



SECULO

Master's Programme in Security and Cloud Computing (Erasmus Mundus)

- ▶ Cybersecurity
- ▶ Computer science
- ▶ Double degree
- ▶ Industry collaboration
- ▶ Scholarships

Consortium of six universities

1 Aalto University is located in Otaniemi within the Helsinki Metropolitan area, and is currently Finland's third-largest university with over 19,000 students. Aalto is renowned for its innovative outlook on education and on entrepreneurship studies. The SECCLLO programme is coordinated by Aalto University's School of Science and its Department of Computer Science, the largest CS unit in Finland and, with over 40 professors, a coveted partner in international research collaboration. aalto.fi, cs.aalto.fi

2 KTH Royal Institute of Technology is Sweden's largest technical research and engineering university and the premier research institution for communications technologies in Sweden. KTH has four campuses in Greater Stockholm, one located in Kista, Stockholm, the home of over 1,000 ICT companies and the birthplace of wireless communication technologies such as NMT, GSM, EDGE and W-CDMA. kth.se, kth.se/master

3 The Norwegian University of Science and Technology (NTNU) is Norway's largest university and the leading institution for engineering education. NTNU is well known for its close collaboration with industry, in particular with its R&D partner SINTEF, one of Europe's largest independent research institutes. Partnerships with the working world and its own research communities equip NTNU students with up-to-date workplace skills. NTNU is located in Trondheim, Gjøvik and Ålesund. ntnu.edu, ntnu.edu/iik

4 The Technical University of Denmark (DTU) is internationally recognised as a leading university in the technical and natural sciences and in its business-oriented approach. DTU Compute (Department of Applied Mathematics and Computer Science) is Denmark's largest environment for mathematics and computer science, and it is located on Lyngby Campus in the Copenhagen Metropolitan area. dtu.dk, compute.dtu.dk

5 University of Tartu (UT) was founded in 1632, making it the oldest of the SECCLLO consortium universities. Today, research at UT focusses on subjects as diverse as medicine and philosophy, genetics and computer science. The Institute of Computer Science is home to cryptology and information security research, and is one of the fastest growing and most international institutes at UT. ut.ee, cs.ut.ee

6 EURECOM is a graduate school and research centre in digital sciences located in the Sophia Antipolis Technology Park in French Riviera. Founded in 1991, it brings together renowned European universities with industrial partners such as Orange, ST Microelectronics, BMW Group, Symantec, Monaco Telecom, SAP, IABG, and the Principality of Monaco. EURECOM's research activities are organised around three areas: Digital Security, Communication Systems, and Data Science and Engineering. eurecom.fr

Industry and research partners (as of November 2017)

F-Secure Corporation, Finland • VTT Technical Research Centre of Finland • Intel Labs Europe, Germany
Nokia Bell Labs, France • Cybernetica AS, Estonia • GuardTime, Estonia

We also collaborate with the NordSec Conference and the Helsinki-Aalto Center for Information Security (haic.aalto.fi).

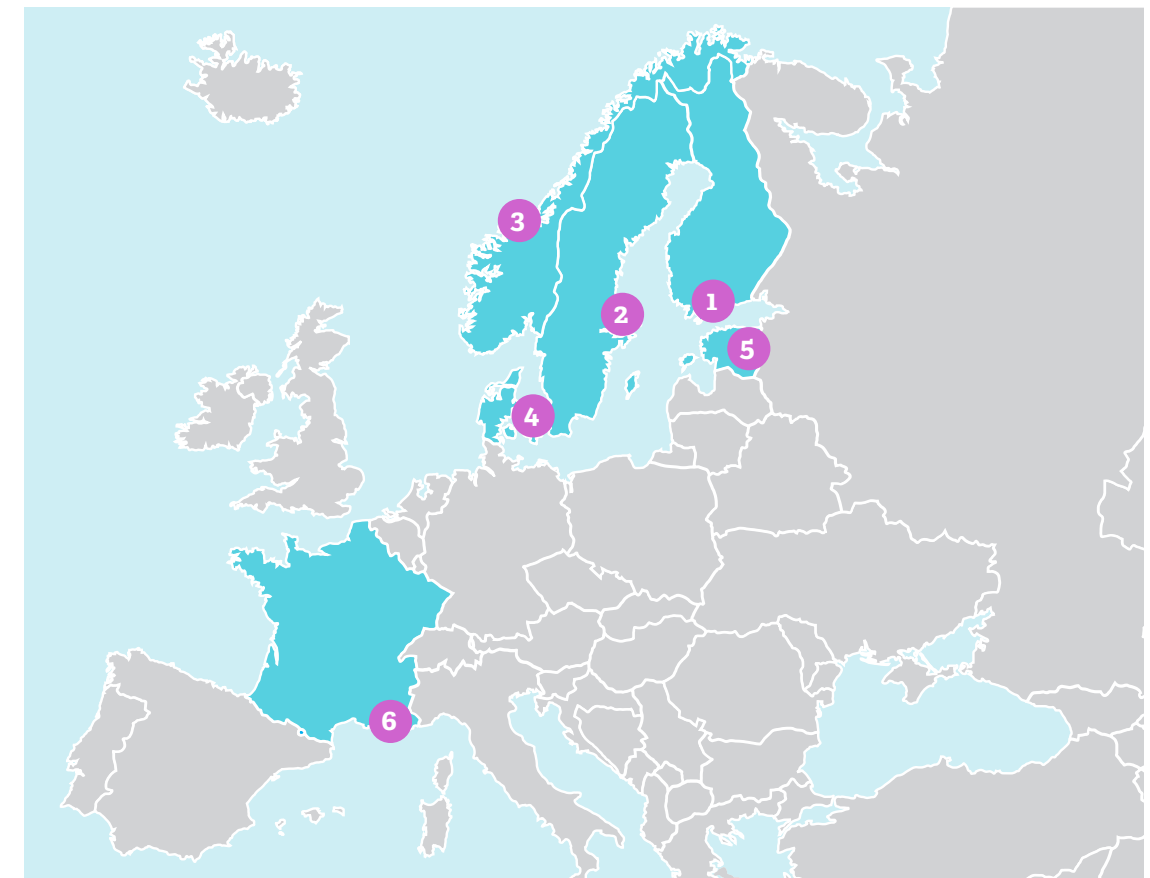
The world is becoming more digital. Can you keep up with its security and privacy needs?

SECCLLO is an Erasmus Mundus double degree programme in the field of computer science, more specifically, information security and cloud computing. The two-year MSc studies offer both practical engineering knowledge and theoretical insights into

- secure systems engineering,
- distributed application development,
- network and service architectures, and
- cloud and mobile platforms

We combine engineering skills with a strongly research-based curriculum. The emphasis is on combining strong security knowledge with hands-on R&D skills in a specific technical area, cloud computing.

Our aim is to educate highly professional engineers to meet both the immediate hiring requirements and the long-term needs of the European ICT industry.



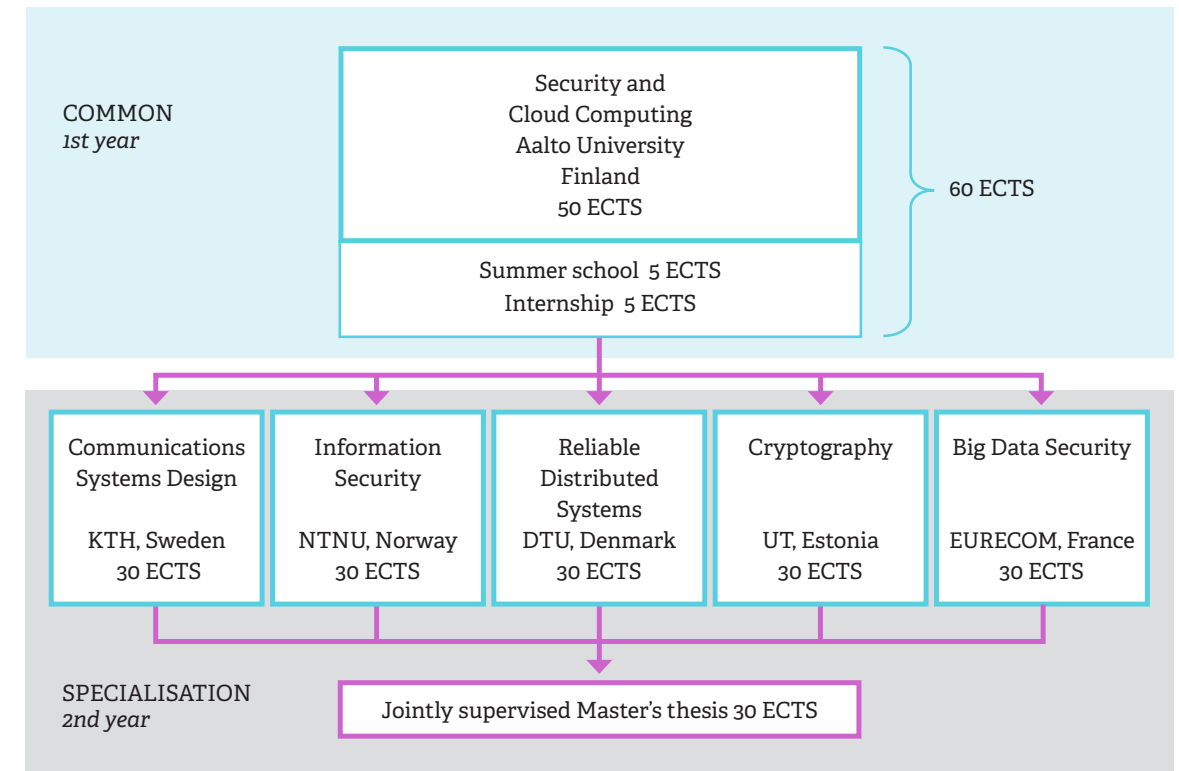
SECCLLO curriculum

During their two-year MSc studies, students will gain a unique experience of studying in two different countries while obtaining a broad understanding of the latest and future technologies for secure cloud and mobile computing systems.

The **joint first-year of studies** (60 ECTS) are taken at Aalto University, Finland. The courses offered cover the fundamental concepts, methods and latest technologies in

- secure systems engineering,
- distributed application development,
- network and service architectures,
- ubiquitous computing, and
- cloud and mobile computing platforms.

The year concludes with a **summer school** and a **summer internship** to be taken at one of the programme's industry partners or in an applied research project.



For the autumn semester of the second year, the students will choose one of **specialisation options** (30 ECTS) offered by the other consortium universities:

- Communications Systems Design (KTH, Sweden)
- Information Security (NTNU, Norway)
- Reliable Distributed Systems (DTU, Denmark)
- Cryptography (University of Tartu, Estonia)
- Big Data Security (EURECOM, France)

The final semester of the programme is dedicated to the Master's thesis (30 ECTS), jointly supervised by professors from both universities the student has studied in.

SECCLLO graduates receive two officially recognised Master of Science degrees (120 ECTS) issued by the entry and exit university (two national degrees, a double degree). The degrees are awarded upon successful completion of the programme.

SECCLLO learning outcomes

The Security and Cloud Computing programme aims to educate professional engineers who are able to take on the most demanding R&D tasks and drive the development of future products and services. More specifically, the learning outcomes are the following:

Students will have the theoretical understanding of information security and practical skills for designing and analysing secure computing systems.

Students will understand the architectural principles of distributed services and applications. They will be able to design, analyse and implement distributed, cloud and mobile computing systems.

Students will have in-depth knowledge of their chosen specialisation area and be able to apply it to technical and scientific problems.

Students will have strong software development skills and other technical and professional skills that enable them to take key roles in an industrial research and development environment, and they will be qualified to continue to doctoral studies.



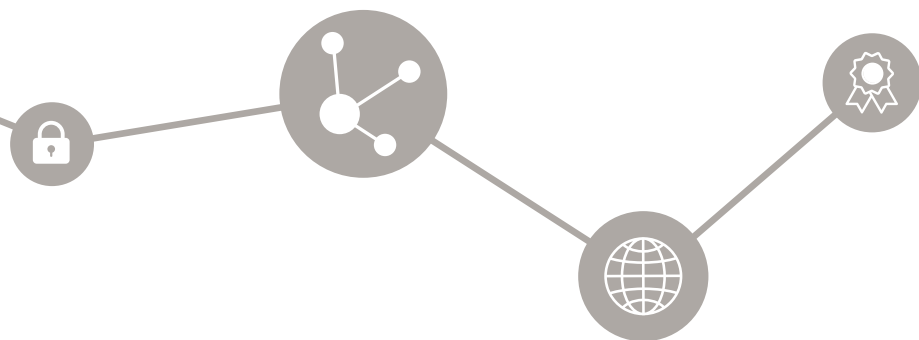
NordSecMob alumni conference in Stockholm in October 2015.

Careers

Information security is an essential qualitative requirement for all digital products and services. The career prospects of SECCLLO graduates are very good, and they are well prepared for industrial R&D jobs, security engineering and consulting, various expert roles, as well as doctoral studies at the consortium universities or abroad.

The typical job titles of graduates include *Software Engineer, Security Analyst, Development Engineer, Software & Systems Reliability Engineer, IT Security Specialist, R&D Engineer, Wireless Engineer, Enterprise Data Architect, Security Architect, Data Scientist, Web Developer, Security Engineer, Mobile Developer...*

The alumni of our predecessor, NordSecMob – Master’s Programme in Security and Mobile Computing, are employed in all the biggest ICT companies including Ericsson, Microsoft, Nokia, Google, Facebook, Skype and IBM. They have also continued on to PhD studies at many prestigious universities including, in addition to the consortium universities, the University of Oxford, Imperial College London, University of Glasgow, ETH Zurich, EPFL, University of Geneva, KU Leuven, TU Eindhoven, TU Darmstadt, TU Berlin, UC Irvine, University of Alabama at Birmingham, University of Waterloo and University of South Australia. Ninety-five per cent of our graduates had a job within 6 months after graduation.



Admission requirements

The general admission requirement is a high-quality Bachelor's degree in Computer Science or Information Technology (to be completed by 31 July) from an officially recognised university. The required background consists of sufficient studies in:

- mathematics (linear algebra, calculus, probability theory, statistics, and discrete mathematics)
- programming
- algorithms and data structures
- databases
- theory of computing
- computer networks
- software engineering
- project and team work

Knowledge of the following areas is considered an advantage: additional knowledge of mathematical methods, mobile applications, web software and online services, operating systems, distributed computing, embedded systems, advanced computer networking, information security and cryptography.

Language test requirements

The applicants are expected to have an excellent command of English. The recognized language tests and their minimum score requirements are:

| | Minimum total score | Minimum writing score |
|------------|---------------------|-----------------------|
| TOEFL IBT | 92 | 22 |
| TOEFL PBT* | 580 | 4.0 |
| IELTS | 6.5 | 5.5 |
| CAE/CPE | A, B, C | - |
| Pearson | 59 | 50 |

For further information and exceptions to the language test requirements, see the programme website.

* Not offered after October 2017. Instead, TOEFL PDT is accepted with minimum scores of Reading 22, Listening 22 and Writing 24.



Student selection criteria

Student selection decisions are made and selected students ranked based on the following evaluation criteria:

- Content of the previous degree(s)
- Study success: grades achieved and pace of studies
- Recognition and quality of applicant's home university
- Motivation and commitment to studies in the programme
- Other relevant achievements (work experience, entrepreneurship experience, publications, awards, patents etc.)
- Recommendation letters provided
- Language proficiency

For further information on applying, required application documents and application deadlines, see the programme website. The application period for the SECCLLO programme takes place in December – January yearly, with the possibility of a second application round for self-funded students later in the spring. The academic year at Aalto University begins in early September.



Scholarships and participation costs

Erasmus Mundus scholarship grants

| | Students from programme countries | Students from partner countries |
|---|-----------------------------------|--|
| Contribution to participation costs | €3 000/year | €9 000/year |
| Contribution to travel costs* | €1 000/year | €2 000/year if residence is less than 4 000 km from Aalto University €3 000/year if residence is 4 000 km or more from Aalto University |
| Contribution to installation costs* | - | €1 000 |
| Contribution to subsistence costs (max 24 months) | €1 000/month | €1 000/month |
| Max. | €32 000 | €49 000 |

The scholarships granted depend on the student's nationality and place of residence at the time of applying. The allocation of scholarships is based on academic merit and granted on a competitive basis. The number of Erasmus Mundus scholarships is limited and will be allocated only to the best applicants. Therefore, we strongly encourage students to look for other financing possibilities as well.

Participation costs

| | Students from programme countries | Students from partner countries |
|--------------------|-----------------------------------|---------------------------------|
| Participation cost | €3 000/year | €9 000/year |

The **programme countries** are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, former Yugoslav Republic of Macedonia, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, United Kingdom.

Partner countries are all countries not listed in the programme countries.

* **Travel and installation costs** depend on the place of residence at the time of applying.

Scholar positions for visiting academics

A visiting scholar is an academic and/or professional individual of outstanding experience who carries out teaching or research assignments and scholarly work in the institutions participating in the SECCLO programme.

The scholars strengthen the academic team of SECCLO. They are invited to contribute to the summer school and also to other teaching activities at the consortium member universities. SECCLO scholars may contribute to activities such as the following:

- Teaching activities in regular courses and in workshops and seminar courses.
- Thesis guidance and tutoring of students, supervision and tutoring of doctoral students.
- Development tasks related to the SECCLO programme, e.g. teaching content or course evaluations.
- Research activities, working on publications with SECCLO staff.
- Promotion of SECCLO at the scholar's home university and country.



Why SECCLO?

Industry demand

There is a worldwide shortage of professionals who are able to develop products and services for the modern cloud and mobile computing platforms and to do this in a secure way.

Innovation and R&D focus

SECCLO differs from most information security programmes in that it links security studies with product and service development skills. The ability to innovate and develop new products and services is what has the most potential for creating new business growth.

International experience

The programme provides you with the profound experience of working and studying in multiple countries in an international environment. Two Master of Science degrees from two European universities mean wider opportunities for employment.

Industry contacts already during studies

Mandatory summer internship between first- and second-year studies, industry involvement in courses, and industry thesis projects are some of the examples of how you will be able to create industry contacts during full-time studies.

Competitive Erasmus Mundus scholarships

The generous Erasmus Mundus scholarships offered for the best students allow you to concentrate on studies without financial worries.

Proven success of our predecessor, NordSecMob

Out of over 200 NordSecMob alumni, 95% had landed a job within 6 months after graduation. They work in all the biggest ICT companies, including Ericsson, Microsoft, Nokia, Google, Facebook, Skype, IBM,...

Join us now to change your life forever!

secclo.aalto.fi • secclo@aalto.fi



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