

## 7. FI: Suomi/Finland

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### 7.1. General information



Finland has nine years of compulsory schooling. Comprehensive schools are primarily run by local authorities, with the exception of a few private schools. The government contributes to the financing of all of the schools. After compulsory schooling, young Finns can choose between general and vocational upper secondary education. Half of them opt for the upper secondary school (*lukio*). The upper secondary school ends in a national matriculation examination. The matriculation certificate provides eligibility for university education.

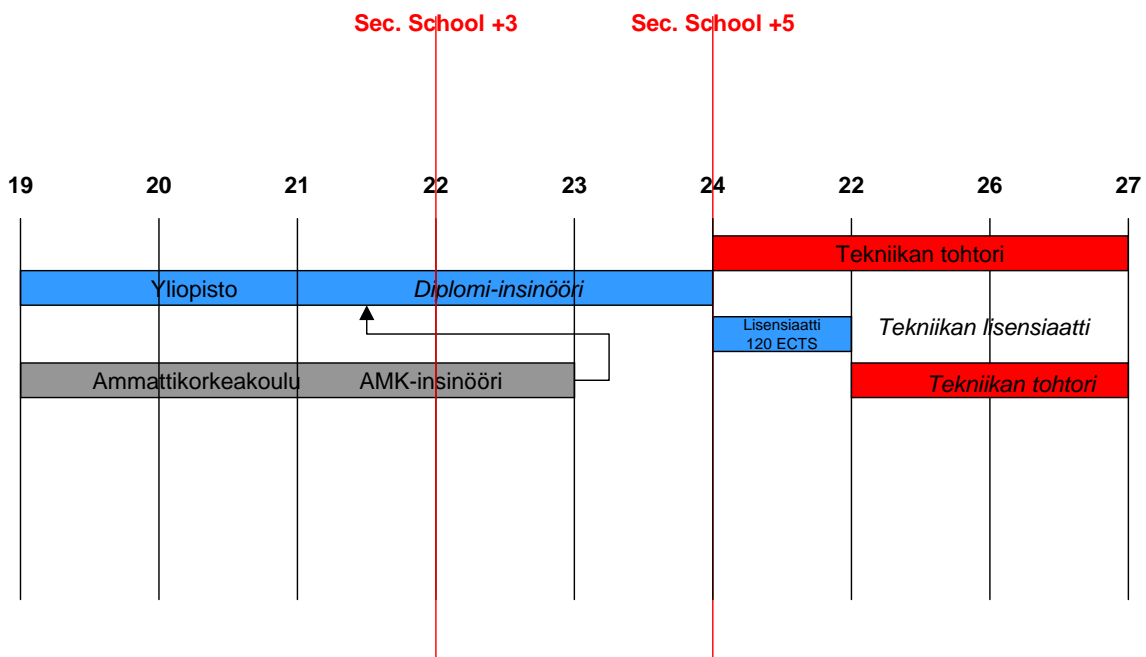


Figure 7.1: Finnish Higher Education System in EIE disciplines.

In upper secondary vocational education the study programmes (*ammattikoulu*) take from two to three years to complete. All three year study programmes provide eligibility for institutions of higher education. Students who have passed the matriculation examination or have a basic vocational qualification are eligible for admission. The system is currently being reformed: eventually, all higher vocational education will be provided at polytechnics (*ammattikorkeakoulu*, AMK, in Swedish *yrkeshögskola*, YH).

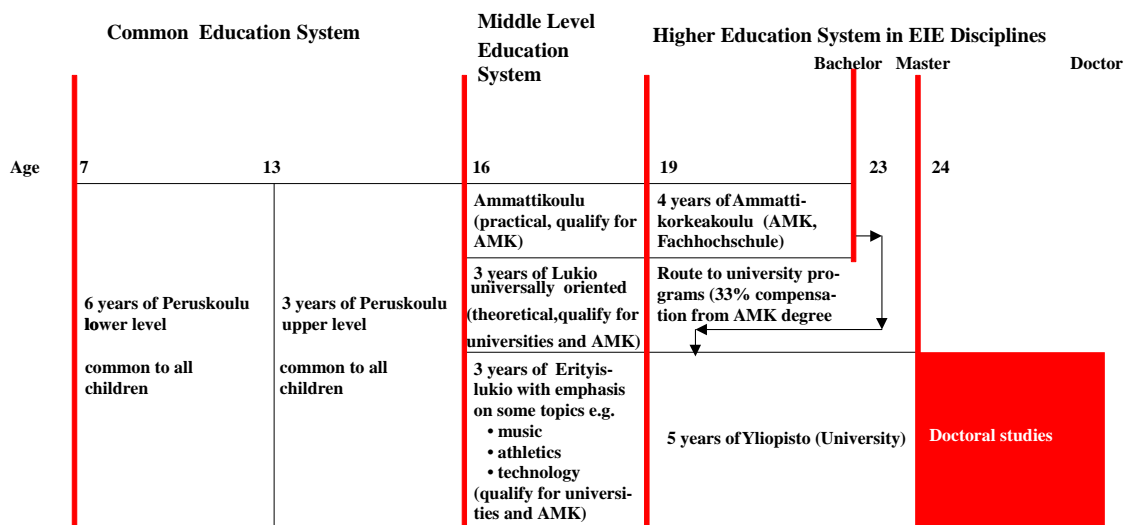


Figure 7.2: Finnish Education System.

The Finnish higher education system comprises two parallel sectors: universities and polytechnics.

There are altogether 20 universities in Finland: ten multifaculty universities, three universities of technology, three schools of economics and business administration, and four art academies. Geographically, the network covers the whole country.

The basic mission of universities is to carry out research and provide education based on it. The underlying principle in university education is the freedom of research and university autonomy, which gives them extensive latitude for independent decisions. All Finnish universities are state-run, with the government providing some 70 % of their funding. Each university and the Ministry of Education conclude a three-year agreement on target outcome to determine the operational principles.

Universities select their own students, and the competition for openings is stiff. All fields apply "*numerus clausus*", in which entrance examinations are a key element. Universities offer openings for about one third of the age group. The annual number of new students is 23,000. The aim is to offer a place in universities and polytechnics to 60-65% of the age group, which will be achieved soon.

In the semesters 2001/2002 there were 162,785 university students in Finland, of whom 21,008 were postgraduate students. The share of engineering students was 21 %.

In March 1998, the Government adopted a programme to increase education relating to the information industry between 1998 and 2002. The programme has strongly increased student enrolment in electrical and information engineering curricula. Around 50 % of new university students in engineering will be in the EIE sector.

All universities engage in both education and research and have the right to award doctorates. Master's degree can generally be attained in five years of full-time study.

The polytechnics were established during the reform process of the 1990s, and now a network of 29 polytechnics covers the entire country. Most of these AMK institutions are multisector establishments. Former Technical institutes set up the basis for the Engineering Departments at the polytechnics. The number of students in the polytechnics in 2002 was 126,206. The share of engineering students was 33 % (42,088).

#### 7.1.1 Electrical and Information Engineering in Finland, boundaries of the field of study

Electrical and Information Engineering has traditionally included all disciplines at Departments of Electrical Engineering (*Sähkötekniikka*). It means Power Engineering, Electronics, Automation and Systems Control, and Communications Engineering. In 1980's new Departments of Information Technology (*Tietotekniikka*) were launched. They mostly concentrate on Computer Science and Engineering, Communications Engineering and Software Engineering.

#### 7.1.2 Content, degrees and accreditations

The extent of the degree programmes taken by the students is given in credit units (*opintoviikko*). One credit unit refers to an input of approximately 40 hours of work, which consists of lecture hours, exercises and other forms of instruction as well as independent work. The extent of a *diplomi-insinööri* degree is 180 credit units including M.Sc. thesis (20 credits). One credit unit equals 1,5 ECTS.

Each University has full autonomy to decide on the contents of each degree. The contents in EIE degrees have many options at each University. Study programmes consist of basic studies, general subject-related studies, advanced professional studies, personal studies and a Master's thesis.

Basic studies in engineering include mathematics, basic sciences and computer technology. After two years the studies become more subject-related. Students can choose specific study options within the degree programme. A Master's thesis is written during the final year of the studies.

Details of the contents of the study programmes are available on the websites of the Universities (see the list of References).

### 7.1.3 Implementation of the Bologna-BMD system in Finland

The new structure of degrees will be implemented by 1.8.2005.

Technical Universities and Engineering Faculties have appointed a working group to prepare the modifications needed for new degrees. There is some controversy regarding introducing the three year degree. However, the working group proposes a new degree of *Tekniikan kandidaatti* (Bachelor of Science in Technology) of 3 years duration. It is not considered a professional degree because of doubts to get professional recognition in industry. No changes are proposed for the content and time frame of the degree of *Diplomi-insinööri* (MSc in Engineering). Anyway the transfer from Finnish credits "*opintoviikko*" to ECTS will be implemented. The working group makes no recommendations on doctoral degrees.

In Polytechnics the only degree is the 4-year degree of *insinööri (AMK)*. The opinion of the Ministry of Education is that at present there exists no urgent need for the change to the Bologna-BMD system. The industries are satisfied with the 4-year degree as well.

## 7.2. Figures on the weight of EIE in Finland

In 2001/2002 there were 162,785 university students in Finland, of whom 21,008 were postgraduate students. The number of students in engineering was 34,190 (21 %).

The annual number of new students is 23,000. The aim is to offer a place in universities and polytechnics to 60-65% of the age group, which will be achieved soon.

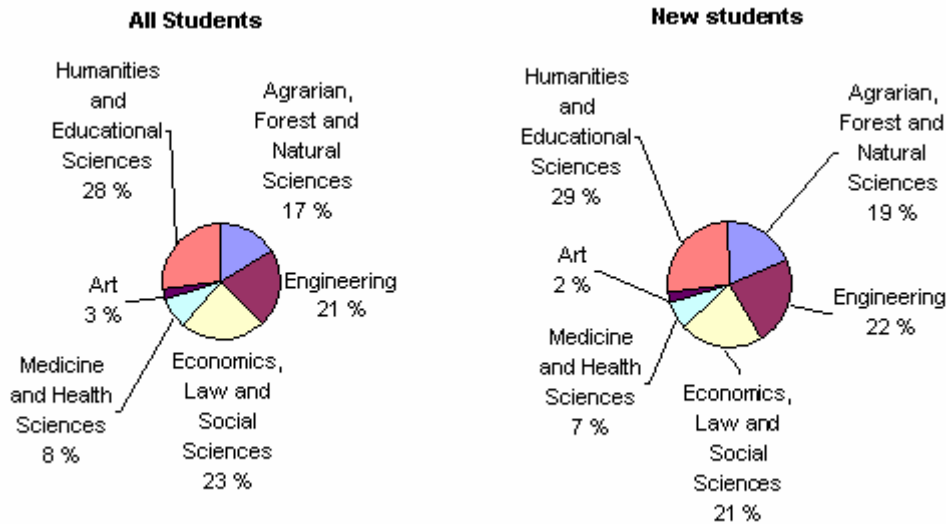


Figure 7.2: University students in 2001/2002.

## 7.3. Degrees in EIE in Finland

All Technical Universities and Faculties of Technology offer Master's programmes in EIE of five years duration. The title of the degree is **diplomi-insinööri (diplomingenjör)**.

There is also an optional pre-doctoral postgraduate degree of **tekniikan lisensiaatti (teknologie licentiat)**, which can be completed in two years of full-time study after the Master's degree. Full-time studies for a doctorate (**tekniikan tohtori, teknologie doktor**) take approximately four years following the Master's degree.

Polytechnic degrees are Bachelor-level higher education degrees with a professional emphasis and take 4 years to complete. The title of the degree is **insinööri (AMK)** or **ingenjör (YH)** in Swedish language *yrkeshögskola* institutions.

At present no higher-education degrees before the Bachelor-level exist.

## **7.4 References**

The information given in this monograph is based on the following documents and web links:

<http://www.minedu.fi/minedu/education/>

<http://www.hut.fi/English>

<http://www.lut.fi/english/>

<http://www.tut.fi/public>

<http://www.ttk.oulu.fi/English/>

<http://www.abo.fi/aa/engelska/>



## **7.5. Doctoral Studies in Finland**

### **7.5.1. Supervision**

#### ***Scientific Board or Supervisor***

Scientific board or Supervisor depending on the convention of the organisation. The Scientific board has two to three members. The student has the same personal supervisor during its thesis work on an active research area of the department. In the latter there are no strict limitations.

#### ***Subject Assignment***

Subject assigned at the beginning of the doctoral studies, or after a specified period of coursework. The thesis subject is assigned by agreement between the student and the supervisor or by a resolution of the scientific board taking into account the preferences of the student.

#### ***Who can be a Supervisor***

The supervisor is normally a professor or docent with an official position at the University. There might be other tutors to help the official supervisor.

#### ***Tasks of Scientific Board/Supervisor***

- |    |                                    |     |
|----|------------------------------------|-----|
| 1. | General management                 | YES |
| 2. | Deciding/advising layout of course | YES |
| 3. | Assigning a thesis subject         | YES |

#### ***Duration***

Four years.

## **7.5.2. Development**

### ***Courseware?***

Yes.

### ***Course Work***

1. The students have to take course work during their doctoral degree preparation and is offered as specialist graduate course units, book studies and seminars. The course work in some cases can be assessed by examinations and/or by projects. If the student fails in the course work, he/she can retake the exam, or develop non-course-work activities.
2. Extension: not available.
3. Credit system: ECTS. 70 credits are allocated to the course work: 40-45 ECTS in the major subject and 25-30 ECTS in supportive studies.
4. Monitoring of the doctoral student.

### ***Contribution to Teaching***

1. Supervision of undergraduate laboratory work.
2. Tutoring of undergraduate groups.
3. Marking of undergraduate assessments/homework.
4. All normal teaching activities, totalling 2-4 hours per week.

### ***Presentation of Work***

1. In the department.
2. At national conferences.
3. At international conferences.



### 7.5.3. Thesis Work

#### ***Submission of Doctoral Written Thesis***

1. Languages normally used: English. Although permitted, alternative languages are rarely used: Finnish (5%).
2. There are credits allocated to the doctoral thesis.
3. The doctoral thesis can be a previously unpublished substantial written report (monograph), or a collection of individual or co-authored scientific papers with an introduction and/or commentary .

#### ***Oral Presentation of Thesis Work***

1. Languages normally used: English. Although permitted, alternative languages are rarely used: Finnish (20%).
2. Oral presentation with oral examination for an open/public audience.
3. Duration: typical duration of 3 hours including examination with an upper time limit of six hours.

### 7.5.4. Examination

#### ***Thesis Examination Board***

1. Composition: one to three internal examiners and at least two external examiners.
2. Selection by the supervisor or the scientific committee of the institution.

#### ***Evaluation***

1. Result based on the reading of the thesis and the oral presentation of the thesis work, with a grading system (Failed, passed, passed with honours).
2. If the student fails, he/she may resubmit a revised thesis. The student may not resubmit for doctorate.

## 7.6. Questionnaires

### Finland

#### 3 – ACTIVITIES DURING DOCTORAL STUDIES

##### 3.1- SUPERVISION OF DOCTORAL STUDIES

- |              |   |                         |
|--------------|---|-------------------------|
| <b>3.1.1</b> | Are the doctoral studies supervised by a Scientific Board/supervisor? If no, please proceed to 3.1.5. | <u>YES/NO</u>           |
| <b>3.1.1</b> | Are the doctoral studies supervised by a Scientific Board/supervisor? If no, please proceed to 3.1.5. | YES and NO <sup>1</sup> |
| <b>3.1.2</b> | How many members are in the Scientific Board?   | 2-3                     |

<sup>1</sup> **It depends on the convention of the organisation. Post graduate could have a steering group of 2-3 members.**

- 3.1.3** How are the members of the Scientific Board chosen?

**3.1.3.1** Elected by the Faculty, Department?

**3.1.3.2** Chosen by the student?

**3.1.3.3** Chosen in another way? Please specify:

- 3.1.4** Which are the main tasks of the Scientific Board/ Supervisor?

**3.1.4.1** General management of the doctoral studies. YES

**3.1.4.2** Deciding the layout of the course, advising the students on their coursework. YES

**3.1.4.4** Assigning the thesis subject. YES

**3.1.4.5** Other. Please specify:

- 3.1.5** Does the student need a personal supervisor during her/his studies? YES<sup>2</sup>

**3.1.5.1** Does the same person supervise her/his thesis work? YES

<sup>2</sup> **Supervisor is a professor in department where doctoral student is aiming to do his thesis.**

3.1- SUPERVISION OF DOCTORAL STUDIES

3.1.6 Must the subject of the doctoral thesis be an active research area in the department? YES <sup>3</sup>

<sup>3</sup> **Supervisor is professor leading research in some area. Doctor students are coming to do research on area of his supervising professor. Of course there are no strict limitations.**

3.1.7 The doctoral thesis subject is normally assigned:

3.1.7.1 At the beginning of the doctoral studies? YES

3.1.7.2 After a specified period of coursework? YES <sup>4</sup>

3.1.7.3 Other. Please specify:

<sup>4</sup> **Sometimes after 1 or 2 years of research dealing with thesis it might be necessary to trim the subject of thesis..**

3.1.8 The thesis supervisor of a doctoral student can be:

3.1.8.1 Any professor or lecturer in the department? NO <sup>5</sup>

3.1.8.2 Any researcher in the department? NO

3.1.8.2.1 In this case, is there a need for a second supervisor who is a professor or lecturer in the department? NO

3.1.8.3 Any researcher in another institution? NO

3.1.8.3.1 In the latter case, is there a need for an internal supervisor? NO

3.1.8.4 Other methods. Please specify:

<sup>5</sup> **The official supervisor, who is responsible for the guidance of the doctoral student, must have an official position at the university. The supervisor is normally a professor or docent. There could be other tutors to help the official supervisor in guiding the doctoral student.**

3.1 - SUPERVISION OF DOCTORAL STUDIES

3.1.9 The thesis subject is assigned by:

3.1.9.1 Agreement between the student and the proposed supervisor? YES<sup>6</sup>

3.1.9.2 Other methods. Please specify: YES<sup>6</sup>

**A resolution of the Scientific Board, taking into account the preferences of the student.**

<sup>6</sup> The scientific board of the faculty gives the permit to publish the thesis. At this phase the final name of the thesis is given if it is not clear already. The scientific board also nominates two reviewers for the thesis from other organisations. Reviewers give their statement about the scientific quality of thesis and propose the permit for publication or not. After the permit for publication there is a public defence of the thesis. The doctor candidate defends his thesis against the opponent. The opponent is also nominated by the scientific board and he has to be from other organisation. After the public defence of the thesis the opponent gives his statement about the defence. If it is passed then the scientific board will accept the thesis and give the grade to the candidate about his thesis.

3.2- COURSE WORK

3.2.1 Do the students have to take coursework during their doctoral degree preparation? If no, please proceed to 3.3. YES

3.2.2 **Extension and assessment.**

3.2.2.1	What is the number of contact hours spent in coursework in each year?	<b>Year</b> <b>2</b>	<b>Year</b> <b>2</b>	<b>Year</b> <b>2</b>	<b>Year</b> <b>2</b>
		<b>Year</b> <b>2</b>	<b>Year</b> <b>2</b>	<b>Year</b> <b>2</b>	<b>Year</b> <b>2</b>

Post graduate scientific studies: 40-45 ECTS in major subject, 25-30 ECTS in supportive studies. These are specialist post graduate courses, book studies and seminars. Assessments are done by exams and/or by projects.

3.2.2.2 In which form is this coursework offered?

- As specialist graduate course units.
- As course units taken from the undergraduate programme.
- Other. Please specify.

## 3.2- COURSE WORK

<b>3.2.2.3</b>	Is the coursework assessed by examinations? If not, please give details:	YES and NO
<b>3.2.3</b>	<b>Credit system</b>	
<b>3.2.3.1</b>	Is the coursework in your institution described by a credit system?	YES
<b>3.2.3.2</b>	Is it the ECTS system?  If not, what is the relationship with ECTS?	YES
<b>3.2.3.3</b>	How many credits are allocated to coursework?	<b>Total of 70 credits</b>
<b>3.2.4</b>	<b>Monitoring</b>	
<b>3.2.4.1</b>	Do you monitor the performance of the doctoral student taking coursework?	YES
<b>3.2.4.2</b>	What regulations apply in case of failure in one or more course units?	
	- Retake the exam.	YES <sup>7</sup>
	- Take a different course unit.	YES <sup>7</sup>
	<sup>7</sup> Normally this isn't a problem.	

## 3.3- PRESENTATION OF WORK RESULTS:

<b>3.3.1</b>	In the department.	YES <sup>8</sup>
<b>3.3.2</b>	At national conferences.	YES <sup>9</sup>
<b>3.3.3</b>	At international conferences.	YES
	<sup>8</sup> YES, methods vary; <sup>9</sup> YES, if any. Other: by publishing papers in international scientific magazines, in national papers and research reports at our university.	

## 3.4- CONTRIBUTION TO TEACHING:

<b>3.4.1</b>	Supervision of undergraduate laboratory.	YES
<b>3.4.2</b>	Teaching undergraduate courses.	YES

Tutoring undergraduate groups, marking of undergraduate assessments/homework, and all normal teaching activities. Total of 2-4 h per week.

**4 - AWARDING OF DOCTORAL DEGREE**

4.1- SUBMISSION OF DOCTORAL THESIS

- 4.1.1** Which language is normally used for the thesis? English<sup>10</sup>  
<sup>10</sup> English is the most preferred.
- 4.1.2** Are alternative languages used for the thesis? Please Specify: YES  
**English: 95 %; Finnish: 5 %.**
- 4.1.3** Which language is normally used for the oral presentation and/or examination? 11
- 4.1.4** Are alternative languages used in the oral presentation and examination? YES  
 Please Specify:  
**English: 80 %; Finnish: 20 %.**  
<sup>11</sup> It depends on the opponent. If the opponent is non Finn then the language used is English. Otherwise the used language is Finnish.
- 4.1.5** Are credits allocated to the doctoral thesis? YES
- 4.1.6 The doctoral thesis is:**
- 4.1.6.1** A previously unpublished substantial written report. YES<sup>12</sup>
- 4.1.6.2** A collection of individual or co-authored scientific papers with an introduction and/or commentary. YES  
<sup>12</sup> Yes, it is a monograph in this case.
- 4.1.6.3** Other. Please specify:

4.2- THESIS EXAMINATION AND DEGREE AWARDING

- 4.2.1** Is there an oral presentation of the thesis work for an open audience as part of the evaluation procedure? YES<sup>13</sup>  
<sup>13</sup> Yes, it is a public defence.

#### 4.2- THESIS EXAMINATION AND DEGREE AWARDING

4.2.2 Composition of the thesis examination board. Please, give the typical number of:

4.2.2.1 Internal examiners. 1-3<sup>14</sup>

4.2.2.2 External examiners. 2<sup>15</sup>

4.2.2.3 TOTAL.

<sup>14</sup> 1-3 (supervisor + others). Others: at least one opponent in public defence.

<sup>15</sup> **There must be at least two (2) external examiners or reviewers. Opponent or opponents (there might be several) can act also as reviewers.**<sup>6</sup>

4.2.3 How is the examination board chosen?

4.2.3.1 By the supervisor. YES<sup>16</sup>

4.2.3.2 By the scientific committee of the institution. YES<sup>17</sup>

4.2.3.3 By the rector or equivalent.

4.2.3.4 By the national ministry.

4.2.3.5 Other. Please specify: YES

Yes, the candidate can give his suggestion as well.

<sup>16</sup> Yes, he proposes reviewers and opponent(s).

<sup>17</sup> **Yes, they nominate reviewers and opponent(s).**

4.2.4 Do the examiners base their evaluation mark on:

4.2.4.1 Reading the thesis. YES

4.2.4.2 The oral presentation of the thesis work. YES

4.2.4.3 Both.

4.2.4.4 What is the typical duration of the oral part of the thesis examination, if applicable? 3 hours

4.2.4.5 Is there an upper limit to the duration of the thesis examination? YES

**Six hours.**

4.2.5 Is the oral part of the examination taken behind closed doors?

4.2- THESIS EXAMINATION AND DEGREE AWARDING

4.2.6 What happens if the student fails?

4.2.6.1 May not resubmit for doctorate. YES <sup>18</sup>

4.2.6.2 May resubmit revised thesis. MAYBE

4.2.6.3 May do further work as specified by examination board. NO

4.2.6.4 If the thesis is to be re-submitted is there a time limit for this to occur?  
Please specify: YES/NO

<sup>18</sup> Reviewers give their statement if the thesis has scientifically good quality to be published or not. In this phase the thesis is revised so that the scientific committee of the institution can give the permit to publish the thesis. That is why it is very rare the candidate failing in public defence.

4.2.7 Is there a grading system for the doctoral degree based on the quality of the work? YES <sup>19</sup>

<sup>19</sup> **Failed, passed, passed with honours.**



## FI: Suomi/Finland

### *Yliopistot (Universities)*

City	Name of the institution	http address
Espoo	Teknillinen korkeakoulu (Helsinki University of Technology)	<a href="http://www.hut.fi/English">http://www.hut.fi/English</a>
Lappeenranta	Lappeenrannan teknillinen yliopisto (Lappeenranta Univ. of Techn.)	<a href="http://www.lut.fi/english/">http://www.lut.fi/english/</a>
Oulu	Oulun yliopisto (University of Oulu)	<a href="http://www.ttk.oulu.fi/English/">http://www.ttk.oulu.fi/English/</a>
Tampere	Tampereen teknillinen yliopisto (Tampere Univ. of Techn.)	<a href="http://www.tut.fi/public">http://www.tut.fi/public</a>
Turku/Åbo	Åbo Akademi (ÅA University) (Swedish-language University)	<a href="http://www.abo.fi/aa/engelska/">http://www.abo.fi/aa/engelska/</a>

### *AMK/YH (Polytechnics)*

City	Name of the institution	http address
Espoo/Esbo	Arcada - Nylands svenska YH	<a href="http://www.arcadi.fi">http://www.arcadi.fi</a>
Espoo	Espoon - Vantaan teknillinen AMK	<a href="http://www.evitech.fi/">http://www.evitech.fi/</a>
Lappeenranta, Imatra	Etelä-Karjalan AMK	<a href="http://www.scp.fi">http://www.scp.fi</a>
Helsinki	Helsingin AMK	<a href="http://www.stadia.fi/">http://www.stadia.fi/</a>
Hämeenlinna	Hämeen AMK	<a href="http://www.hamk.fi">http://www.hamk.fi</a>
Jyväskylä	Jyväskylän AMK	<a href="http://www.jypoly.fi">http://www.jypoly.fi</a>
Kajaani	Kajaanin AMK	<a href="http://www.kajak.fi">http://www.kajak.fi</a>
Kemi, Tornio	Kemi-Tornion AMK	<a href="http://www.token.fi">http://www.token.fi</a>
Kokkola	Keski-Pohjanmaan AMK	
Kotka	Kymenlaakson AMK	<a href="http://www.kyamk.fi">http://www.kyamk.fi</a>
Lahti	Lahden AMK	<a href="http://www.lamk.fi">http://www.lamk.fi</a>
Mikkeli	Mikkelin AMK	<a href="http://www.mikkeli.amk.fi">http://www.mikkeli.amk.fi</a>
Oulu	Oulun seudun AMK	<a href="http://www.oamk.fi">http://www.oamk.fi</a>
Joensuu	Pohjois-Karjalan AMK	<a href="http://www.ncp.fi">http://www.ncp.fi</a>
Kuopio	Pohjois-Savon AMK	<a href="http://www.pspt.fi">http://www.pspt.fi</a>
Rovaniemi	Rovaniemen AMK	
Pori	Satakunnan AMK	<a href="http://www.spt.fi">http://www.spt.fi</a>
Seinäjoki	Seinäjoen AMK	<a href="http://www.seamk.fi">http://www.seamk.fi</a>
Vaasa/Vasa	Svenska YH	<a href="http://www.syh.fi/">http://www.syh.fi/</a>
Tampere	Tampereen AMK	<a href="http://www.tpu.fi">http://www.tpu.fi</a>
Turku	Turun AMK	<a href="http://www.turkuamk.fi">http://www.turkuamk.fi</a>
Vaasa	Vaasan AMK	<a href="http://www.puv.fi">http://www.puv.fi</a>
Tammisaari/ Ekenäs	YH Sydväst	<a href="http://www.sydvast.fi">http://www.sydvast.fi</a>