

AUTONOMOUS SYSTEMS

INTERNATIONAL
PROGRAMME



AALBORG UNIVERSITY
COPENHAGEN

AUTONOMOUS SYSTEMS

Technologies are continuously digitalising and automating our world, which has been changing the nature of many sectors. In order to compete and survive, companies and organisations have to improve efficiency and adaptability on a global scale. Specifically, they should re-design/upgrade their systems to make good use of data in decision making and operation optimisation. In reality, this is often a big challenge because the business and production systems are extremely complex and therefore slow in processing changes. Fortunately, the latest advances in artificial intelligence, sensing, optimisation, information technologies, and systems engineering now allow for such systems to overcome this challenge by becoming autonomous.

Imagine fleets of smart robots that collaborate in manufacturing facilities, advanced warehouse logistics solutions such as the Amazon warehouses, crew-less cargo ships, smart grids, or interconnected smart home appliances. Those are just a few examples of what we call autonomous systems.

Autonomous systems need to exhibit intelligent behavior, robustness and adaptability to constant changes of their environments, while requiring minimal human involvement. At the same time, reliability and safety lie at the heart of the success of such systems. What is needed for the development of autonomous systems solutions and their deployment in real life applications is a combination of technological and engineering skills.

The Master's programme in Autonomous Systems enables you to handle modern day production and service systems' complexity by using latest technological tools and concepts. You learn how to analyse, model and develop intelligent autonomous solutions. You will be trained to deploy autonomous systems and assess their operational performance within relevant industry and business environments.

ENGINEERING APPROACH

The Master's programme in Autonomous Systems aims at providing graduates with competences to solve complex problems related to the design and deployment of autonomous systems and has been developed to build both theoretical understanding and practical experience of students enrolled in the programme. The programme focuses on topics as: Systems Engineering & Validation, Modelling and Control of Mechatronic Systems, Optimisation Scheduling and routing, Sensing and Perception, Machine Learning and Big Data, and Networks of Autonomous Systems. Those topics can be applied across industrial sectors in order to provide flexible autonomous solutions to problems ranging from classical manufacturing to service production.

The programme gives the graduate the opportunity to specialise within specific areas of autonomous systems; ranging from e.g. autonomous solutions in Automation and Robotics within Industry 4.0 to Autonomous Logistics.

The programme is based on a combination of academic, problem-oriented and interdisciplinary approaches and is structured in modules and organised as a problem-based study. A module is a programme element or a group of programme elements which aim to give students a set of professional skills within a fixed time frame specified in ECTS credits, and concluding with one or more examinations within specific exam periods defined in the curriculum.

INTERNATIONAL ENVIRONMENT

The Master's programme in Autonomous Systems is offered internationally, and all teaching is therefore conducted in English. During the third semester, you have the opportunity to define your own semester. You may acquire industrial experience via a traineeship in an international company, study at a foreign university or specialise within a specific area through your project work.



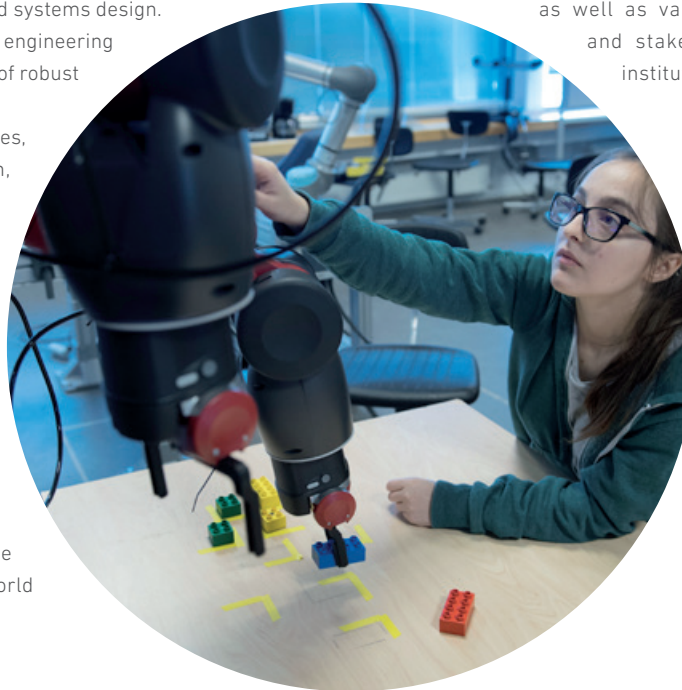
COMPETENCE PROFILE

As a graduate from the Master's programme in Autonomous Systems, you will be:

- able to analyse a given use-case problem and design suitable autonomous systems and solutions by applying scientific methods and tools, general skills related to problem solving and systems design.
- able to apply a wide range of technologies and an engineering approach for solving problems within the domain of robust autonomous systems.
- able to evaluate and select among scientific theories, methods and tools for the conception, design, implementation and operation of autonomous systems.
- able to apply theories, methods and concepts in different organisational and empirical settings in order to solve complicated technical problems in a business/societal context.
- able to participate in the development and implementation of novel and innovative technology-based concepts, systems and solutions.

On the basis of this, you will be able to identify, assess and implement potentially disruptive innovative autonomous solutions to existing real-world problems.

The programme takes in students with various nationalities and offers highly competitive engineering curriculum together with training in practical problem solving over the two years of study. It enables you to contribute to technological innovation as well as value creation for clients and stakeholders in companies, institutions and organisations.



ACADEMIC CONTENT

Autonomous Systems is a two-year Master of Science in Engineering programme consisting of four semesters worth 30 ECTS each, bringing the total to 120 ECTS.

The programme is research-based and forms the basis for jobs within all kinds of production and service companies in the e.g. manufacturing, IT, logistics, healthcare and pharmaceutical industry, as well as for research work in academia to further human knowledge and skills in autonomous systems related fields. The programme brings together the notions of analysis, modelling, optimisation, design and implementation in a scientific and innovative engineering perspective.

During the program you will work with practical real life problems in close collaboration with companies across various sectors. You will face the challenges of applying theoretical solutions to real cases, and transferring autonomous systems out of the lab in real environments.

1ST SEMESTER ENGINEERING OF AUTONOMOUS SYSTEMS

1st semester addresses the following themes:

- Use of system engineering tools to model, investigate and select new solutions
- Optimisation of the operations of an autonomous system in a deterministic or stochastic environment
- Improvement of management and performance of autonomous systems

Semester structure

- Engineering of Autonomous Systems (15 ECTS project)
- Systems Engineering & Validation (5 ECTS course)
- Modelling and Control of Mechatronic Systems (5 ECTS course)
- Optimisation, Scheduling and Routing (5 ECTS course)

2ND SEMESTER INTELLIGENT AUTONOMOUS SYSTEMS

At 2nd semester, you will address the following issues:

- Development of autonomous solutions with advanced sensing, big data, machine learning, vision and perception technologies
- Design of intelligent autonomous systems and networks based on demand characteristics in different industry/business contexts
- Evaluation of performance of intelligent autonomous systems and networks in a dynamic application/commercial environment

Semester structure

- Intelligent Autonomous Systems (15 ECTS project)
- Sensing and Perception (5 ECTS course)
- Machine Learning and Big Data (5 ECTS course)
- Networks of Autonomous Systems (5 ECTS course)

3RD SEMESTER

AUTONOMOUS SYSTEMS IN PRACTICE

During your third semester, you have the opportunity to define your own semester. You may e.g. acquire industrial experience via a traineeship in an international company, study at a foreign university or specialise within a specific area through project work.

Semester structure

- Autonomous systems in practice (30 ECTS)

4TH SEMESTER

INNOVATIVE AUTONOMOUS SYSTEMS SOLUTIONS

This semester is dedicated to the Master's thesis. You will work independently on applying scientific knowledge in novel and innovative ways within relevant application domains. The study groups at this semester are small, and the work situation resembles work situations in the industry. The Master's thesis may include innovation work, enhancement or research. The Master's thesis may be a continuation of the project you did on your 3rd semester, or it can deal with a new theme.

Semester structure

- Master's thesis (30 ECTS)





CAREER OPPORTUNITIES

Graduates are qualified to work in a number of industries e.g. production, manufacturing, transportation industries in both private and public organisations.

Examples of potential future job titles for a graduate with a Master's degree in Autonomous Systems are production manager, systems engineer, IT consultant - to mention but a few.

As a graduate, you will be able to analyse, model, optimise, design, and implement intelligent autonomous systems that can function in a complex world.

PROBLEM BASED LEARNING

As a student at Aalborg University, you will work closely together with your fellow students by way of problem based project work. Aalborg University is host to a successful UNESCO Chair in Problem Based Learning in Engineering Education and a Centre for PBL and Sustainability approved by UNESCO. The Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO will build upon and develop the work of the UNESCO Chair and Centre for PBL and Sustainability, and is keenly supported by Aalborg University and the Danish Ministry of Science, Innovation and Higher Education.

Performing problem based project work, you will typically be part of a group consisting of 4-5 students. Once you have formed a project group, you need to define a problem together that you want to examine. The problem forms the basis of your project, and you are to a great extent responsible for defining it yourselves within an often very broad theme frame. The group work ensures a great variety of approaches and perspectives which results in a sound and thoroughly prepared project. Together, you are able to discuss the details thoroughly. At the same time, you are able to solve larger and more complex problems than if you were studying on an individual basis.

Each of you has the opportunity to shape the project because group work requires a contribution from everyone. If you have any academic questions, you may also discuss these with your friends in the group. The project work is completed with an exam. While working on your project, you will also need to do individual exams in your subjects. Together with lectures, literature and cooperation with the corporate sector, the project work will

help you gain a deeper insight into the subject you are examining than if you had been working on your own.

With group work, you will quickly realise that you might have different opinions about how to solve a problem. Group work means that you have to compromise, and you will learn a lot about how to cooperate. Group work is very popular in the modern labour market so both you and your future workplace will benefit from the skills in cooperation you have acquired at Aalborg University.



RATED FOR EXCELLENCE

Aalborg University is rated for excellence in the QS-ranking system. Aalborg University has received five stars certifying the world-class position of the university based on cutting-edge facilities and internationally renowned research and teaching faculty.

BEST ENGINEERING UNIVERSITY IN EUROPE

Aalborg University is ranked the best university in Europe and the eighth best university worldwide for engineering according to the Best Global Universities list published by U.S. News and World Report.

STUDY IN COPENHAGEN

Aalborg University Copenhagen is located near the centre of Copenhagen, just 15 minutes from the Central Station. At Aalborg University Copenhagen you will be part of a dynamic, international and inspiring research and study environment of approximately 3500 students, more than 500 employees, and several innovative companies.

NEW AND MODERN FACILITIES

The campus buildings are designed to facilitate and optimise project-based learning, networking and interaction. All students at Aalborg University Copenhagen have access to well-designed study spaces, newly furnished lecture halls and well-equipped laboratories.

INNOVATION AND ENTREPRENEURSHIP

Innovation and entrepreneurship are integrated into all programmes at Aalborg University Copenhagen with the purpose of stimulating and developing your innovative ideas. The campus is home to several start-ups, and AAU Innovation is represented at the university to support students with entrepreneurial aspirations.

ACCOMMODATION IN COPENHAGEN

The housing market in Copenhagen is challenging, so start your search early. AAU Cph has a limited number of rooms in residence halls for international students.



AUTONOMOUS SYSTEMS

APPLICATION AND REQUIREMENTS

In order to apply, you are required to have a Bachelor's degree in:

- Bachelor of Science (BSc) in Engineering (Manufacturing and Operations Engineering), Aalborg University
- Bachelor of Science (BSc) in Engineering (Mechanical Engineering and Manufacturing), Aalborg University
- Bachelor of Science (BSc) in Engineering (Mechatronics), University of Southern Denmark (SDU)
- Bachelor of Science (BSc) in Engineering (Electrical Engineering), DTU
- Bachelor (BSc) in robotics, Aalborg University
- Bachelor of Science (BSc) in Engineering (Robot Systems), University of Southern Denmark (SDU)

Students with another Bachelor degree may, be admitted following a specific academic assessment if the applicant is considered as having comparable educational prerequisites. The University can stipulate requirements concerning conducting additional exams prior to the start of study.

LIMITED ADMISSION

There are only a limited number of student places available. Applicants will be assessed individually based on relevance of Bachelor degree (including whether the Bachelor's degree is research based or not) and Grade Point Average of the BA at the time of application.

The programme will admit 50 students.

The official English language requirements for international students applying for a Master's degree programme at Aalborg University are:

- IELTS (academic test): 6.5 or
- TOEFL (paper-based) *: 560 or
- TOEFL (internet-based): 88 or
- Cambridge Certificate of Proficiency (CPE) or
- Certificate in Advanced English (CAE) or
- Cambridge First Certificate with the grade B **.

*Paper-based tests taken after september 2017 will not be accepted. As of the admission year 2019, no paper-based tests from TOEFL will be accepted.

** As of the admission year 2019 the Cambridge First Certificate will no longer be accepted.

The test must be less than two years old to be accepted.

Valid reasons for exemption from submitting an English test:

- Applicants who have passed either 'English level B' in upper secondary school in Denmark (minimum average grade 02) or a skills set test (realkompetencevurdering) at "English level B".
- Applicants holding an English taught qualifying upper secondary school exam, Bachelor's degree or Master's degree from USA, Canada, Australia, New Zealand, UK, Ireland or South Africa.

- Applicants holding a Danish, Nordic, German, or European Baccalaureate (from Schola Europaea) qualifying exam with an English level, which the Danish Agency for Higher Education considers equivalent to a Danish B level in English.
- Applicants holding a passed International Baccalaureate (from the IB diploma programme (www.ibo.org)).
- Applicants holding a qualifying upper secondary school exam (with a minimum of two years of instruction in English during the last three years of upper secondary school) from EU/EEA countries if it is stated on the national final diploma that the achieved level of English language qualifications is equivalent to level B2 referring to Common European Framework of Reference for Languages (CEFR).
- Applicants holding a complete Bachelor's or Master's degree in English linguistics.

Please note that applicants attending or holding a Professional Bachelor's degree are not exempted from submitting one of the above-mentioned English tests.

TUITION-FREE STUDIES

Students from EU/EEA countries are not required to pay a tuition fee. However, all students must pay all other costs related to studying in Denmark: for example costs related to books, living expenses and accommodation. With the exception of students from partner universities outside the EU/EEA, a student from a non-EU/EEA country will need to pay a tuition fee.

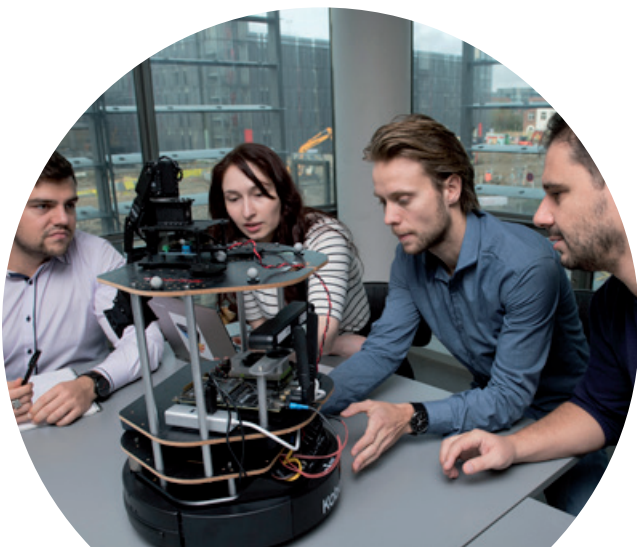
For more information, please see:

en.aau.dk/education/apply/master/how-to-apply

DEADLINE

Deadline for application:
March 1

AUTONOMOUS SYSTEMS



AUTONOMOUS SYSTEMS

2-YEAR MASTER'S PROGRAMME

C O N T A C T

CONSIDERING APPLYING TO AAU?

If you have questions about the application process, or general questions about studying at Aalborg University, please contact:

AAU Student Guidance

Phone: (45) 9940 9440

E-mail: studentguidance@aau.dk

ADMISSION OFFICE

If you have questions about an application you have already sent, or need information on residence permits, please contact:

Aalborg University Admissions Office

Phone: (+45) 9940 9655

E-mail: masteradmission@aau.dk

STUDENT GUIDANCE

If you have questions about the programme, please contact:

Email: cph.sg@ses.aau.dk



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