



**Faculty of Science and Engineering**

**STUDY GUIDE  
2017-2018**

**MASTER'S PROGRAMME IN  
INFORMATION TECHNOLOGY**

This guide has been compiled for students that study at Åbo Akademi University in the Master’s Degree Programme in Information Technology. Its purpose is to give information about the Faculty and certain procedures, the study programme and the structure of the studies.

## Contents

1. The Faculty of Science and Engineering .....	2
1.1 The Faculty and decision making .....	2
1.2 The Faculty office .....	2
2. Studies .....	3
2.1 Academic year .....	3
2.2 Registration for the academic year .....	3
2.3 MinPlan .....	3
2.4 Course registration .....	4
2.5 Examination .....	4
2.6 Flexible study right - JOOPAS: studies at the University of Turku .....	5
2.7 Certificates and study transcripts .....	6
2.8 The thesis, graduation and diploma .....	6
3. Services .....	7
3.1 Computers, printers and copying machines .....	7
3.2 Libraries .....	8
3.3 Career Services .....	8
3.3 Student tutor and teacher tutor .....	8
3.4 Student activities .....	9
4. Master’s Programme in Information Technology .....	10
4.1 Structure of the studies .....	10
4.2 CE Computer Engineering Degree .....	10
4.2.1 Compulsory Modules .....	11
4.2.2 Master’s thesis in Computer Engineering .....	11
4.2.3 Recommended study-pace for a degree in Computer Engineering .....	12
4.3 CS Computer Science Degree .....	12
4.3.1 Compulsory Modules .....	13
4.3.2 Master’s thesis in Computer Engineering .....	13
4.3.3 Recommended study-pace for a degree in Computer Science .....	14
4.4 Thematic Modules .....	14
4.4.1 High Performance Computing (20 ECTS) .....	14
4.4.2 Embedded Computing (20 ECTS) .....	15
4.4.3 Bioinformatics (20 ECTS) .....	15
4.4.4 Computational Data Analytics (20 ECTS) .....	15
4.4.5 Distributed and Critical Systems (20 ECTS) .....	15
4.5 Elective Studies Module .....	16
5. Double degree in Embedded Systems .....	17
5.1 Requirements and schedule .....	17
5.2 Structure of the modules .....	18

# 1. The Faculty of Science and Engineering

The education on undergraduate and graduate levels is organized into five Study Programmes in which several subjects work together.

The Study programmes at the Faculty of Science and Engineering are:

Biosciences (Cell Biology, Biochemistry, Environmental and Marine Biology)  
Chemical Engineering  
Information Technology (Computer Science, Computer Engineering)  
Natural Sciences (Mathematics, Physics, Chemistry, Geology)  
Pharmacy

The subjects within Information Technology are located in the Agora-building (address: Vattenborgsvägen 3, 20500 Åbo). Building T6 on the campus map:

<http://www.abo.fi/public/en/media/2141/campuskartaengelska.pdf>.

## 1.1 The Faculty and decision making

The governing body of the faculty is the Faculty Council. The Dean, professor Tapio Salmi, chairs the council which has 12 members representing the professors, other employees and students of the faculty in equal numbers.

In organizational terms, subjects are located beneath the faculty and led by a Head of Subject. The Heads of Subjects are appointed by the Dean and have both scientific and administrative responsibilities.

## 1.2 The Faculty office

The Faculty office (fakultetskansliet) is located in the Axelia-building, Biskopsgatan 8, 20500 Åbo. The office is open Monday-Thursday at 10.00-15.00, Friday closed.

Academic Affairs Coordinator Heidi Karlsson is available at the Faculty office by mutual agreement. Telephone (02) 215 3540, e-mail: [fnt-utbildningskoordinator@abo.fi](mailto:fnt-utbildningskoordinator@abo.fi)

The Study Advisors are available at the Faculty office by mutual agreement:

Jessica Lindroos, Telephone (02) 215 4517, e-mail: [fnt-studieradvivare@abo.fi](mailto:fnt-studieradvivare@abo.fi)

Kerstin Fagerström, Telephone (02) 215 3321, e-mail: [fnt-studieradvivare@abo.fi](mailto:fnt-studieradvivare@abo.fi)

Simon Berg, Telephone (02) 215 4600, e-mail: [fnt-studieradvivare@abo.fi](mailto:fnt-studieradvivare@abo.fi)

Contact information for the rest of the Faculty Office personnel is found here:

[http://www.abo.fi/fakultet/en/fnt\\_administration](http://www.abo.fi/fakultet/en/fnt_administration).

It is recommended that you book an appointment with the Academic Affairs coordinator or the Study Advisor in advance by e-mail or telephone.

## 2. Studies

### 2.1 Academic year

The academic year is divided into four periods, two during the autumn and two during the spring. These are the dates for the periods for the academic year 2017-2018:

Period I	weeks 36-43	4.9.2017-27.10.2017
Period II	weeks 44-51	30.10.2017-22.12.2017
Period III	weeks 2-11	8.1.2018-16.3.2018
Period IV	weeks 12-21	19.3.2018-25.5.2018

Week 35, 28.8-1.9.2017, is reserved for student orientation for new students.

### 2.2 Registration for the academic year

New students register for their first academic year according to these instructions (please read the instructions carefully!): <http://www.abo.fi/student/infofornyastud/en>.

You must pay the Student Union fee in order to be registered as present. By registering as present, you have the right to study, receive credits, have your study results registered, and receive student benefits. The Student Union fee for the academic year 2017-2018 is 116 €. After you have registered, you should order your student card at [www.frank.fi/en](http://www.frank.fi/en). You can also use the free student card app, Frank, which is available for Android and iOS.

### 2.3 MinPlan

MinPlan is used to make individual study plans and for registering for courses and exams. MinPlan also contains information about all courses. Log in to MinPlan here: <http://www.abo.fi/minplan>. You can download a manual for MinPlan here: <https://www.abo.fi/student/en/minplanmanualer>.

## 2.4 Course registration

### Course registration at Åbo Akademi University

Course registration is required and done through MinPlan. Instructions for course registration are found in the MinPlan manual. If you missed a registration for a course or exam you can register by email to our secretary Christel Engblom [christel.engblom@abo.fi](mailto:christel.engblom@abo.fi).

### Course registration at the University of Turku

Taking courses at the University of Turku requires that the student has a valid user ID issued by the University of Turku Computing Centre. The student receives the student ID once he or she has applied for a study right through <http://www.joopas.fi>. The students also need to apply through Joopas for each course that they wish to take at the University of Turku.

Course registration might be required. In these cases registration is done in a Virtual Study Register called Nettiopsu: <https://nettiopsu.utu.fi>. More information about Nettiopsu can be found here: <https://intranet.utu.fi/en/unit/student-services/systems/Students/Pages/Course-Registration-in-Nettiopsu.aspx>.

## 2.5 Examination

### Examinations at Åbo Akademi University

At the end of the course there is usually a course exam (kurstentamen). The course exams usually do not require registration in MinPlan. Always check if registration is needed in advance.

In addition to the course exams, there are general examination opportunities which take place on Fridays. This allows the student to retake course exams. Students should register for the general examination opportunity at least eight days in advance. The registration is done in MinPlan. Instructions concerning registration for examinations are found in the MinPlan manual.

**Please Note! The registration procedure can vary at different Departments, subjects and courses - you can always check with the teacher or the department secretary.**

The student can take an exam three times in the same course, after that the course lecturer should be contacted and the matter discussed. Registering for an exam counts as one of these three times even if the student does not show up at the actual exam occasion.

Students are usually not allowed to bring the course material with them to the exams, always check with the course lecturer what material is allowed in each exam. Coats, bags, mobile phones etc. should be left outside the exam room or at the back of the room. If requested by the exam supervisor, students should be prepared to show proof of identification, e.g. a student card.

The results of the examinations are typically given within two weeks after the examinations are taken. The results of the ÅAU courses are registered in Åbo Akademi's study register (STURE). If several weeks have passed since the course finished but the result is still not in the register, contact the lecturer of the course.

The person responsible for examinations in the IT subjects at Åbo Akademi University is secretary *Christel Engblom* ([christel.engblom@abo.fi](mailto:christel.engblom@abo.fi)).

The dates for the **course and general exams in Information Technology** are found: [http://www.abo.fi/fakultet/en/fnt\\_undervisningsprogram](http://www.abo.fi/fakultet/en/fnt_undervisningsprogram).

The courses in the IT subjects usually have course exams (kurstentamen). In addition to the course exams, there are general exams arranged to allow the student to retake the exams. The general exams can be taken in the same term as the course is completed or in the following term.

**Please acquaint yourself with the rules and regulations for examination at Åbo Akademi University.** The Åbo Akademi University Examination and Assessment Instructions are found here: <http://www.abo.fi/student/en/regler>.

### **Examination at the University of Turku**

The first course exam is arranged at the end of the course. The course exams do not necessarily require registration. In addition to the course exams there should be 3 general exams arranged for each course every academic year. For general exams, the student should register for the exam.

Please find the examination dates either through NettiOpsu or from the responsible course teacher. NettiOpsu: <https://nettiopsu.utu.fi/>.

Manuals on exam registration can be found at: <https://intranet.utu.fi/en/unit/student-services/systems/Students/Pages/Exam-Registration-in-Nettiopsu.aspx>.

The person responsible for examinations in the Department of Future Technologies at the University of Turku is the student secretary ([opintosihteerit-ml@utu.fi](mailto:opintosihteerit-ml@utu.fi)).

## **2.6 Flexible study right - JOOPAS: studies at the University of Turku**

Åbo Akademi University has an agreement of flexible study right with the University of Turku. According to this agreement students from Åbo Akademi University can take courses that are offered by the University of Turku.

*Please note that students at the Master's programme in Information Technology are automatically assigned a JOO study right at the University of Turku for studies **within their own field of study (IT)**. You still have to apply for a JOO study right for studies outside of your own field of study.*

To apply for studies outside of the field of study, the student sends in an electronic application for flexible study right which has to be approved by Åbo Akademi University as well as by the University of Turku. The application is found at <http://www.joopas.fi> (→ Joopas Application System).

**Credits (study points) from the University of Turku are not transferred automatically to Åbo Akademi University.** *The student must get a study transcript from the University of Turku and bring it to the Faculty Office in Axelia, who will transfer the credits into the study record at Åbo Akademi University. Please transfer your studies from UTU to ÅAU before January 31 every year.*

## **2.7 Certificates and study transcripts**

Study achievements from other Universities (e.g. the University of Turku) are not transferred automatically to Åbo Akademi University. The student must get a study transcript from the other university and bring it to the Study Advisor, who will see to it that the study achievements are transferred into the study record at Åbo Akademi University. Please transfer your studies each year in January before January 31 as the faculty obtains funding based on your progress.

## **2.8 The thesis, graduation and diploma**

In order to graduate, all study credits including the thesis have to be noted in the study register.

The students are advised to find a topic and start working on their master theses at least 6 months before the planned submission date. The following steps are recommended:

- Identify a topic by contacting a teacher (lecturer or professor).
- Work on the thesis and have regular meetings with your supervisor.
- When the thesis is ready:
  - Decide on a deadline to submit the thesis for grading based on the Language Check deadlines at <http://www.abo.fi/stodenhet/en/csklanguagecheck#document2>.
  - Agree with your supervisor how long before the language check the thesis should be submitted for grading (usually more than 2 weeks).
  - The thesis must include an abstract that has a length of about 2500 characters (without spaces).
  - Submit the thesis for grading (via the Urkund system for plagiarism detection, indicating the supervising teacher). All theses should go through a check for plagiarism. More information can be found here: [https://www.abo.fi/student/en/etik\\_plagiat](https://www.abo.fi/student/en/etik_plagiat).
  - The supervisor will submit your thesis and thesis evaluation to language check

In order to shorten the time needed for writing the thesis and potentially securing a higher grade, it is highly recommended that students take advantage of the courses and advice on academic writing provided by the Centre for Language and Communication:

- Course 923800.0 *Academic writing Skills in English for Masters Students* (3 ECTS)
- Text consultation in English (free of charge)  
<http://www.abo.fi/stodenhet/en/csktextconsultation>.

When all your courses are completed, and your thesis is sent to the Centre for Language and Communication for language check, you can apply for your Master's degree certificate. Fill in the application for certificate form found here: [http://www.abo.fi/fakultet/en/fnt\\_slutskedet](http://www.abo.fi/fakultet/en/fnt_slutskedet) and bring/send it to the Study Advisor at the Faculty office in Axelia, 3rd floor.

When the language check for the thesis is approved, the student brings two hardback copies of the thesis to the Faculty Office in Axelia. The thesis will then be officially approved by the Dean. After this approval, the thesis will be registered in the study register.

Degree certificates are issued approximately once a month during the period September-June. The schedule and more information about graduating is found here: [http://www.abo.fi/fakultet/en/fnt\\_slutskedet](http://www.abo.fi/fakultet/en/fnt_slutskedet).

## **3. Services**

### **3.1 Computers, printers and copying machines**

The computers in the computer classes located in the University buildings are available for all the students studying at Åbo Akademi University.

A username and a password are needed to use the computers, the students also need to sign a user agreement. The credentials and agreements can be obtained from the Help Desk at ICT Services, Fänriksgatan 3, 20500 Åbo. With the password it is possible to log on to all of the public computers located in any of the University's computer classes. The following page lists all available computer classes:

<http://www.abo.fi/stodenhet/en/klasser>. Always remember to log off after use so that no one else can use your account.

Students can print about 400 black-and-white pages for free in a six-month period. If this amount is exceeded the student will pay for the pages printed. Top-up codes for more quota may be bought via Åbo Akademi's webshop: <https://shop.abo.fi/c/13-ict-servicens-avgifter/en/>, you will have to log on using your ÅA-username). Copying machines are available in the

university buildings. More information about printing and copying can be found at: <http://www.abo.fi/stodenhet/en/utskrifter>.

### **3.2 Libraries**

To be able to borrow from the libraries students need to have a library card which they will receive at the library. Student cards (studiekort) that were issued before the autumn semester 2013 can also be used as library cards. The loan time for books is usually 2–4 weeks. More information is found at <http://www.abo.fi/bibliotek/en>.

The main library of Åbo Akademi is located in Domkyrkogatan 2-4, 20500 Åbo, tel. (02) 215 4180, e-mail: [biblioteket@abo.fi](mailto:biblioteket@abo.fi). The main library offers reading facilities and a reference library. Books that can be borrowed at the main library have to be reserved in advance through the library portal Alma <https://abo.finna.fi/?lng=en-gb>.

Course book library is located in the ASA-building, Fänriksgatan 3 A, 20500 Åbo, tel. (02) 215 4192). This library offers course books, which can be borrowed on site, and reading facilities.

### **3.3 Career Services**

The Career Services at Åbo Akademi University (Arbetsforum) are located in Åhuset, Gezeliusgatan 2A, 20500 Åbo. They provide information for both graduates and students. Their main task is to help students enter the labour market and to give advice on issues dealing with job-hunting. The Career Services offer employers direct access to highly skilled students and graduates. They work in close co-operation with the Career Services at the University of Turku and the Turku Employment Office. More information here: <http://www.abo.fi/stodenhet/en/arbetsforum>.

### **3.3 Student tutor and teacher tutor**

All first-year students are assigned a student tutor and a teacher tutor. The student tutor is an older student who helps the new students adapt to student life in Åbo, whereas the teacher tutor gives advice in study-related matters.

Student tutors (academic year 2017-2018) for students admitted to the programme at Åbo Akademi University are:

- Gohar Shah, e-mail: [gohar.shah@abo.fi](mailto:gohar.shah@abo.fi)
- Muhammad Sulaiman, e-mail: [muhammad.sulaiman@abo.fi](mailto:muhammad.sulaiman@abo.fi)
- Taisia Sycheva, e-mail: [taisia.sycheva@abo.fi](mailto:taisia.sycheva@abo.fi)

Teacher tutor for students admitted to the programme at Åbo Akademi University are:

- Sébastien Lafond (Embedded Computing)  
Web: <https://research.it.abo.fi/people/slafond>, e-mail: [sebastien.lafond@abo.fi](mailto:sebastien.lafond@abo.fi)
- Dragos Truscan (Software Engineering)

Web: <https://research.it.abo.fi/people/dtruscan>, e-mail: [dragos.truscan@abo.fi](mailto:dragos.truscan@abo.fi)

- Vladimir Rogojin (Computer Science)

Web: <https://research.it.abo.fi/people/vrogojin>, e-mail: [vladimir.rogojin@abo.fi](mailto:vladimir.rogojin@abo.fi)

### **3.4 Student activities**

All students at Åbo Akademi University are required to be members of the Student Union (Åbo Akademis Studentkår), <http://www.studentkaren.fi/en>, which takes care of its members' interests in several ways. The membership fee of the Student Union for the Academic year 2017-2018 is 116€. By being a member, you receive a student card that you can use to obtain student discounts for trains, buses, hostels, students' restaurants, theatres etc. As a member, you are also entitled to use the services of the Student Health Care Centre (Studenthälsövården) [http://www.yths.fi/en/contact\\_details/units/turku](http://www.yths.fi/en/contact_details/units/turku) at Kyrkovägen 13, 20540 Åbo.

## 4. Master's Programme in Information Technology

### 4.1 Structure of the studies

The Master's Programme in Information Technology has a duration of two academic years and accounts for 120 ECTS. This means that the student should complete about 60 ECTS each academic year. In addition, students accepted to the programme may be required to compensate courses, depending on their background, with complementary studies (max. 60 ECTS). These additional studies are not included in the Master's degree. The aim of these studies is to bring everyone to approximately compatible skills in terms of their background and other topics that are relevant for the area.

The structure of the programme as well as the courses are available in MinPlan. The student is required to make his or her own study plan using MinPlan and confirm it with the designated teacher tutor. Furthermore, the registration for courses offered by Åbo Akademi University and the registration for exams at Åbo Akademi University are done in MinPlan.

### 4.2 CE Computer Engineering Degree

The Computer Engineering Degree in the Master's Degree Programme in Information Technology has the following structure:

Compulsory module <i>Logic and Algorithms</i> (20 ECTS) Compulsory module <i>Project and Practice</i> (20 ECTS)	
Thematic module (20 ECTS)	Elective module (20 ECTS)
Master's thesis (30 ECTS) Master's thesis seminar (5 ECTS) Experimentation in Computer Science and Engineering (5 ECTS)	

## 4.2.1 Compulsory Modules

### Software Technology 1 (20 ECTS)

Choose **four** of the following courses:

452501.0 Development of Web Services (5 ECTS)

452503.0 Development of Interactive Web Applications (5 ECTS)

455303.0 Parallel Programming (5 ECTS) **or** 455304.0 Code Optimization (5 ECTS) *These two courses are offered alternating years. Code Optimization is offered 2017-18.*

451502.0 Cloud Computing (5 ECTS)

456506.0 Cryptography and Network Security (5 ECTS)

### Software Technology 2 (20 ECTS)

Compulsory course:

451000.0 Project Course (10 ECTS)

Choose **two** of the following courses:

456502.0 Software Architecture (5 ECTS)

452502.0 Software Testing (5 ECTS)

DTEK1054 Advanced Course of Software Engineering (5 ECTS) *Offered by the University of Turku*

See chapter 4.4 for information on the thematic modules. For information on the elective studies module, see chapter 4.5.

## 4.2.2 Master's thesis in Computer Engineering

The Master's Thesis accounts for 30 ECTS and should be written in the last year of study, i.e. during the second academic year. Contact the coordinator of the program or any of the lecturers of the program to discuss a possible topic for the thesis. The process of writing your thesis may take longer than the allotted 6 months. It is therefore recommended that you contact the lecturer and start planning the thesis in the fall of year 2.

In connection with writing the master's thesis, the student also has to complete the following courses:

*Code later*      Master's thesis Seminar (5 ECTS)

451503.0      Experimentation in Computer Science and Engineering (5 ECTS)

Please see Section **2.8** for more information regarding the thesis writing and graduation process.

### 4.2.3 Recommended study-pace for a degree in Computer Engineering

	Period 1	Period 2	Period 3	Period 4
Year 1	Development of Web Services	Development of Interactive Web Application	System Architecture of IoT	Software Testing
	Cloud Computing	Parallel Programming or Code Optimization	Thematic course or Elective studies course	Thematic course or Elective studies course
	Project Course			Thematic course or Elective studies course
	Software Architecture			
Year 2	Experimentation in Computer Science and Engineering	Master's Thesis Seminar	Thesis	
	Thematic course or Elective studies course	Thematic course or Elective studies course		
	Elective studies course	Thematic course or Elective studies course		

### 4.3 CS Computer Science Degree

The Computer Science Degree in the Master's Degree Programme in Information Technology has the following structure:

Compulsory module <i>Logic and Algorithms</i> (20 ECTS) Compulsory module <i>Project and Practice</i> (20 ECTS)	
Thematic module (20 ECTS)	Elective module (20 ECTS)
Master's thesis (30 ECTS) Master's thesis seminar (5 ECTS) Experimentation in Computer Science and Engineering (5 ECTS)	

### **4.3.1 Compulsory Modules**

#### **Logic and Algorithms (20 ECTS)**

Compulsory courses:

456509.0 Logic for CS (5 ECTS)

456508.0 Computability and Computational Complexity (5 ECTS)

456404.0 Graph Algorithms (5 ECTS)

456406.0 Text Algorithms (5 ECTS)

#### **Project and Practice (20 ECTS)**

Compulsory courses:

451000.0 Project Course (10 ECTS)

456700.0 Lab Internship (10 ECTS)

### **4.3.2 Master's thesis in Computer Engineering**

The Master's Thesis accounts for 30 ECTS and should be written in the last year of study, i.e. during the second academic year. Contact the coordinator of the program or any of the lecturers of the program to discuss a possible topic for the thesis.

In connection with writing the master's thesis, the student also has to complete the following courses:

Master's thesis Seminar (5 ECTS)

Experimentation in Computer Science and Engineering (5 ECTS)

Please see Section **2.8** for more information regarding the thesis writing and graduation process.

### 4.3.3 Recommended study-pace for a degree in Computer Science

	Period 1	Period 2	Period 3	Period 4
Year 1	Logic for Computer Science	Advanced Text Algorithms	Lab Internship	Lab Internship
	Computability and Computational complexity	Thematic course	Thematic course	Elective studies course
	Graph Algorithms	Thematic course	Thematic course	Elective studies course
Year 2	Experimentation in Computer Science and Engineering	Master's thesis Seminar		
	2 Elective studies courses, Project Course			
	Thesis			

### 4.4 Thematic Modules

One thematic module is 20 ECTS; the student may complete one or two thematic modules. Students choose four courses from the list within the module, so that they in total amount to 20 ECTS per module. **The same course cannot be included in two different modules.**

Please note that not all courses are offered every year. Courses that are not offered during the academic year 2017-2018 are marked with \*.

#### 4.4.1 High Performance Computing (20 ECTS)

*Recommended for Computer Engineering students.*

455306.0 Accelerator Programming (5 ECTS)

455305.0 Introduction to Scientific Computing (5 ECTS)

456519.0 Computational Modelling: Methods and Applications (5 ECTS)

455303.0 Parallel Programming (5 ECTS) \* or 455304.0 Code Optimization (5 ECTS) These two courses are offered alternating years. Code Optimization is offered 2017-18.

451502.0 Cloud Computing (5 ECTS)

#### **4.4.2 Embedded Computing (20 ECTS)**

*Recommended for Computer Engineering students.*

453507.0 System Architecture of Internet of Things (5 ECTS)  
453306.0 Real-time systems (5 ECTS)  
454506.1 Applied Signal Processing, Theory (5 ECTS)  
453101.0 Wireless communication (5 ECTS)  
455303.0 Parallel Programming (5 ECTS) \* **or** 455304.0 Code Optimization (5 ECTS) These two courses are offered alternating years. Code Optimization is offered 2017-18.

#### **4.4.3 Bioinformatics (20 ECTS)**

*Recommended for Computer Science students.*

456519.0 Computational Modelling: Methods and Applications (5 ECTS) *alt. with 456311.0*  
456511.0 Introduction to Computational and Systems Biology (5 ECTS) \* *alt. with 456519.0*  
BIOI4463 Introduction to Genomics (5 ECTS) *Offered by the University of Turku*  
BIOI4270 Bioinformatics, Programming Course (5 ECTS) *Offered by the University of Turku*  
BIOI4440 Biological Data Analysis with R (5 ECTS) *Offered by the University of Turku*  
213031.0 Computer-aided Drug Design (5 ECTS) *Course in biochemistry*  
212021.0 Structural Biology (5 ECTS) *Course in biochemistry*

#### **4.4.4 Computational Data Analytics (20 ECTS)**

*Recommended for Computer Science students.*

456517.0 Introduction to Data Science (5 ECTS) *Online course*  
456318.0 Data Analysis with Visual Basic (5 ECTS) *Online course*  
456408.0 Machine Learning (5 ECTS) *Online course*  
TKO\_3121 Machine Learning and Algorithmics Seminar (5 ECTS) *Offered by the University of Turku*  
TKO\_3120 Machine Learning and Pattern Recognition (5 ECTS) *Offered by the University of Turku*

#### **4.4.5 Distributed and Critical Systems (20 ECTS)**

*Recommended for Computer Science students.*

456400.9 Reliable Distributed Systems (5 ECTS)  
456400.5 Distributed Systems and Algorithms (5 ECTS)  
456309.0 Specification Methods (5 ECTS)  
456505.0 Program Derivation (5 ECTS) *Self-study course*  
456506.0 Cryptography and Network Security (5 ECTS) \*  
456501.0 Software Safety (5 ECTS) \*  
456503.0 Software Quality (5 ECTS) \*

DTEK0039 Security Engineering (5 ECTS) *Offered by the University of Turku*

DTEK0043 IoT Systems: Design and Applications (5 ECTS) *Offered by the University of Turku*

#### **4.5 Elective Studies Module**

The student also has the opportunity to complete free optional courses to an extent of 20 ECTS, these make up the *elective study modules*. If the student opts to complete the *elective study module*, he or she only completes one thematic module.

The courses included in the elective studies module can be any courses offered by any subject at Åbo Akademi University.

**A second thematic module may also form the elective studies module.**

*The Centre for Language and Communication* (Centret för språk och kommunikation/CSK) offers language courses, <http://www.abo.fi/stodenhet/en/cskenglish>. Please note that language courses always require registration through MinPlan.

The centre offers the course 923800.0 *Academic writing skills in English for Masters students* (3 ECTS). This course is **highly recommended** for all Computer Science and Computer Engineering master students

A language course in Swedish is also available and recommended for Computer Science and Computer Engineering master students: 909970.0 *Swedish as a foreign language, level 1*, (5 ECTS). This course offers a basic understanding of the Swedish language and of cultural aspects related to Swedish-speaking Finns.

## 5. Double degree in Embedded Systems

Åbo Akademi University offers a double degree programme in Embedded Systems with ESIGELEC in Rouen, France. Students do half of their studies at their home university and half at Åbo Akademi University/ESIGELEC. Students that complete the whole programme get a Master of Science degree in Technology (Diplomingenjör, 120 ECTS) from Åbo Akademi and a Master of Science degree (Diplôme d'Ingénieur, 300 ECTS) from ESIGELEC. The duration of the programme is 5-6 terms and the languages of instruction are English and French. More information can be found on [http://www.abo.fi/fakultet/en/it\\_ddes](http://www.abo.fi/fakultet/en/it_ddes) or from [ddes@abo.fi](mailto:ddes@abo.fi).

**This guide is for students coming from ESIGELEC to Åbo Akademi.**

### 5.1 Requirements and schedule

**Åbo Akademi and ESIGELEC requirements:**

Modules	Required ECTS		Total
	ÅAU	ESIGELEC	
Software Technology I	10	10	20
Software Technology II	10	10	20
Thematic module in Embedded Computing	10	10	20
Compulsory language courses *	3		3
Elective studies *	7	10	17
Seminar & experimental engineering skills	5	5	10
Master's thesis	30		
<b>Total</b>	120		

*\* From the academic year 2018-19 the required number of ECTS will be for the module "Compulsory language courses" 5 ECTS, and for the module "Elective studies" 15 ECTS*

## Academic calender:

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Year 1		Engineering Cycle at ESIGELEC (2nd year, semesters 1 and 2)								Internship 2 From 2 to 3 months		
Year 2	Periods I, II, III and IV at Åbo Akademi University									Final internship		
Year 3	Final internship/project - MSc. Thesis From 6 to 9 months											

## 5.2 Structure of the modules

Please note that the following structure of modules is based on the 2016-2017 syllabus of ESIGELEC and the 2017-2018 syllabus of Åbo Akademi University. The structure is subject to possible annual updates and modifications.

### Software Technology I: 20 ECTS

*From ESIGELEC: a minimum of 10 ECTS selectable from:*

ISE202-A Embedded Linux and Real-time Operating Systems (3 ECTS)

ISE203-A Tools and methods for software (3 ECTS)

ISE201-A Binary logic and VHDL (2 ECTS)

ISE206-A Communication Buses (2 ECTS)

ISN201-F Software engineering (3,5 ECTS)

ISN202-A Java and JEE programming (3,5 ECTS)

ISN203-F C# programming (2,5 ECTS)

ISN204-F Network services (2,5 ECTS)

*From Åbo Akademi: a minimum of 10 ECTS selectable from:*

455303.0 Parallel Programming (5 ECTS) **or** 455304.0 Code Optimization (5 ECTS) *These two courses are offered alternating years. Code Optimization is offered 2017-18.*

456502.0 Software Architecture (5 ECTS)

452502.0 Software Testing (5 ECTS)

451502.0 Cloud Computing (5 ECTS)

455306.0 Accelerator Programming (5 ECTS)

## **Software Technology II: 20 ECTS**

*From ESIGELEC: a minimum of 10 ECTS selectable from*

IN2C1-F Operating systems and networks (3 ECTS)  
TIC51 Object oriented and Java programming (7 ECTS) Year 1  
SN1xx Logic (2 ECTS)  
SN1xx Computer architecture (2 ECTS)  
IN201-F Web application development (2 ECTS)  
IN202-F TCP/IP network interconnection (2 ECTS)

*From Åbo Akademi: 10 ECTS*

451000.0 Project course (10 ECTS)

## **Thematic module in Embedded Computing: 20 ECTS**

*From ESIGELEC: a minimum of 10 ECTS selectable from*

ATS2C1-F Signal processing II (5 ECTS)  
SE2C1-F Microprocessor Architecture (6 ECTS)  
EL2C1-F Modulation (1,5 ECTS)  
EL2C2-F Analog converters (1,5 ECTS)

*From Åbo Akademi: a minimum of 10 ECTS selectable from:*

453507.0 System Architecture of Internet of Things (5 ECTS)  
453306.0 Real-time systems (5 ECTS)  
454506.1 Applied signal processing, theory (5 ECTS)  
453101.0 Wireless communication (5 ECTS)

## **Compulsory language courses: 3 ECTS (5 ECTS starting from the academic year 2018-19)**

*From Åbo Akademi: 3 ECTS (5 ECTS from the academic year 2018-19)*

923800.0 Academic writing skills in English for Masters students (3 ECTS)

## **Elective studies: 17 ECTS**

*From ESIGELEC: 10 ECTS*

Any courses offered by ESIGELEC

*From Åbo Akademi: 7 ECTS (5 ECTS from the academic 2018-19)*

Any courses offered by Åbo Akademi, including the following:

451503.0 Experimentation in Computer Science and Engineering (5 ECTS)  
452501.0 Development of web services (5 ECTS)  
452503.0 Development of interactive web applications (5 ECTS)  
456400.9 Reliable distributed systems (5 ECTS)  
456517.0 Introduction to data science (5 ECTS) (*online course*)  
456408.0 Machine Learning (5 ECTS) (*online course*)  
456506.0 Cryptography and network security (5 ECTS)\*  
456400.5 Distributed systems and algorithm (5 ECTS)\*

456501.0 Software safety (5 ECTS)\*  
456503.0 Software quality (5 ECTS)\*

*Courses marked with \* are not offered every year*

**Seminar & experimental engineering skills: 10 ECTS**

*From ESIGELEC: 5 ECTS*  
TIC61 Software development project (5 ECTS) *Year 1*

*From Åbo Akademi: 5 ECTS*  
Master's thesis seminar (5 ECTS)

**Master's thesis: 30 ECTS**

Will be graded and approved by Åbo Akademi and by ESIGELEC.