SUSTAINABLE BIOTECHNOLOGY
Natural resources should be exploited in a sustainable way. The implementation of green technologies is highly prioritised, rapidly expanding and fundamental for the development of a sustainable society. Would you like to develop new and sustainable biotechnological solutions for tomorrow’s society?

Mineral oil constitutes the most important non-renewable resource for the production of liquid fuels, chemicals (pharmaceuticals, pesticides, surfactants, fertilisers) and materials (e.g. plastics). Alternative renewable resources have to be exploited in a sustainable manner in order to compensate for the forthcoming depletion of mineral oil and to effectively deal with the environmental impact of its intensive use.

Together with other renewable resources, biomass (agricultural and forest residues, agro-industrial wastes, algae) constitutes an important part of the future energy supply and is seen as the most important replacement for oil as feedstock material in the chemical industry.

In the coming decades, oil refineries are expected to be amply replaced by biorefineries, where (bio)chemical and biological conversion processes, using chemical catalysts, enzymes and microorganisms, will transform biomass into biofuels, biomaterials and platform and fine chemicals.

The 21st Century is considered the Age of Biology, where scientific and technological progress in life sciences are expected to tackle global challenges, such as depletion of resources, food supply, climate changes and lifestyle diseases. By studying Sustainable Biotechnology at Aalborg University, you can get the knowledge and insights to shape a better future and involved in cutting-edge research in the frame of ongoing national and international projects.
BACHELOR’S PROGRAMME IN SUSTAINABLE BIOTECHNOLOGY

During the programme in Sustainable Biotechnology, you will achieve skills and competencies within microbiology, biochemistry, molecular biology, enzyme technology, fermentation technology, bioprocess engineering, biorefineries, sustainability and other related areas.

The Bachelor’s programme is structured to ensure a clear scientific and technical progression in the field of biotechnology and offers the opportunity to focus on either biology- or process-oriented education through the choice of the topic of each semester project.

1ST SEMESTER

In the first semester, you will obtain the basics of an engineering education in the courses
• General and Organic Chemistry (5 ECTS),
• Linear Algebra (5 ECTS), and
• Problem-based Learning in Science, Technology and Society (5 ECTS).

Within the project on Biological production (15 ECTS) you will learn how the production of fuels and chemicals can be uncoupled from fossil resources.

2ND SEMESTER

In the second semester, you will learn about
• Biomolecules and Biochemistry I (5 ECTS),
• Calculus (5 ECTS), and
• Sustainability (5 ECTS).

In the semester project on Biomass Conversion (15 ECTS) you will handle biomass, characterise its composition and evaluate its potential of conversion.

The first and second semester establish the knowledge foundation of the entire study programme of Sustainable Biotechnology.

3RD SEMESTER

The project of the third semester deals with the Sustainable Production of Biofuels or Biochemicals (15 ECTS), combining the knowledge obtained in bioenergy, diversity of microorganisms and their application in bioprocesses, which is acquired in the courses
• Energy and Resources (5 ECTS),
• Applied Biodiversity (5 ECTS), and
• Kinetics and Process Modelling (5 ECTS).
4TH SEMESTER

In the fourth semester, your skills in biotechnology and process engineering will be expanded in the courses
• Microbiological Processes (5 ECTS),
• Biochemistry II (5 ECTS), and
• Process Technology (5 ECTS).
In your project on The Cell as a Factory (15 ECTS) you will investigate how to apply microorganisms in a specific biotechnological process.

5TH SEMESTER

In the fifth semester, the focus will be on genetic engineering of microorganisms, with courses on
• Molecular Biology (5 ECTS),
• Cell Biology and Genetics (5 ECTS), and
• Applied Statistics (5 ECTS).
The knowledge obtained in cell and molecular biology will allow the genetic modification of microorganisms for biological production processes in your project on Development of Recombinant Biocatalysts (15 ECTS).

6TH SEMESTER

The major part of the sixth and last semester is the Bachelor Project (20 ECTS) in Sustainable Biotechnology, which you can carry out individually or in group, in the frame of an ongoing research project, and/or in collaboration with a company. In parallel, you follow the courses on
• Cases in Bioprocess Technology (5 ECTS) and
• Biotechnology, ethics and society (5 ECTS).

As a Bachelor in Sustainable Biotechnology you qualify for admission to the two-year Master of Science in Engineering programme in Sustainable Biotechnology.
**MASTER’S PROGRAMME IN SUSTAINABLE BIOTECHNOLOGY**

The Master’s programme in Sustainable Biotechnology is designed to ensure a clear scientific and technical progression in the field of biotechnology and offers the opportunity to focus on either biology- or process-oriented education through the choice of the semester project topics.

The programme consists of four semesters and creates in the first semester a common platform for the different qualifications and competences that allow admittance to the study programme. In the subsequent semesters, this platform is expanded and varied, leaving you with the possibility for specialisation and independent problem solving during your Master thesis, which will prepare you for your future career.

**1ST SEMESTER**

In the first semester, a foundation on advanced processes within sustainable biotechnology is established through the courses on

- Biological Production Processes (5 ECTS),
- Systems and Synthetic Biology (5 ECTS), and
- Biorefinery Principles (5 ECTS).

Your lab project on Advanced Microbiological Production (15 ECTS) will give you the opportunity to apply and further develop your skills on performing and evaluating lab experiments for a certain biological production process.

**2ND SEMESTER**

In the second semester, the complexity of your semester project of Biomass Conversion Processes (15 ECTS) is increased by integrating microbiology and biochemical skills with process technology disciplines. This integration is supported by the courses

- Microbiological Discovery (5 ECTS),
- Anaerobic and Fungal Biotechnology (5 ECTS), and
- Advanced Kinetics and Modelling of Bioprocesses (5 ECTS).

**3RD AND 4TH SEMESTER**

The third and fourth semester are dedicated to the Master’s Thesis (60 ECTS), which constitutes an independent project associated to a research group or a company.

The Master’s Thesis can be split into a Project Work (30 ECTS) in an external organisation in the third semester and a Master’s Thesis (30 ECTS) in Sustainable Biotechnology in the fourth semester or a more comprehensive two semester project (60 ECTS) can be performed associated to a research group or a company.

**STUDY ABROAD**

Since the whole study programme is taught in English, you will have the opportunity to spend a semester abroad.

We have formalised collaborations with several universities in Europe, China and the USA, and we can help facilitate and plan a stay abroad.
Therefore, the semester projects and the BSc and MSc Thesis can be performed in the frame of cutting edge research developed at the Section.
The study programme in Sustainable Biotechnology will qualify you for general biotechnology disciplines. With an MSc in Sustainable Biotechnology your future workplace can be in a company that deals with e.g. pharmaceutical production, food production, energy technology or environmental engineering.

The study programme in Sustainable Biotechnology will qualify you for employment within a number of fields where new technologies are or will be developed for the transition of fossil based to sustainable bio-based production.

With a Master’s degree in Sustainable Biotechnology you qualify for employment in biotechnology and bioengineering companies, research institutions, consulting companies and public institutions. We furthermore expect that the biomass conversion and biotechnology sector will expand significantly in the coming years leading to new job opportunities.
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. 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 indispensable 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.
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 3000 students, 400 researchers and several innovative companies.

NEW AND MODERN FACILITIES

The new campus is designed to facilitate and optimize 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.

FREE DANISH CLASSES

Learning the Danish language will significantly improve your chances of getting a job in Denmark after graduation. The municipality in Copenhagen offers free Danish classes for this purpose.
APPLICATION AND REQUIREMENTS

DANISH AND SCANDINAVIAN STUDENTS

Bachelor’s programme
To be admitted to Bachelor’s programme in Sustainable Biotechnology, you must meet the following requirements:
• Upper secondary school exam (stx, eux, hf, hhx, htx, Adgangskursus, or the like).
• English B
• Mathematics A
and one of the following combinations:
• Physics B and Chemistry B
• Physics B and Biotechnology A
• Earth Sciences A and Chemistry B

NOTE! Starting from 2019 a minimum grade of 4.0 will be required for Mathematics A.

Master’s programme
To be admitted to the Master’s programme in Sustainable Biotechnology you must have a Bachelor’s degree in Sustainable Biotechnology, Biotechnology, Biology, Chemical Engineering, or the like.

OTHER INTERNATIONAL STUDENTS

Bachelor’s programme
To be admitted to the Bachelor’s programme in Sustainable Biotechnology, you must meet the following requirements:
• Upper secondary school exam
• English B or an acceptable IELTS or TOEFL or Cambridge score
• Mathematics A
and one of the following combinations:
• Physics B and Chemistry B
• Physics B and Biotechnology A
• Earth Sciences A and Chemistry B

Master’s programme
To be admitted to the Master’s programme in Sustainable Biotechnology you must have a Bachelor’s degree in Sustainable Biotechnology, Biotechnology, Biology, Chemical Engineering, or the like.

OFFICIAL LANGUAGE REQUIREMENTS

The official language requirements for international students applying for a Bachelor’s degree or a Master’s degree at Aalborg University are:
• IELTS (academic test): 6.5 www.ielts.org or
• TOEFL (paper-based): 560 www.ets.org/toefl (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).
• TOEFL (internet-based): 88 www.ets.org/toefl
• Cambridge Certificate of Proficiency (CPE) www.cambridgeenglish.org or
• Certificate in Advanced English (CAE) www.cambridgeenglish.org or
• Cambridge First Certificate with the grade B www.cambridgeenglish.org (as of the admission year 2019 the Cambridge First Certificate will no longer be accepted).

For further information please refer to apply.aau.dk.

APPLICATION DEADLINES

Bachelor’s programme
Danish students: 5 July.
International students: 15 March, 12 noon.

Master’s programme
Danish and international students: 1 Marts.
Please refer to optagelse.dk and apply.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.
DANISH AND INTERNATIONAL STUDENTS
If you have questions about how to apply, or general questions about studying in Denmark and life at Aalborg University, please contact

AAU Student Guidance
Phone: (45) 9940 9440
studentguidance@aau.dk

ALREADY APPLIED?
If you have questions regarding an application you have already sent, please contact

Aalborg University Admissions Office
Phone: (+45) 9940 9940
E-mail: bacheloradmission@aau.dk / masteradmission@aau.dk

Student guidance in Copenhagen
Phone: (+45) 9940 2450
E-mail: studentguidance@cph.aau.dk

If you have questions regarding the study programme, please contact the student guidance service at cph.sg@ses.aau.dk