

Autonomous Systems 2018-2020

Major code: ELEC3055

Entry points: Aalto University, Royal Institute of Technology (KTH), Technische Universität Berlin (TU Berlin), University of Trento (UNITN)

Exit points with specializations:

Aalto: Robotics and Artificial Intelligence

KTH: Intelligent Autonomous Systems

TU Berlin: Applications of Autonomous Systems

UNITN: Real-time perception, decision and control for autonomous driving

EURECOM: Sensing, Communicating and Processing Big Data for Autonomous Systems

ELTE: Computer Science for Autonomous Driving

Professor in charge: Quan Zhou

Other professors of the major: Ville Kyrki

Arto Visala

Objectives of the programme

AUS is a combination of computer science and electronic engineering. During the programme, students will gain new skills in both areas. In computer science, relevant skills include Internet of Things (IoT), machine learning, artificial intelligence and robot vision. In electronic engineering, relevant fields are automation, control, embedded systems and communications. Students learn the latest theoretical knowledge and know how to apply their skills in practical real-life problems. Typical application areas of autonomous systems include autonomous vehicles, intelligent robots, industrial IoT and autonomous software systems.

Compulsory major courses (24 ECTS)

Code	Course name	Credits
SCI-E1010	Introduction course for Master's students: Academic Skills	1 ECTS
ELEC-C1320	Robotics	5 ECTS
ELEC-E8101	Digital and Optimal Control	5 ECTS
ELEC-E8103	Modelling, Estimation and Dynamic Systems	5 ECTS
CS-E3210	Machine Learning Basic Principles	5 ECTS
LC-xxxx	Language course: Compulsory degree requirement, both oral and written requirements	3 ECTS

Compulsory I&E Courses (7 ECTS)

Code	Course name	Credits
CS-E5120	Introduction to Digital Business and Venturing	3 ECTS
CS-E5130	Digital Business Management	4 ECTS

Total: 31 ECTS

No compulsory major courses

Compulsory I&E Courses (17 ECTS)

Code	Course name	Credits
TU-E4100	Startup Experience	9 ECTS

CS-E5140 Global Business in the Digital Age 4 ECTS

CS-E5430 ICT Innovation Summer School 4 ECTS

Optional major courses - select 12 ECTS

Code	Name	Credits	Semester
ELEC-E8105	Non-linear Filtering and Parameter Estimation	5 ECTS	Spring
ELEC-E8111	Autonomous Mobile Robots	5 ECTS	Spring
ELEC-E8115	Micro- and Nano Robotics	5 ECTS	Spring
ELEC-E8123	Networked Control Systems	5 ECTS	Spring
ELEC-E8126	Robotic manipulation	5 ECTS	Spring
ELEC-E8408	Embedded Systems Development	5 ECTS	Spring
ELEC-E5710	Sensors and Measurement Methods	5 ECTS	Spring
MS-E2112	Multivariate Statistical Analysis	5 ECTS	Spring
ELEC-E8127	Special assignment in automation technologies	1-10 ECTS	Autumn/Spring

Total: 29 ECTS

Total for the whole year: 60 ECTS

Note for exit year at partner university: According to Finnish legislation, a master's thesis is a public document and its contents cannot be confidential. Therefore, the material of the thesis must be chosen so that it does not include any information that could be classified as a business secret of the financing company.

Aalto specialization – Robotics and Artificial Intelligence

Compulsory courses (4 ECTS)

Code	Course name	Credits
SCI-E1010	Introduction course for Master's students: Career and working life skills	1 ECTS
LC-xxxx	Language course: Compulsory degree requirement, both oral and written requirements	3 ECTS

Compulsory I&E Course (6 ECTS)

Code	Course name	Credits
CS-E5425	I&E Study Project	6 ECTS

Specialisation Electives: select 20 ECTS over the two semesters

Code	Course name	Credits	Semester
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ELEC-E8104	Stochastic models and estimation	5 ECTS	Autumn
ELEC-E8116	Model-Based Control Systems	5 ECTS	Autumn
ELEC-E8125	Reinforcement learning	5 ECTS	Autumn
ELEC-E7120	Wireless Systems	5 ECTS	Autumn
CS-C3180	Software Design and Modelling	5 ECTS	Autumn
CS-E4850	Computer Vision	5 ECTS	Autumn
CS-E4890	Deep Learning	5 ECTS	Spring
CS-E4830	Kernel Methods in Machine Learning	5 ECTS	Spring
CS-E5710	Bayesian Data Analysis	5 ECTS	Autumn

Total: 30 ECTS

Code	Course name	Credits
EEA.thes	Master's Thesis	30 ECTS

Total for the whole year: 60 ECTS