normally means that a person who has a native language other than Swedish, Norwegian, Danish, Icelandic or Faroese shall have the requisite knowledge of Swedish. For those courses or programmes which are run in a language other than Swedish, an examination of knowledge of this language is required in the same way.

A special eligibility examination is made to determine whether the person seeking admission onto a programme at Chalmers has the specific prior knowledge which is relevant for the course programme in question. Requirements for special eligibility could include:

- 1. Knowledge in a subject in the national high school programme or equivalent knowledge
- 2. Knowledge from one or more university courses or
- 3. Other conditions which are determined by the course programme or which are of significance to the professional field for which the programme is preparing the student.
- Real expertise shall be taken into account.
- 4. Information on the contents and results gained
  - 4.1 Mode of study: Full-time equivalent.



Name: Arash Rouhani-Kalleh

Student identification number or code (if available): 901117-1213

#### 4.2 Programme requirements

Scope

A Bachelor's degree is awarded after the student has completed the courses required to gain 180 credits (180 ECTS) in a defined specialisation determined by each higher education institution itself, of which 90 credits are for progressively specialised study in the principal field (main field of study) of the programme.

#### Outcomes

Knowledge and understanding

For a Bachelor's degree the student shall have:

- demonstrated knowledge and understanding in the main field of study, including knowledge of the disciplinary foundation of the field, understanding of applicable methodologies in the field, specialised study in some aspect of the field as well as awareness of current research issues.

#### Competence and skills

For a Bachelor's degree the student shall have:

- demonstrated the ability to search for, gather, evaluate and critically interpret the relevant information for a formulated problem and also discuss phenomena, issues and situations critically
- demonstrated the ability to identify, formulate and solve problems autonomously and to complete tasks within predetermined time frames
- demonstrated the ability to present and discuss information, problems and solutions in speech and writing and in dialogue with different audiences, and
- demonstrated the skills required to work autonomously in the main field of study.

#### Judgement and approach

For a Bachelor's degree the student shall have:

- demonstrated the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues
- demonstrated insight into the role of knowledge in society and the responsibility of the individual for how it is used, and
- demonstrated the ability to identify the need for further knowledge and ongoing learning.

#### Independent project (degree project)

A requirement for the award of a Bachelor's degree is completion by the student of an independent project (degree project) for at least 15 credits in the main field of study.

#### Miscellaneous

Specific requirements determined by each higher education institution itself within the parameters of the requirements laid down in this qualification descriptor shall also apply for a Bachelor's degree with a defined specialisation.

For a Bachelor's degree to be awarded by Chalmers students must have:

- satisfied the requirements for courses worth at least 45 credits, including a degree project worth 15 credits, examined at Chalmers or at a university or college with which Chalmers has a special agreement.
- 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): See degree certificate/Official transcript.
- **4.4 Grading scheme and, if available, grade distribution guidance:** Unless otherwise prescribed in the course syllabus, a grade is to be awarded on completion of a course. The grade is to be determined by a teacher specially appointed by the higher education institution (an examiner).

The grades assigned are defined as Three, Four or Five. A higher figure signifies a better grade. The grade Three is the lowest pass grade. As well as the numbered scale, the scale Passed/Not Passed is used.

The grading system at the school of Architecture: courses are given on a Passed/Not Passed basis.

No overall grade is given for a degree and students are not ranked.

ECTS Grading Table			
Chalmers grading system	Total number awarded in the reference group	Percentage of the total number	
3 (Tre)	224578	41.08 %	
4 (Fyra)	205882	37.66 %	
5 (Fem)	116266	21.27 %	

**4.5** Overall classification of the qualification (in original language): Not applicable for Swedish qualifications.

#### 5. Information on the function of the qualification

5.1 Access to further study: The degree gives eligibility to studies within the second cycle.



5.2 Professional status (if applicable): Not applicable

Student identification number or code (if available): 901117-1213

#### 6. Additional information

6.1 Additional information: See Degree Certificate/Official Transcript

#### **6.2** Further information sources:

Chalmers tekniska högskola, SE-412 96 Göteborg http://www.chalmers.se

Swedish National Agency for Higher Education, the Swedish ENIC/NARIC office, Box 7851, SE-103 99 Stockholm

#### 7. Certification of the supplement

**7.1 Date:** 28 June 2012

7.2 Signature

Christer Marklund

7.3 Capacity: Officer of Degree

7.4 Official stamp or seal



#### 8. Information on the national higher education system

Information on the Swedish higher education system of enclosure



# The Swedish Higher Education System

(The following description is approved by the Swedish National Agency for Higher Education)

#### General

Higher education institutions have great autonomy in the organization of studies, use of resources and general administration. The Government may award the status of universitet to higher education institutions that meet certain criteria. Independent higher education providers may apply for recognition by the Government, obtain degree awarding powers and receive state subsidies. Qualifications from all higher education institutions that are recognized by the Government have equal official value. The same law governs all state higher education institutions. All Swedish degrees are issued in accordance with the same qualifications ordinance.

#### **Quality assurance**

The Swedish National Agency for Higher Education is responsible for quality assurance system for higher education. All study programmes have been evaluated since 2001.

The Swedish National Agency for Higher Education has also completed two rounds of quality audits of higher education institutions. Evaluation reports are public.

# Access and admission to higher education

Higher education within all cycles has two strata of entry requirements: general and (additional) specific requirements. General eligibility to the first cycle is the same for all higher education.

General eligibility is attained either by completing an upper-secondary school programme, completed adult education at upper secondary school level or having the potential to benefit from the education, by virtue of other education, practical experience or other circumstances. The specific requirements vary according to the field of higher education and are in general expressed in terms of upper-secondary school qualifications in specific subjects. Restrict-

ed admission is used for all study programmes and courses.

#### Degree awarding powers

Universities have the right to award general qualifications at first, second and third cycle. A small number of university colleges have been awarded the general right to award first and second cycle qualifications, as well as the right to award third cycle qualifications in specific domain/s. Other state university colleges have the right to award first cycle qualifications and magister-examen but must apply to the Swedish National Agency for Higher Education for the right to award masterexamen and third cycle qualifications.

University colleges that are self-governing and independent, as well as the Swedish University of Agricultural Sciences (SLU) and the Swedish National Defence College, must apply to the Government for the entitlement to award all qualifications.

With regard to vocational or professional qualifications at first and second cycle, both state universities and university colleges must apply to the Swedish National Agency for Higher Education for degree awarding powers.

#### Qualifications

All courses and study programmes are placed within one of three cycles: the first, second or third cycle. All qualifications are placed within one of the three cycles. Higher education within the first and second cycles is provided in the form of courses. Courses may be grouped together into programmes with varying levels of individual choice. Students themselves are also able to combine different courses towards a degree. A course syllabus is required for each course within the first and second cycle and a programme syllabus for each study programme. Educational cycle and intended learning out-

comes have to be specified for each course. Sweden has a system of credits (högskole-poäng); a normal 40-week academic year corresponds to 60 credits. The system is compatible with ECTS credits.

In the qualifications ordinance, the Government has laid down which qualifications may be awarded and the objectives as well as intended learning outcomes for these qualifications. In the Swedish higher education system there are generally no intermediate qualifications. All qualifications are regarded as final, even if there is a possibility to continue studying. There are three categories of qualifications: qualifications in the arts, social science and sciences, in fine, applied and performing arts and professional qualifications. Translations into English of all titles of qualifications are regulated at the national level. An institution of higher education may decide that a discipline precedes a qualification title e.g. filosofie kandidatexamen or medicine doktorsexamen or/and add a major field of studies e.g. civilingenjörsexamen i maskinteknik.

# Qualifications in the arts, social science, science and in fine, applied and performing arts

#### First cycle:

- I. Högskoleexamen (Higher Education Diploma) requires 120 credits and a diploma project. The corresponding degree in fine, applied and performing arts is konstnärlig högskoleexamen (Higher Education Diploma).
- 2. Kandidatexamen (Bachelor of Arts/Bachelor of Science) requires 180 credits with a defined main field of studies determined by each higher education institution itself. At least 90 credits with increasingly in-depth studies including a diploma project of 15 credits have to be completed in the main field of study. The correspond-





ing degree in fine, applied and performing arts is *konstnärlig kandidatexamen* (Bachelor of Fine Arts).

#### Second cycle:

- I. Magisterexamen (Master of Arts/
  Master of Science (60 credits)) requires a defined main field of studies. At least 30 credits have to be completed in the main field of study including a thesis of 15 credits. In addition, normally the student must hold either a kandidatexamen or a professional degree of at least 180 credits or an equivalent foreign degree. Konstnärlig magisterexamen (Master of Fine\_Arts (60 credits)) is awarded in fine, applied and performing arts.
- 2. Masterexamen (Master of Arts (120 credits)/Master of Science (120 credits)) requires a defined main field of studies. At least 60 credits have to be completed in the main field of study including a thesis of 30 credits. In addition, in general, the student must hold either a kandidatexamen or a professional degree of at least 180 credits or an equivalent foreign degree. Konstnärlig masterexamen (Master of Fine Arts (120 credits)) is awarded in fine, applied and performing arts. The most advanced courses for Masterexamen may be accepted as partial fulfilment of the requirements for a doctoral programme.

General admission requirements to qualification within the second cycle are: qualification within the first cycle of at least 180 credits or a corresponding foreign qualification. In addition, admission may be granted to an applicant who has the potential to benefit from the education, by virtue of other educational achievements, practical experience or other circumstances.

#### **Professional qualifications**

There are about 40 professional degrees. Professional qualifications are awarded in the fields of engineering, health care, agriculture, law, education, etc. Professional qualifications may be placed within either the first or the second cycle. With a few exceptions, general entry requirements to professional degrees are the same as to the first cycle. Programmes leading to professional qualifications may vary in length

depending on their content and may stretch over two cycles.

#### Third cycle:

The Faculty Board decides which subjects may be offered within the third cycle. For every subject, a general study plan should be drawn up and approved by the Faculty Board. The study plan must state the principal organisation of the studies, the specific admission requirements, the examinations required towards the degree and whether the study programme may end with the award of a *licentiatexamen* or a *konstnärlig licentiatexamen*.

Two qualifications are offered within the third cycle:

- I. Licentiatexamen (Licentiate) requires at least 120 credits including a thesis of at least 60 credits. The corresponding degree in fine, applied and performing arts is konstnärlig licentiatexamen. The Faculty Board may also decide that a licentiatexamen can be awarded as an intermediate degree towards doktorsexamen.
- 2. Doktorsexamen (Doctor of Philosophy) requires 240 credits including a thesis of at least 120 credits. The thesis has to be defended publicly. The corresponding degree in fine, applied and performing arts is konstnärlig doktorsexamen.

Entry requirements to the third cycle are: The applicant has to be deemed to have ability to benefit from the education. And general requirements to the third cycle are:

- 1. a second cycle degree
- completed course requirements of at least 240 credits of which 60 credits within the second cycle or
- equivalent level of knowledge acquired in Sweden or abroad.

Transitional provisions:

Rules for admission to the third cycle were changed from 1 July 2007. A person who met general requirements for admission before 1 July 2007 should be considered as eligible for admission until 30 June 2015. The general entry requirements before 1 July 2007 were a completed undergraduate programme of at least 120 credits (equivalent to 180 higher education credits) or largely equivalent knowledge acquired in some other system in this country or abroad.

#### **Grading**

The Higher Education Ordinance states that the following grades may be awarded: Pass with Distinction (väl godkänd), Pass (godkänd) or Fail (underkänd) unless the institution decides to grade on some other scale. A number of courses use only two grades: Pass or Fail. Others, for example in Law and Engineering, traditionally use scales with several levels — expressed as letters or numbers. ECTS grading have been introduced at several Higher education institutions. No overall grade is given for a degree and students are not ranked.

