DEGREE CERTIFICATE
BACHELOR OF SCIENCE (TECHNOLOGY)

Lappeenranta-Lahti University of Technology LUT
LUT School of Engineering Sciences

Ajay Sah
(010896-3173)

has completed the following first-cycle degree as provided in the government decree on university degrees and professional specialisation programmes (794/2004): Bachelor of Science (Technology) (180 credits), Software and Systems Engineering, with Software and Systems Engineering as the intermediate specialisation studies.

The degree has been awarded in accordance with a double degree agreement: Bachelor of Science (Technology) by Hebei University of Technology. Graduates are awarded two degree certificates if they complete studies and a related thesis in accordance with the requirements of both universities.

16 June 2024

JAANA SANDSTRÖM
Vice Rector

The Certificate is electronically signed. The authenticity of the document can be verified from the original file and at https://lut.fi/validate or at the website of Digital and population data services agency at https://dvv.fineid.fi/en/validation.

This degree certificate is composed of three parts: in addition to this certificate, it contains a transcript providing information on the studies included in the degree, and a diploma supplement for international use, providing information on the university and the completed degree, its level and its status in the Finnish education system. The graduate has been granted an original degree certificate in Finnish and English.

BACHELOR OF SCIENCE (TECHNOLOGY)

First names	Ajay
Last name	Sah
Personal identity code	010896-3173
Student number	000363491
Degree programme	Software and Systems Engineering (180 credits)
Intermediate specialisation studies	Software and Systems Engineering
Field of education	Fields of education (Ministry of Education and Culture), Information and Communication Technologies (ICTs)
Date of the degree	16 Jun 2024

Content of the degree

	Scope	Grade
General Studies	44 cr	5
Language and Communication Studies	19 cr	5
Intermediate Specialisation Studies, Software and Systems Engineering	95 cr	4
Minor Studies, Sustainability Science	20 cr	4
Elective studies	3 cr	3
Total number of credits completed for the degree	**181 cr**	

The degree includes the thesis **Building a chatbot using dialogflow: a proof-of-concept demonstration** which was approved with the grade of 5 (excellent). The scope of the thesis is 10 credits.

The degree was completed **with distinction.**

The degree includes studies completed elsewhere with a total of 19 credits.

The graduate completed their secondary education in a language other than Finnish or Swedish. The maturity test included in the degree was completed in English.

SOFTWARE AND SYSTEMS ENGINEERING

Course name and code	Scope	Lang	Grade	Date
GENERAL STUDIES (TiBScGenDD)	**44 cr**		**5**	**18 Mar 2024**
Introduction to IoT-Based Systems (BL40A2010)	4 cr	en	5	11 Apr 2023
Software Project Management (CT60A5531)	3 cr	en	5	2 May 2023
Engineering Physics (LES10A020)	3 cr	en	4	18 Mar 2022
Software Engineering (CT60A4002)	6 cr	en	5	4 Mar 2022
Technical Documentation and 3D Modeling (BK10A6101)	6 cr	en	4	19 May 2022
Principles of C-programming (LES10A110)	3 cr	en	4	29 May 2022
Introduction to Programming (CT60A0203)	6 cr	en	4	25 Jan 2022
Statistical mathematics (CT60A9710)	3 cr	en	5	28 Feb 2022
Introduction to DD Studies in Software and Systems Engineering (CT10A9900)	1 cr	en	Pass	22 Apr 2022
Mathematics A (CT60A9700)	6 cr	en	5	7 Jan 2022
Work Internship in Bachelor's Degree in Finland (CT10A0400) Lappeenranta-Lahti University of Technology LUT, 1.6.2023 - 31.8.2023.	3 cr	en	Pass	18 Mar 2024
LANGUAGE AND COMMUNICATION STUDIES (TiBScLangDD)	**19 cr**		**5**	**16 May 2023**
Finnish Culture and Language 1 (K200BX70) * LAB University of Applied Sciences.	5 cr	fi	5	17 Dec 2021
English for Professional Development (Technology) (KE00BZ85) * LAB University of Applied Sciences.	4 cr	en	4	7 Dec 2022
Basic Chinese 1 (KC00CQ66) * LAB University of Applied Sciences.	5 cr	en	4	9 Jan 2023
Basic Chinese 2 (KC00CQ67) * LAB University of Applied Sciences.	5 cr	en	5	16 May 2023
Intermediate Specialisation Studies				
SOFTWARE AND SYSTEMS ENGINEERING (TiBScSSEDD)	**95 cr**		**4**	**8 May 2024**
Object-Oriented Programming (CT60A2411)	4 cr	en	5	28 Apr 2023

Course name and code	Scope	Lang	Grade	Date
User Interfaces and Usability (CT30A2803)	6 cr	en	5	30 May 2022
Foundations of Information Processing (BM40A0102)	6 cr	en	5	13 Jan 2022
Foundations of Computer Science (BM40A0202)	6 cr	en	4	27 May 2022
Data Structures and Algorithms (BM40A1500)	6 cr	en	3	27 Feb 2023
Discrete Models and Methods (BM20A8800)	3 cr	en	5	8 Mar 2023
Discrete Models and Methods 2: Functional programming (CT60A9601)	3 cr	en	3	8 May 2024
Distributed Systems (CT30A3401)	6 cr	en	4	19 Apr 2024
Advanced Web Applications (CT30A3204)	6 cr	en	2	5 Apr 2024
Fundamentals of Software Testing (CT60A4160)	3 cr	en	4	19 Dec 2022
Advanced networks (CT60A4700)	3 cr	en	4	16 Dec 2022
Computer networks and Internet (CT60A5540)	3 cr	en	2	30 Nov 2022
Operating Systems and System Programming (CT30A3370)	6 cr	en	5	26 Apr 2024
Fundamentals of smart systems (CT60A4800)	4 cr	en	5	16 Dec 2022
Foundations of Artificial Intelligence and Machine Learning (BM40A1601)	6 cr	en	1	13 Feb 2024
Software Quality Management (CT60A5511)	3 cr	en	4	9 May 2023
Cyber Security of Software Systems (CT60A5521)	3 cr	en	5	21 Apr 2023
Basics of database systems (CT60A4304)	3 cr	en	4	7 Mar 2023
Database Systems Management (CT60A7650)	3 cr	en	4	11 Sep 2023
Bachelor's Thesis and Seminar (CT10A4000)	10 cr	en	5	5 Dec 2023
¦ Examiner: Jussi Kasurinen				
Workshop for Scientific Writing (CT70A9200)	2 cr	en	Pass	1 Aug 2023
Maturity test in Bachelor's Degree (LUTKYPSAT)	0 cr	en	Pass	5 Dec 2023
Minor Studies				
SUSTAINABILITY SCIENCE (YmDSaSS)	**20 cr**		**4**	**1 Feb 2024**
Introduction to Circular Economy (BH60A5400)	5 cr	en	4	16 Dec 2022
Climate Change (BH60A5900)	5 cr	en	5	22 Apr 2022

Course name and code	Scope	Lang	Grade	Date
Environmental Labelling (BH60A6100)	4 cr	en	3	30 Jan 2024
Sustainable Cities (BH60A6200)	6 cr	en	4	1 Feb 2024
ELECTIVE STUDIES (VapValK_LESBSc_SEME)	**3 cr**		**3**	**21 Dec 2023**
Introduction to Web Programming (CT30A2910)	3 cr	en	3	21 Dec 2023

Grade average 4,15

GRADING SCALES AND DESCRIPTIONS FOR COMPLETED STUDIES

The scope of studies is measured in ECTS credits (cr). The average workload of 1 600 hours needed to complete one academic year of studies corresponds to 60 credits.

The average grade of study attainments is calculated from courses which have been graded on a scale from 0 to 5 (fail–excellent) and which the student has passed. The average grade is weighted according to the courses' scopes in credits. The average grade is only displayed if at least half of the scope of the degree has been graded using the scale from 0 to 5.

*** Studies completed elsewhere**

Language of study

Finnish	5 cr
Swedish	0 cr
English	176 cr

Language of study: fi (Finnish), sv (Swedish), en (English).
The language of study is not defined for all completed studies.

Grading scale for completed studies

5 (excellent), 4 (very good), 3 (good), 2 (satisfactory), 1 (passable), 0 (fail)

Pass (Pass), Fail (Fail)

Grading scales for theses

5 (excellent), 4 (very good), 3 (good), 2 (satisfactory), 1 (passable), 0 (fail)

TUTKINTOTODISTUS
TEKNIIKAN KANDIDAATTI

Lappeenrannan-Lahden teknillinen yliopisto LUT
LUT School of Engineering Sciences

Ajay Sah
(010896-3173)

on suorittanut yliopistojen tutkinnoista ja erikoistumiskoulutuksista annetun valtioneuvoston asetuksen (794/2004) mukaisen alemman korkeakoulututkinnon: tekniikan kandidaatti (180 opintopistettä), software and Systems Engineering, suuntautumisvaihtoehdon aineopintoina software and systems engineering.

Tekniikan kandidaatin tutkinto on myönnetty kaksoistutkintosopimuksen mukaisesti: Bachelor of Science (Technology) Hebei University of Technology -yliopistosta. Mikäli opiskelija on suorittanut opintonsa ja opinnäytetyönsä kummankin yliopiston tutkintovaatimusten mukaisesti, hänelle myönnetään kaksi tutkintotodistusta.

16. kesäkuuta 2024

JAANA SANDSTRÖM
Vararehtori

Tutkintotodistus on sähköisesti allekirjoitettu. Allekirjoituksen voi todentaa alkuperäisestä tiedostosta. Varmentaminen on mahdollista osoitteessa https://lut.fi/tarkasta tai Digi- ja väestötietoviraston palvelussa https://dvv.fineid.fi/fi/validation.

Tämä tutkintotodistus on kolmiosainen: tämän todistussivun lisäksi siihen kuuluvat opintosuoritusote, joka sisältää tiedot tutkintoon kuuluvista opinnoista, ja kansainväliseen käyttöön tarkoitettu Diploma Supplement, jossa on tiedot yliopistosta sekä suoritetusta tutkinnosta, sen tasosta sekä asemasta Suomen koulutusjärjestelmässä. Tästä tutkinnosta on annettu alkuperäinen tutkintotodistus suomen ja englannin kielellä.

TEKNIIKAN KANDIDAATTI

Etunimet	Ajay
Sukunimi	Sah
Henkilötunnus	010896-3173
Opiskelijanumero	000363491
Tutkinto-ohjelma	Software and Systems Engineering (180 opintopistettä)
Suuntautumisvaihtoehdon aineopinnot	Software and Systems Engineering
Koulutusala	OKM:n ohjauksen ala, Tietojenkäsittely ja tietoliikenne
Tutkinnon myöntämispäivä	16.6.2024

Tutkinnon sisältö

	Laajuus	Arvosana
Yleisopinnot	44 op	5
Kieli- ja viestintäopinnot	19 op	5
Suuntautumisvaihtoehdon aineopinnot, Software and Systems Engineering	95 op	4
Sivuopinnot, Sustainability Science	20 op	4
Vapaasti valittavat opinnot	3 op	3
Tutkintoon sisältyvät opinnot yhteensä	**181 op**	

Tutkintoon sisältyvä opinnäyte **Building a chatbot using dialogflow: a proof-of-concept demonstration** on hyväksytty arvosanalla 5 (erinomainen). Opinnäytteen laajuus on 10 opintopistettä.

Tutkinto on suoritettu **oivallisesti.**

Tutkintoon sisältyy muualla suoritettuja opintoja 19 opintopistettä.

Tutkinnon suorittaneen koulusivistyskieli on muu kuin suomi tai ruotsi. Tutkintoon sisältyvän kypsyysnäytteen kieli on englanti.

SOFTWARE AND SYSTEMS ENGINEERING

Suorituksen nimi ja koodi	Laajuus	Kieli	Arvosana	Pvm
YLEISOPINNOT (TiBScGenDD)	**44 op**		**5**	**18.3.2024**
Introduction to IoT-Based Systems (BL40A2010)	4 op	en	5	11.4.2023
Software Project Management (CT60A5531)	3 op	en	5	2.5.2023
Engineering Physics (LES10A020)	3 op	en	4	18.3.2022
Ohjelmistotuotanto (CT60A4002)	6 op	en	5	4.3.2022
Technical Documentation and 3D Modeling (BK10A6101)	6 op	en	4	19.5.2022
Principles of C-programming (LES10A110)	3 op	en	4	29.5.2022
Ohjelmoinnin perusteet (CT60A0203)	6 op	en	4	25.1.2022
Statistical mathematics (CT60A9710)	3 op	en	5	28.2.2022
Introduction to DD Studies in Software and Systems Engineering (CT10A9900)	1 op	en	Hyv.	22.4.2022
Mathematics A (CT60A9700)	6 op	en	5	7.1.2022
Tekniikan kandidaatin tutkinnon työharjoittelu kotimaassa (CT10A0400) Lappeenranta-Lahti University of Technology LUT, 1.6.2023 - 31.8.2023.	3 op	en	Hyv.	18.3.2024
KIELI- JA VIESTINTÄOPINNOT (TiBScLangDD)	**19 op**		**5**	**16.5.2023**
Finnish Culture and Language 1 (K200BX70) * LAB-ammattikorkeakoulu.	5 op	fi	5	17.12.2021
English for Professional Development (Technology) (KE00BZ85) * LAB-ammattikorkeakoulu.	4 op	en	4	7.12.2022
Basic Chinese 1 (KC00CQ66) * LAB-ammattikorkeakoulu.	5 op	en	4	9.1.2023
Basic Chinese 2 (KC00CQ67) * LAB-ammattikorkeakoulu.	5 op	en	5	16.5.2023
Suuntautumisvaihtoehdon aineopinnot				
SOFTWARE AND SYSTEMS ENGINEERING (TiBScSSEDD)	**95 op**		**4**	**8.5.2024**
Olio-ohjelmointi (CT60A2411)	4 op	en	5	28.4.2023

Suorituksen nimi ja koodi	Laajuus	Kieli	Arvosana	Pvm
User Interfaces and Usability (CT30A2803)	6 op	en	5	30.5.2022
Foundations of Information Processing (BM40A0102)	6 op	en	5	13.1.2022
Foundations of Computer Science (BM40A0202)	6 op	en	4	27.5.2022
Data Structures and Algorithms (BM40A1500)	6 op	en	3	27.2.2023
Discrete Models and Methods (BM20A8800)	3 op	en	5	8.3.2023
Discrete Models and Methods 2: Functional programming (CT60A9601)	3 op	en	3	8.5.2024
Distributed Systems (CT30A3401)	6 op	en	4	19.4.2024
Advanced Web Applications (CT30A3204)	6 op	en	2	5.4.2024
Ohjelmistotestauksen periaatteet (CT60A4160)	3 op	en	4	19.12.2022
Advanced networks (CT60A4700)	3 op	en	4	16.12.2022
Computer networks and Internet (CT60A5540)	3 op	en	2	30.11.2022
Käyttöjärjestelmät ja systeemiohjelmointi (CT30A3370)	6 op	en	5	26.4.2024
Fundamentals of smart systems (CT60A4800)	4 op	en	5	16.12.2022
Foundations of Artificial Intelligence and Machine Learning (BM40A1601)	6 op	en	1	13.2.2024
Software Quality Management (CT60A5511)	3 op	en	4	9.5.2023
Ohjelmistojärjestelmien tietoturva (CT60A5521)	3 op	en	5	21.4.2023
Basics of database systems (CT60A4304)	3 op	en	4	7.3.2023
Database Systems Management (CT60A7650)	3 op	en	4	11.9.2023
Kandidaatintyö ja seminaari (CT10A4000)	10 op	en	5	5.12.2023
┆ Tarkastaja: Jussi Kasurinen				
Workshop for Scientific Writing (CT70A9200)	2 op	en	Hyv.	1.8.2023
Kypsyysnäyte kandidaatintutkinnossa (LUTKYPSAT)	0 op	en	Hyv.	5.12.2023
Sivuopinnot				
SUSTAINABILITY SCIENCE (YmDSaSS)	**20 op**		**4**	**1.2.2024**
Introduction to Circular Economy (BH60A5400)	5 op	en	4	16.12.2022
Climate Change (BH60A5900)	5 op	en	5	22.4.2022

Suorituksen nimi ja koodi	Laajuus	Kieli	Arvosana	Pvm
Environmental Labelling (BH60A6100)	4 op	en	3	30.1.2024
Sustainable Cities (BH60A6200)	6 op	en	4	1.2.2024
VAPAASTI VALITTAVAT OPINNOT (VapValK_LESBSc_SEME)	**3 op**		**3**	**21.12.2023**
Introduction to Web Programming (CT30A2910)	3 op	en	3	21.12.2023

Opintosuoritusten keskiarvo 4,15

OPINTOSUORITUSTEN ARVOSANA-ASTEIKOT JA SELITTEET

Opintojen laajuutta mitataan opintopisteinä (op). Yhden lukuvuoden opintojen suorittamiseen keskimäärin vaadittava 1600 tunnin työpanos vastaa 60 opintopistettä.

Opintosuoritusten keskiarvo lasketaan hyväksytysti suoritetuista opintojaksoista, jotka on arvioitu asteikolla 0–5 (hylätty–erinomainen). Keskiarvo on painotettu opintopistelaajuudella. Keskiarvo näytetään vain, jos vähintään puolet tutkinnon laajuudesta on arvioitu asteikolla 0–5.

*** Muualla suoritettu opinto**

Opintojen suorituskieli

Suomi	5 op
Ruotsi	0 op
Englanti	176 op

Suorituskielen selitykset: fi (suomi), sv (ruotsi), en (englanti).
Kaikille opintosuorituksille ei ole aina määritelty suorituskieltä.

Opintosuoritusten arvosana-asteikot

5 (erinomainen), 4 (kiitettävä), 3 (hyvä), 2 (tyydyttävä), 1 (välttävä), 0 (hylätty)

Hyv. (Hyväksytty), Hyl. (Hylätty)

Opinnäytetöiden arvosana-asteikot

5 (erinomainen), 4 (kiitettävä), 3 (hyvä), 2 (tyydyttävä), 1 (välttävä), 0 (hylätty)

DIPLOMA SUPPLEMENT

This Diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of this 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 of any value-judgements, equivalence statements or suggestions about recognition. Information should be provided in all eight sections. Where information is not provided, a reason should be given.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Last name(s)

Sah

1.2 First name(s)

Ajay

1.3 Date of birth (dd/mm/yyyy)

01/08/1996

1.4 Student identification number or code (if available)

000363491

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1 Name of qualification and (if applicable) title conferred (in original language)

Tekniikan kandidaatti
Bachelor of Science (Technology)

2.2 Main field(s) of study for the qualification

Fields of education (Ministry of Education and Culture), Information and Communication Technologies (ICTs)

2.3 Name and status of awarding institution (in original language)

Lappeenrannan-Lahden teknillinen yliopisto LUT (Lappeenranta-Lahti University of Technology LUT) The quality assurance system of the university has passed the audit conducted by the Finnish Education Evaluation Centre. Further information: www.karvi.fi

The degree has been awarded in accordance with a double degree agreement: Bachelor of Science (Technology) by Hebei University of Technology. Graduates are awarded two degree certificates if they complete studies and a related thesis in accordance with the requirements of both universities.

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

English

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1 Level of qualification

First-cycle education degree (bachelor level).
The degree is on level 6 in the National Framework for Qualifications and Other Competence Modules (FiNQF) and the European Qualifications Framework.

3.2 Official duration of programme in credits and/or years

The degree consists of at least 180 credits, 3 years of full-time study.
Finnish credits are fully compatible with the ECTS.

3.3 Access requirements

The Finnish Matriculation Examination gives general eligibility for higher education. General eligibility is also given by upper secondary vocational qualifications, further vocational qualifications and specialist vocational qualifications.
Foreign qualifications which in the awarding country give eligibility for higher education studies, give general eligibility for higher education also in Finland. There is a numerus clausus, i.e. restricted entry, to all fields of study.

4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

4.1 Mode of study

Full-time

4.2 Programme learning outcomes

Education leading to the Bachelor's degree is based on scientific research and practices in the relevant professional field. The studies have provided students with: 1. knowledge of the intermediate and minor studies included in the degree, or knowledge of the basics of corresponding modules and studies in the degree programme and the ability to follow developments in the field, 2. extensive, advanced knowledge of their field and the capacity for understanding and critically assessing theories, key concepts, methods and principles 3. the capacity for scientific thinking and scientific approaches to work, taking ethical viewpoints into account, 4. the ability to apply what they have learnt to their work and international collaboration, 5. the ability to complete Master's level studies and for continuous learning, 6. good communication and language skills and the ability to head activities and projects.
The intended learning outcomes for the programme has been stated as follows:

After completing the Bachelor's programme in Software and Systems Engineering the graduate will be able to 1) apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to development of complex, scalable software systems, 2) demonstrate software engineering application domain knowledge and principles of selecting and the use of software methods, 3) understand the dynamics of how teams develop and function, productively participate in software projects with heterogeneous teams, 4) interact professionally with colleagues or clients and overcome challenges that arise from geographic distance, cultural differences, and multiple languages in the context of computing and software engineering, 5) communicate effectively both verbally and in writing, produce documents, and work as a part of a project team using English, 6) recognize the need for, and engage in, lifelong learning, 7) describe, design and solve problems by programming and using software engineering techniques and experimentation, 8) apply technical skills in different application domains taking into account technical, social, an economical constraints, 9) elicit, analyze and specify software requirements through a productive working relationship with project stakeholders, 10) apply appropriate codes of ethics and professional conduct to the solution of software engineering problems and 11) understand IT related business, entrepreneurship and innovation models.

4.3 Programme details (e.g. modules or units studied), and the individual grades/marks/credits obtained

See transcript of records for all courses taken and included in the degree. Also the grades obtained per course and the overall grade of the graduate are given in transcript of records.

4.4 Grading scheme and, if available, grade distribution guidance

5 = Excellent, 4 = Very good, 3 = Good, 2 = Satisfactory, 1 = Passable, 0 = Fail, Hyv. = Pass
The ECTS Grading Table enclosed to Diploma Supplement is available in https://elut.lut.fi/en/graduation/degree-certificate > Diploma Supplement and ECTS Grading Table.

4.5 Overall classification of the qualification (in original language)

With distinction

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study

Eligible for second-cycle higher education studies. The admissions decisions are made in the receiving higher education institution.

5.2 Access to a regulated profession (if applicable)

6. ADDITIONAL INFORMATION

6.1 Additional information

6.2 Further information sources

- www.lut.fi, Lappeenranta-Lahti University of Technology LUT

- www.minedu.fi, Ministry of Education and Culture
- www.oph.fi/recognition, www.oph.fi/qualificationsframework
The Finnish National Agency of Education, the ENIC: European Network of Information Centres in the European Region, and the NARIC: National Academic Recognition Information Centres in the European Union, and the National Coordination Point for the European Qualifications Framework (EQF)
- www.karvi.fi, The Finnish Education Evaluation Centre (FINEEC)

7. CERTIFICATION OF THE SUPPLEMENT

Date (dd/mm/yyyy)

16/06/2024

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

The Finnish education system consists of pre-primary and basic education, general and vocational education and higher education. The compulsory schooling consists of one-year pre-primary education for 6-year-olds and nine-year basic education for children aged 7-16.

Post-compulsory education consists of general and vocational upper secondary education that lead to the national Matriculation Examination (*ylioppilastutkinto/studentexamen*), vocational upper secondary qualification (*ammatillinen perustutkinto/yrkesinriktad grundexamen*), further vocational qualification (*ammattitutkinto, yrkesexamen*) and specialist vocational qualification (*erikoisammattitutkinto/specialyrkesexamen*).

Higher education system in Finland

The Finnish higher education system comprises universities (*yliopisto/universitet*) and universities of applied sciences (*ammattikorkeakoulu, AMK/yrkeshögskola, YH*). The universities engage both in education and research and have the right to award doctorates. The universities of applied sciences are multi-field institutions of professional higher education. Universities of applied sciences engage in applied research and development.

First and second cycle higher education studies are measured in credits (*opintopiste/studiepoäng*). Study courses are quantified according to the work load required. One year of full-time study is equivalent to 1600 hours of student work on average and is defined as 60 credits. The credit system complies with the European Credit Transfer and Accumulation System (ECTS).

Higher education qualifications in Finland are referenced at levels 6, 7 and 8 both in the National Qualifications Framework as well as in the European Qualifications Framework.

University degrees

The Government Decree on University Degrees and Specialisation Studies (794/2004 including amendments) defines the objectives, extent and overall structure of degrees. The universities decide on the detailed contents and structure of the degrees they award. They also decide on their curricula and forms of instruction.

First cycle university degree

The first cycle university degree consists of at least 180 credits (three years of full-time study). The degree is called *kandidaatti/kandidat* in all fields of study except for Law (*oikeusnotaari/rättsnotarie*) and Pharmacy (*farmaseutti/farmaceut*). The determined English translation for all of these degrees is Bachelor's degree, the most common degree titles being Bachelor of Arts and Bachelor of Science.

Studies leading to the degree provide the student with: (1) knowledge of the fundamentals of the major and minor subjects or corresponding study entities or studies included in the degree programme and the prerequisites for following developments in the field, (2) knowledge and skills needed for scientific thinking and the use of scientific methods or knowledge and skills needed for artistic work, (3) knowledge and skills needed for studies leading to a higher university degree and for life-long learning, (4) a capacity for applying the acquired knowledge and skills to work and in international co-operation, and (5) adequate language and communication skills for working in one's own field and for international work and co-operation.

Studies leading to the degree may include: basic and intermediate studies; language and communication studies, interdisciplinary programmes, and other studies and work practice for professional development. The degree includes a Bachelor's thesis (6 – 10 credits).

Second cycle university degree

The second cycle university degree consists of at least 120 credits (two years of full-time study). The degree is usually called *maisteri/magister*. Other second cycle degree titles are *diplomi-insinöörin tutkinto/ diplomingenjörexamen* (Technology), *proviisorin tutkinto /provisorexamen* (Pharmacy), *arkkitehdin tutkinto/arkitektexamen* (Architecture) and *maisema-arkkitehdin tutkinto/ landskapsarkitektexamen* (Landscape Architecture). The determined English translation for all these degrees is Master's degree, the most common degree titles being Master of Arts and Master of Science. The second cycle university degree title in the fields of Medicine, Veterinary Medicine and Dentistry is *lisensiaatti/licentiat*, the English title being Licentiate. The admission requirement for the second cycle university degree is a first cycle degree.

In the fields of Medicine and Dentistry the university may arrange the education leading to the second cycle university degree without including a first cycle university degree in the education. In Medicine, the degree consists of 360 credits (six years of full-time study) and in Dentistry the degree consists of 330 credits (five and a half years of full-time study).

Studies leading to the second cycle university degree provide the student with: (1) good overall knowledge of the major subject or a corresponding entity and conversance with the fundamentals of the minor subject or good knowledge of the advanced studies included in the degree programme; (2) knowledge and skills needed to apply scientific knowledge and scientific methods or knowledge and skills needed for independent and demanding artistic work; (3) knowledge and skills needed for independently operating as an expert and developer of the field and for international co-operation; (4) knowledge and skills needed for scientific or artistic postgraduate education and for life-long learning; and (5) good language and communication skills for working in one's own field and for international work and co-operation.

The studies leading to the second cycle university degree may include: basic and intermediate studies and advanced studies, language and communication studies; interdisciplinary studies, other studies, and internship improving expertise. The degree includes a Master's thesis (20 – 40 credits).

Doctoral degrees

The aim of doctoral studies is to provide student with an in-depth knowledge of their field of research and capabilities to produce novel scientific knowledge independently.

The degree of *lisensiaatti/licentiat* (Licentiate) may be taken before the Doctor's degree and in general it takes two years of full-time study to complete.

The Doctor's degree takes approximately four years to complete after a second cycle degree and two years when completed after a Licentiate's degree. A student who has been admitted to studies leading to Doctor's degree must complete a given amount of studies, show independent and critical thinking in their field of research and write a Doctor's dissertation and defend it in public.

University of applied sciences degrees

The universities of applied sciences Act (932/2014 including amendments) defines the objectives, extent and overall structure of universities of applied sciences degrees. The universities of applied sciences decide on the detailed contents and structure of the degrees they award. They also decide on their curricula and forms of instruction.

First cycle university of applied sciences degrees

The first cycle university of applied sciences degree consists of 180, 210, 240 or 270 credits (three to four and a half years of full-time study) depending on the field of study. The first cycle university of applied sciences degree is called *ammattikorkeakoulututkinto/yrkeshögskoleexamen*. The determined English translation for the degree is Bachelor's degree. The degree titles indicate the field of study, e.g. Bachelor of Engineering and Bachelor of Health Care.

Studies leading to the degree provide the student with: (1) broad overall knowledge and skills with relevant theoretical background for working as expert of the field, (2) knowledge and skills needed for following and advancing developments in the field, (3) knowledge and skills needed for professional development and life-long learning, and (4) adequate language and communication skills for working in one's own field and for international work and co-operation.

The first cycle university of applied sciences degree comprises basic and professional studies, elective studies, a practical training period, and a final project.

The second cycle university of applied sciences degrees

The second cycle university of applied sciences degree consists of 60 or 90 credits (a year or a year and a half of full-time study). The Master of Police Services degree consists of 120 credits. The degree is called *ylempi ammattikorkeakoulututkinto/högre yrkeshögskoleexamen*. The determined English translation for the degree is Master's degree. The degree titles indicate the field of study, e.g. Master of Culture and Arts or Master of Business Administration.

Studies leading to the degree provide the student with: (1) broad and advanced knowledge and skills for developing the professional field as well as the theoretical skills for working in demanding expert and leadership positions in the field, (2) profound understanding of the field, its relation to working life and society at large as well as the knowledge and skills needed for following and analysing both theoretical and professional developments in the field, (3) capacity for life-long learning and continuous development

of one's own expertise , and (4) good language and communication skills for working in one's own field and for international work and co-operation.

The second cycle university of applied sciences degree comprises advanced professional studies, elective studies, and a final project.

Professional specialisation programmes

Universities and universities of applied sciences offer professional specialisation programmes for those who have completed a degree and have already entered working life. Professional specialisation programmes aim to promote professional development and specialisation by means of providing education based on the research.

Provisions on the joint objectives and minimum scope of professional specialisation programmes are issued by government decree. The minimum scope of professional specialisation studies is 30 credits.