

MANUFACTURING AND OPERATIONS ENGINEERING

3-YEAR BACHELOR'S PROGRAMME · 2-YEAR MASTER'S PROGRAMMES



AALBORG UNIVERSITY
COPENHAGEN

MAKE IT WORK!

Tablets, 3D movies, music services and online stores are all results of good ideas. But a good idea is not enough; you must also be able to produce it. Therefore, behind every new product lies an innovative and creative process of development and production where engineers, designers and product developers cooperate closely in order to put together a product and service. They make sure that the functionality is first class, that everything works and looks like it is supposed to, and last but not least that the price is right. In short, they make sure that the product lives up to the standards and the expectations of the user.

Through the BSc programme in Manufacturing and Operations Engineering, you learn how to realise and produce a good idea by using modern technology and materials, virtual reality, data mining, production, service management etc. Through an engineering perspective, you will be educated to work with innovation and product development where you acquire skills in areas such as; prototyping, programming, software and robot technology.

The education will prime you for working with improvement, development and innovation of working procedures and production systems so that technology, system and people work together in the most efficient and optimal way. You will learn to apply the newest tools and methods for innovative production development – tools that enable you to work in the intersection between product, service and production development.

The study programme is taught in English, takes place in an international environment and is offered internationally. In addition to your professional qualifications, you will therefore also acquire strong linguistic skills. Moreover, you will obtain solid intercultural competences because of the international environment.

STUDY IN COPENHAGEN

Aalborg University Copenhagen (AAU-Cph) is located near the centre of Copenhagen, just 15 minutes from the Central Station. At AAU-Cph, you will be part of a dynamic, international and inspiring research and study environment of more than 3,000 students, 500 researchers and several innovative companies.

NEW AND MODERN FACILITIES

The new campus is designed to facilitate and optimise project-based learning, networking and interaction. All students at AAU-Cph have access to well-designed study spaces, newly furnished lecture halls and, for the experimental programmes, well-equipped laboratories.

INNOVATION AND ENTREPRENEURSHIP

Innovation and entrepreneurship are integrated into all programmes at AAU-Cph with the purpose of stimulating and developing your innovative ideas. The new campus is home to several start-ups, and AAU Innovation is represented at AAU-Cph 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.

BSC PROGRAMME IN MANUFACTURING AND OPERATIONS ENGINEERING

Throughout the BSc in Manufacturing and Operations Engineering, you will work creatively with production development and innovation. You learn to work with innovation technology and advanced production technologies and systems, and you will learn to work with sustainable production development, planning of production and service, and technology and project management. In addition, you will gain knowledge of the newest IT-tools for innovation and design such as; 3D-print, crowd sourcing, rapid prototyping and programming and the newest production concepts such as lean. Furthermore, you will acquire proficiency in organisation, project management and the role of employees in production development.

Projects will typically be carried out in close collaboration with companies. Through the projects, you will explore complex, often interdisciplinary problems in depth. Here, a creative and engaged mind-set is required in order to develop solutions to challenging problems.

From the 3rd semester, you have the opportunity to focus on either production of physical products or on service development. Moreover, during the six semesters, you have the possibility of focusing on a specific industry as the education is structured around several projects in the same company.

1ST SEMESTER

During the 1st semester of the study programme, you will gain insight in the history of product development: How have production and products developed into being what they are today? Which role does the past play in today's understanding of production development? During this semester, you will also learn to work problem oriented – both through courses and your 1st semester project work where you will work with both historical and modern production through production games and experiments.

During the 1st semester you will follow courses in:

- Linear Algebra
- Materials and Manufacturing Processes
- Problem Based Learning in Science, Technology and Society

2ND SEMESTER

During the 2nd semester, you work with product and service development. Through the courses, you learn about innovative product development technologies and the working tools which are necessary in the process from idea to prototype. This knowledge is important, because innovative products and innovative production development go hand in hand. The content of the courses is integrated into the project work where you for instance can work with a gadget from idea to prototype. Your gadget can be physical or virtual, and you will receive access to FAB-laboratories,

where you can design your product, develop advanced functions by the help of embedded electronics and optimise the user interface.

2nd semester offers courses in:

- Calculus
- Innovation Technology: Product Development and Product Service Design
- Reality and Models

3RD SEMESTER

Innovative ideas must be developed into prototypes that can be produced for the market in an effective way. Effective and innovative production determine how innovative the product and the service are, and how much money the company can earn on the product or service in question. On 3rd semester, you can choose to focus on either production of physical products or production of service.

Production of physical products

With this focus, you learn how advanced materials, automation, autonomous vehicles and robots are used in production and how you can programme these both virtually and in reality.

The courses within this topic are:

- Digital Manufacturing Technology
- New Materials and Processes

Service

With this focus, you learn about data mining and databases. Digitally, you learn how you can model and support complex services, and how you can design tasks and environment in the most optimal way.

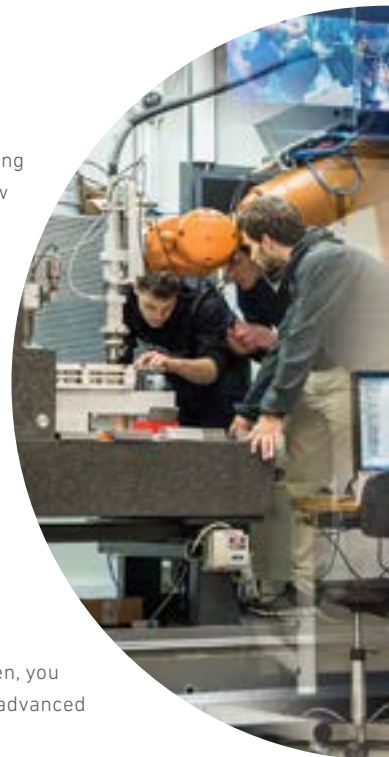
The courses within this topic are:

- Job Design
- Digital Manufacturing and Service

In addition, 3rd semester includes one mandatory course:

- Manufacturing Processes, Automation and Robots.

Depending on which area you have chosen, you can choose to analyse the production of advanced products or services of a company.



4TH SEMESTER

4th semester is about the latest technological development within production and service design. You continue in your chosen direction, and you learn about subjects such as; programming of intelligent robots, highly advanced quality control systems and modern philosophies of production systems. You will also get an introduction to statistics, which is an important tool in production planning.

The contents of the courses are integrated into the project work, and dependent on the direction you have chosen, you can address issues such as how to design intelligent and competitive production services and technologies in local companies or at the university. In such projects, you will among other things work with production and service systems, quality control, streamlining, utilisation of big data and intelligent robots.

The courses in 4th semester depend on the chosen direction:

- Engineering Design and Quality Control
- Industrial Vision, Sensors and Quality Control
- Intelligent Manufacturing
- Intelligent Production and Service Design
- Introduction to Probability and Applied Statistics

5TH SEMESTER

During the 5th semester, joint courses about production and service economy and value chains are provided. You learn how to make products available on the international market, including how to plan and lead the process in the most suitable way, how to make prognoses of the expected sales, how to optimise strategies and how to utilise intelligent technology to solve these tasks.

Through the project work, you explore production and service management in depth. Here, you can for instance research how Danish and European companies make their products and services available internationally, what importance these strategies have in relation to logistics and logistic chains and how to optimise these areas.

The courses on the 5th semester are the following:

- Introduction to Production and Service Economy
- Operations Planning and Control
- Systems Thinking and Process Improvement

6TH SEMESTER

This semester will be dedicated to your bachelor project, which you will write within the theme; innovative product development. For your bachelor project, you can build an intelligent robot system by the help of available robot technologies, or you can develop a web-based service just to mention two of many interesting possibilities.

Possibly, your 6th semester will take place in a workplace where you analyse production or service processes and make creative suggestions for improvement. But you can also work on setting up your own company with point of departure in the competences you have acquired throughout the education.

Moreover, 6th semester includes one obligatory course in Scientific Theory and Entrepreneurship and one optional course where you can choose between the following:

- Advanced Manufacturing and Service Information Systems
- Selected Topics in Intelligent Manufacturing
- Global Supply Chain Management



GRADUATE DESTINATIONS AND MASTER DEGREE OPPORTUNITIES

MANUFACTURING AND OPERATIONS ENGINEERING

The undergraduate degree in Manufacturing and Operations Engineering qualifies you for a number of different Master's programmes at Aalborg University. Among others:

- Design of Mechanical Systems (AAU Aalborg)
- Global Systems Design (AAU Copenhagen)
- Manufacturing Technology (AAU Aalborg)
- Operations and Innovation Management (AAU Copenhagen and AAU Aalborg)

Dependent on which MSc programme you choose to supply your undergraduate degree with, you have a number of different career paths to choose between. In industrial companies, you can take part in the development of the company's competitiveness in a market which is marked by increasing demands for flexibility, acceleration and globalisation. Here, you can contribute to the improvement of working procedures, production systems and market creation through improvement and innovation of for instance; product development and planning, integrated product development and logistics. An example of a well-known production development engineer is Tim Cook, CEO at Apple, who has streamlined the production and increased the quality and revenue of the company.

In service companies such as UPS, Amazon and PostDanmark or in IT-companies such as Microsoft and Google, you can be part of planning, implementing and improving working procedures and the development and utilisation of advanced technology. Furthermore, you can find work within areas such as distribution, grocery sector and other service companies.

In the latest years, public systems such as hospitals and local and state administrations are being met with high demands for efficiency and dynamic. You can take part in this development by help of your insights in and knowledge of work planning, quality control, production management and optimal resource utilisation, where many problems can be solved, based on the same approach and competences as with classical production systems.

MASTER'S PROGRAMME IN GLOBAL SYSTEMS DESIGN

ABOUT THE PROGRAMME

Are you interested in combining engineering sciences and business know-how to contribute to value creation and systems design in national and international businesses or public organisations? The Master's programme enables you to analyse and model business processes, and design product, services, and production systems. You will learn to develop, simulate, and cost-benefit-evaluate solutions and simplify, standardise, and automate work procedures and processes. Using an engineering approach, you will work with application of modern calculation, automation and IT technologies which can contribute to, e.g. enhanced resource utilisation.

CAREER OPPORTUNITIES

Graduates are prepared to work in industrial organisations, helping develop and maintain competitive workplaces and production systems. You can map, analyse, and optimise processes and deal with market and production or supply chain data, and you will be able to simplify, automate, and optimise business processes across industrial fields. You could become a robotics and automation engineer, production manager, Lean Six Sigma consultant, IT consultant or logistics manager – to mention a few.

PROGRAMME STRUCTURE

This is a two-year Master of Science in Technology programme (120 ECTS credits).

1ST SEMESTER

- Introduction to problem based learning and scientific methodology
- Development and design of product and service systems (from customer focus, finance, logistics and sustainability perspectives)
- Automation and robotics
- Analysis and modelling of business systems and processes
- Business economics and statistics
- Design of production and logistics systems and control of associated materials, capacity and resources

2ND SEMESTER

- Automated and intelligent production systems
- Analysis, advanced simulation and optimisation of production, logistics and business processes
- Formulation and implementation of product, service, business and production strategies
- Process excellence, Lean Six Sigma philosophies and tools
- Project management and organisational change

3RD SEMESTER

You may define your semester in order to, e.g. acquire industrial experience via a traineeship in an international company, study at a foreign university or specialise in a specific area through project work.

4TH SEMESTER

You work independently on solving a business, production or logistics related problem in your Master's thesis.



GLOBAL MANAGEMENT

- A SPECIALISATION WITHIN THE OPERATIONS AND INNOVATION MANAGEMENT PROGRAMME

Do you want to develop and manage the global business systems and value chains of the future? Specialising in Global Management, you will be able to handle the challenges of the increasing globalisation that most companies are facing at present. Off-shoring and outsourcing of different activities within the company's value chain are creating a completely new managerial agenda. Studying Global Management will give you the expertise needed in order to analyse, understand and solve the challenges associated with the disintegration and globalisation of a company's value chain. Moreover, the programme allows you to work with innovative, global business models and systems, and it will provide you with a balanced analytical, systemic and managerial understanding of the management and development of a global value chain.

CAREER OPPORTUNITIES

The Global Management specialisation gives you many possible career paths. You might have a career as a manager, specialist, consultant, analyst or process manager to mention but a few. Examples of potential future workplaces include:

- Novo Nordisk
- Carlsberg
- Vestas
- Ferrosan
- IBM
- Siemens
- Danske Bank

PROGRAMME STRUCTURE

Global Management is a two-year Master's specialisation (120 ECTS credits). The specialisation provides you with the opportunity to conduct your project work in collaboration with a company. You will address topics like:

- Strategic planning and management
- Innovation and technology management
- Change management
- Business creation and development
- Organisational design
- Managing global processes
- Outsourcing and off-shoring

Each semester is based on a specific theme:

- 1st semester: Design of global value chains. Here you will deal with the problems and challenges emerging from the dis-integration and fragmentation of a company's value chains.
- 2nd semester: Global innovation and technology management. During this semester you will work with the problems related to the increasing globalisation and its effect on the innovative activities of a company.
- 3rd semester: Traineeship or study abroad
- 4th semester: Master's thesis.



MEDIA MANAGEMENT

- A SPECIALISATION WITHIN THE OPERATIONS AND INNOVATION MANAGEMENT PROGRAMME

If you are you intrigued by topics like strategy and innovation in film and computer games animation, and you want to work in the media industry, you should consider this specialisation. Media Management will allow you to study topics like media convergence, technological development, and globalisation of the media industry. You will learn to manage future challenges and opportunities within the media industry, and you will be prepared for the managerial tasks of an international organisation.

You will work with themes like:

- Technological innovation
- Media clusters
- Entrepreneurship
- Organisation
- Communication
- Leadership

CAREER OPPORTUNITIES

Graduating in Media Management, you have many possible career paths, nationally as well as internationally. Examples of your potential future job title might be international project manager, media strategist or outsourcing manager. You can obtain employment in international media firms, communication departments in privately held companies or in NGOs or the public sector.

PROGRAMME STRUCTURE

Media Management is a two-year Master's specialisation (120 ECTS credits). The programme provides you with the opportunity to conduct your project work in collaboration with a company. Project examples include:

- Outsourcing of game production to China
- Developing film clusters in the context of increased global competition
- Configure international co-productions in animation

Each semester is based on a specific topic:

- 1st semester: Design of business systems for media firms
- 2nd semester: Innovation and technology control in media firms
- 3rd semester: Traineeship or study abroad
- 4th semester: This semester is devoted to your Master's thesis.



PROBLEM BASED LEARNING (PBL - MODEL)

As a student at Aalborg University, you will work closely together with your fellow students by way of problem based project work. The Aalborg Model for Problem Based Learning (PBL) receives great interest both nationally and internationally, and UNESCO has placed its only Professorial Chair in PBL at Aalborg University.

Typically, you will 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.

PROBLEM BASED LEARNING (PBL)

Aalborg University is famous for its problem based learning where you work in a team on a large written assignment often



collaborating with an industrial partner. This study method is also called "The Aalborg Model for problem based learning". The method is highly recognised internationally, and UNESCO has placed its only professorial chair in PBL at Aalborg University.

The problem based project work at Aalborg University gives you a unique opportunity to acquire new knowledge and competences at a high academic level in an independent manner.

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.



Within Engineering and Technology, Aalborg University ranks as number 79 in the world.

The QS Stars system is a detailed comparative tool focusing on the performance of the institution based on a broad set of criteria, such as employability, facilities, innovation, research, teaching, and internationalisation.



APPLICATION AND REQUIREMENTS

In order to be admitted to the Bachelor's programme in Manufacturing and Operations Engineering at Aalborg University, you need the following qualifications:

Upper secondary school exam, including:

- English B or an acceptable IELTS or TOEFL or Cambridge score (see apply.aau.dk)
- Mathematics A
- One of the following combinations:
 - Physics B and Chemistry C
 - Physics B and Biotechnology A
 - Earth Sciences A and Chemistry C

To be taken into consideration for admission to the Bachelor's programme in Manufacturing and Operations Engineering, you must fulfil the entry requirements.

QUOTA 1

If you have a non-Danish degree that may be converted into a Danish GPA (grade points average), your application will also be assessed in Quota 1. For Quota 1 applicants, only the GPA of the upper secondary school certificate is assessed. Applicants are admitted on a competitive basis according to their GPA, so that the applicant with the highest GPA is admitted first and so on until all places are filled. In Quota 1, you can get an Quickbonus of 1,08 which will be counted into your GPA, if you apply no later than two years after you have finished your upper secondary education.

QUOTA 2 AND 3

Qualified applicants in Quota 2 and 3 will be selected through an overall assessment based on:

- Grades in the subjects that constitute the specific entry requirements – see above
- Activities up to a maximum of 12 months and no less than 6 months: Relevant professional full-time (minimum 29.7 hours/week) work experience and/or relevant education and supplementary courses.

APPLICATION

In order to apply for admission, please go to the portal of the Danish Ministry of Education, optagelse.dk. IT, Communication and New Media admission's area no. is 25095.

It is important that you read our guide How to apply to Aalborg University: apply.aau.dk/how-to-apply-undergraduate/guide-to-apply/ Please, also note our information about general entry requirements.

FOR FURTHER INFORMATION

Information concerning admission requirements in general may be found on the website of the Danish Agency for International Education. On this page you can also find information on whether the level of a foreign certificate meets the general entry requirements.

DEADLINE

At www.optagelse.dk you must start your application process by filling in an application form and a priority form. This produces a Signature Page, that you must print out, sign and submit by regular mail to:

Aalborg Universitet
Studiekontoret (Admissions Office)
Fredrik Bajers Vej 5, Postbox 159
9100 Aalborg
Denmark

Or by e-mail to studiekontor@aau.dk

Application deadline for all applicants holding a foreign entry examination

Your Signature page must be received at The Admissions Office before 15 March, 12.00 o'clock. Only the Signature page is proof of you applying for an undergraduate programme. Your application process is not completed until the Signature page is received at The Admissions Office.

Questions regarding admission, entry requirements, application procedure may be directed to:

The Student Guidance Office
Aalborg University
Fredrik Bajers Vej 5
DK – 9220 Aalborg East
Telephone: (45) 9940 9440 (weekdays between 12-15)
E-mail: studentguidance@aau.dk

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.

CONTACT INFORMATION

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If you have questions about how to apply or general questions about studying in Denmark and life at Aalborg University, please contact:

The Student Guidance Office

Aalborg University

Fredrik Bajers Vej 5

DK – 9220 Aalborg East

Telephone: (45) 9940 9440 (weekdays between 12-15)

E-mail: studentguidance@aau.dk



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