



AALBORG UNIVERSITET

BACHELOR OF SCIENCE (BSC) IN ENGINEERING (MANUFACTURING AND OPERATIONS ENGINEERING) 2017

BACHELOR OF SCIENCE (BSC) IN ENGINEERING
COPENHAGEN

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§ 1: PREFACE

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum is established. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for The Faculty of Engineering and Science.

§ 2: BASIS IN MINISTERIAL ORDERS

The Bachelor's programme is organised in accordance with the Ministry of Science, Innovation and Higher Education's Order no. 1061 of June 30, 2016 on Bachelor's and Master's Programmes at Universities (the Ministerial Order of the Study Programmes) and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 258 of March 18, 2015 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order) with subsequent changes.

§ 3: CAMPUS

The programme is offered in Copenhagen.

§ 4: FACULTY AFFILIATION

The Bachelor's programme falls under The Faculty of Engineering and Science, Aalborg University.

§ 5: STUDY BOARD AFFILIATION

The Bachelor's programme falls under Study Board of Production

§ 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

The Bachelor's programme is associated with the external examiners corps on Nationwide engineering examiners/Machine.

§ 7: ADMISSION REQUIREMENTS

Admission to the Bachelor's programme in Manufacturing and Operations Engineering requires an upper secondary education.

The programme's specific entry requirements are:

- English B
- Mathematics A

And one of the following combinations:

- Physics B and Chemistry C
- Physics B and Biotechnology A
- Earth science A and Chemistry C.

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Bachelor's programme entitles the graduate to the designation Bachelor (BSc) i teknisk videnskab (produktionsudvikling). The English designation is: Bachelor of Science (BSc) in Engineering (Manufacturing and Operations Engineering).

§ 9: PROGRAMME SPECIFICATIONS IN ECTS CREDITS

The Bachelor's programme is a 3-year, research-based, full-time study programme. The programme is set to 180 ECTS credits.

§ 10: RULES CONCERNING CREDIT TRANSFER (MERIT), INCLUDING THE POSSIBILITY FOR CHOICE OF MODULES THAT ARE PART OF ANOTHER PROGRAMME AT A UNIVERSITY IN DENMARK OR ABROAD

The Study Board can approve successfully completed (passed) programme elements from other Bachelor's programmes in lieu of programme elements in this programme (credit transfer). The Study Board can also approve successfully completed (passed) programme elements from another Danish programme or a programme outside of Denmark at the same level, in lieu of programme elements within this curriculum. Decisions on credit transfer are made by the Study Board based on an academic assessment. See the Joint Programme Regulations for the rules on credit transfer.

§ 11: EXEMPTIONS

In exceptional circumstances, the Study Board study can grant exemption from those parts of the curriculum that are not stipulated by law or ministerial order. Exemption regarding an examination applies to the immediate examination.

§ 12: RULES FOR EXAMINATIONS

The rules for examinations are stated in the Examination Policies and Procedures published by the faculty on their website.

§ 13: RULES CONCERNING WRITTEN WORK, INCLUDING THE BACHELOR'S PROJECT

In the assessment of all written work, regardless of the language it is written in, weight is also given to the student's formulation and spelling ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination can be assessed as 'Pass' on the basis of good language performance alone; similarly, an examination normally cannot be assessed as 'Fail' on the basis of poor language performance alone.

The Study Board can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Bachelor's project must include an English summary (or another foreign language: French, Spanish or German upon approval by the Study Board). If the project is written in English, the summary must be in Danish (The Study Board can grant exemption from this). The summary must be at least 1 page and not more than 2 pages (this is not included in any fixed minimum and maximum number of pages per student). The summary is included in the evaluation of the project as a whole.

§ 14: REQUIREMENTS REGARDING THE READING OF TEXTS IN A FOREIGN LANGUAGE

It is assumed that the student can read academic texts and use reference works and similar.

§ 15: COMPETENCE PROFILE ON THE DIPLOMA

The following competence profile will appear on the diploma:

A graduate of the Bachelor's programme has competencies acquired through an educational programme that has taken place in a research environment.

A graduate of the Bachelor's programme has fundamental knowledge of and insight into his/her subject's methods and scientific foundation. These properties qualify the graduate of the Bachelor's programme for further education in a relevant Master's programme as well as for employment on the basis of the educational programme

§ 16: COMPETENCE PROFILE OF THE PROGRAMME

Persons obtaining the Bachelors degree:

Knowledge:

- Possess knowledge about theories, methodologies and practice in the areas of innovation technology, system, processes, manufacturing, production and service.
- Are able to understand and reflect on theories, methodologies and practice within these subject areas.

- Have knowledge in design and planning innovative processes in relation to manufacturing and operations engineering.
- Know about the important connection between:
 - Business models
 - Products and services
 - Product and service innovation
 - Production systems
 - Operations management
 - The actors and technologies involved in the production and development processes.

Skills:

- Are able to apply selected methodologies and tools provided by the available innovation technologies.
- Are able to analyze and evaluate theoretical and practical issues within manufacturing and operations engineering in a broader socio-economic context.
- Are able to develop and implement services and applications using innovation technology related skills.
- Are able to develop new and improve existing innovation technologies.
- Are able to explain the reasons for and choose relevant solution models for technology improvement and for technology applications.
- Are able to communicate academic, technical and related business issues and solution models to peers and non-specialists or collaboration partners and users from an interdisciplinary perspective.

Competencies:

- Are able to handle complex and development-oriented situations in study or work contexts.
- Are able to solve problems using mathematical and technological tools.
- Are able to combine technological, economic and social/policy perspectives to analyze and contribute to the operation and development of innovative production and service systems.
- Are able to independently participate in discipline-specific and interdisciplinary cooperation with a professional approach.
- Are able to identify their own learning needs and organize their own learning in different learning environments.
- Are able to oversee the entire process from the innovation to the production and service in terms of innovation technologies and production systems.
- Are able to communicate with end-users, both non-professional and professional users such as designers and engineers
- Are able to identify how to employ innovation technologies to facilitate, improve and integrate product, service and production development processes.

§ 17: STRUCTURE AND CONTENTS OF THE PROGRAMME

Innovation technologies facilitate and support the innovation process of new products, services and processes as well as their production and manufacturing.

Innovation technology allows organizations to simulate and virtualize products, services and production, support their development, allows rapid prototyping and reduces the time from the design and development phase to the actual manufacturing. Virtualization, rapid prototyping and social media offer early end-user involvement which increases the idea potential and reduces uncertainty in the innovation process, and virtualized products, crowd-sourcing and data-mining effectively reduce the time to market.

The overall aim of the programme is to educate and equip bachelor engineers with innovation technology and understanding of state-of-art production technology and systems. The students will become a technology facilitators and developers as well as users. This is done by providing the students with a solid understanding of a) innovation technologies and b) production technology and systems within manufacturing, and the increased layer of servitization associated with the physical product. The education supports a broad definition of service (a non-physical product) that includes both public and private service processes and that includes the material side of service such as information storage, computer infrastructure, machine intelligence and e-commerce..

In addition to the technological aspects, this bachelor education will equip the students with the skills and competences to a) oversee the entire process from the innovation to the production and service in terms of innovation technologies and production systems, b) communicate with end-users, both non-professional and professional users such as designers and engineers and c) to identify how to employ innovation technologies to facilitate, improve and integrate product, service and production development processes. The programme strives to give the students a comprehensive

understanding of the important connection between a) business models, b) products and services, c) product and service innovation, d) productions systems, e) operations management and f) the actors and technologies involved in the productions and development processes.

The programme is structured in modules and organized as a problem-based study. A module is a programme element or a group of programme elements, which aims 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. The examinations are defined in the curriculum.

The programme suggests two tracks: **Track A** focuses on production and production technology, and provides the necessary background knowledge on services. **Track B** focuses on production and services, and provides the necessary background knowledge on production technology. However, the student is free to choose courses from either track.

All projects are to be conducted in English. The study board may, in some cases, exempt from this.

The programme is based on a combination of academic, problem-oriented and interdisciplinary approaches and organized based on the following work and evaluation methods that combine skills and reflection:

- lectures
- classroom instruction
- project work
- workshops
- exercises (individually and in groups)
- project work, simulation and exercises in labs
- teacher feedback
- reflection
- portfolio work

The BSc education in manufacturing and operations engineering is taught in English. All activities, including the above stated, are carried out in English. All exercise work and deliverables, project-work (as well as any documentation in connection to these) delivered by the student must be written in English and all exams are carried out in English. In accordance with the current Joint programme regulations, The Study Board for Industry and Global Business Development may choose to exempt from this rule in extraordinary cases, which in principle requires a well-documented application from the student and/or teacher.

§ 18: OVERVIEW OF THE PROGRAMME

All modules are assessed through individual grading according to the 7-point scale or Pass/Fail. All modules are assessed by external examination (external grading) or internal examination (internal grading or assessment by the supervisor only). Unless stated otherwise, the modules are used for both tracks.

Offered as:					
Module name	Course type	ECT S	Applied grading scale	Evaluation method	Assessment method
1 SEMESTER					
Commencement of Studies Exam		0	Approved/Disapproved	Internal examination	Written
Project in Classic Production and Service Technologies	Project	5	Passed/Not Passed	Internal examination	Oral exam based on a project
Project in From the Classic to Modern Production and Service	Project	10	7-point grading scale	Internal examination	Oral exam based on a project
Fundamentals of Operations Management and Process Modelling and Control	Project	5	7-point grading scale	Internal examination	Written or oral exam

Problem-based Learning in Science, Technology and Society	Course	5	Passed/Not Passed	Internal examination	Written exam
Linear Algebra	Course	5	7-point grading scale	Internal examination	Written exam
2 SEMESTER					
Project in Product and Service Development	Project	15	7-point grading scale	External examination	Oral exam based on a project
Innovation Technology: Product Development & Product Service Design	Course	5	7-point grading scale	Internal examination	Written or oral exam
Introduction to Probability Theory and Statistics	Course	5	7-point grading scale	Internal examination	Written or oral exam
Materials and Manufacturing Processes	Course	5	7-point grading scale	Internal examination	Written or oral exam
3 SEMESTER Elective Track A					
Project in Product, Processes and Automation	Project	15	7-point grading scale	Internal examination	Oral exam based on a project
New Materials and Processes	Course	5	7-point grading scale	Internal examination	Written or oral exam
Manufacturing Processes, Automation and Robots	Course	5	7-point grading scale	Internal examination	Written or oral exam
Digital Manufacturing Technology	Course	5	7-point grading scale	Internal examination	Written or oral exam
3 SEMESTER Elective Track B					
Project in Product, Processes and Automation	Project	15	7-point grading scale	Internal examination	Oral exam based on a project
Job Design	Course	5	7-point grading scale	Internal examination	Written or oral exam
Manufacturing Processes, Automation and Robots	Course	5	7-point grading scale	Internal examination	Written or oral exam
Digital Manufacturing and Service	Course	5	7-point grading scale	Internal examination	Written or oral exam
4 SEMESTER Elective Track A					
Project in Intelligent Manufacturing and Service Design	Project	15	7-point grading scale	External examination	Oral exam based on a project
Calculus	Course	5	7-point grading scale	Internal examination	Written or oral exam
Industrial Vision, Sensors and Quality Control	Course	5	7-point grading scale	Internal examination	Written or oral exam
Intelligent Manufacturing	Course	5	7-point grading scale	Internal examination	Written or oral exam
4 SEMESTER Elective Track B					
Project in Intelligent Manufacturing and Service Design	Project	15	7-point grading scale	External examination	Oral exam based on a project

Calculus	Course	5	7-point grading scale	Internal examination	Written or oral exam
Engineering Design and Quality Control	Course	5	7-point grading scale	Internal examination	Written or oral exam
Intelligent Production and Service Design	Course	5	7-point grading scale	Internal examination	Written or oral exam
5 SEMESTER					
Project in Operations and Service Management	Project	15	7-point grading scale	External examination	Oral exam based on a project
Introduction to Production and Service Economics	Course	5	7-point grading scale	Internal examination	Written or oral exam
Systems Thinking and Process Improvement	Course	5	7-point grading scale	Internal examination	Written or oral exam
Operations Planning and Control	Course	5	7-point grading scale	Internal examination	Written or oral exam
6 SEMESTER					
BSc Project	Project	20	7-point grading scale	External examination	Oral exam based on a project
Global Supply Chain Management	Course	5	7-point grading scale	Internal examination	Written or oral exam
Selected Topics in Intelligent Manufacturing	Course	5	7-point grading scale	Internal examination	Written or oral exam
Advanced Manufacturing and Service Information Systems	Course	5	7-point grading scale	Internal examination	Written or oral exam

On 3rd and 4th Semester, respectively, students must choose 2 out of 4 elective courses. On the 3rd Semester the students must choose one and only one of the two courses Digital Manufacturing Technology and Digital Manufacturing and Service. On the 6th Semester students must choose 2 out of the 3 listed courses.

In the modules listed above Theory and Science and Methods Related to the Profession is included the course modules Problem Based Learning in Science, Technology and Society and in the project modules at 1., 2., 3., 4., and 6. Semester.

The Board of Studies of Industry and Global Business Development may decide that a course module's academic content in a Semester is taught in the project module, which is increased in ECTS accordingly. The decision can be justified in terms of capacity or economy of the current Semester.

§ 19: ADDITIONAL INFORMATION

The current version of the curriculum is published on the study board's website, including more detailed information about the programme, including exams.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the Dean of The Faculty of Engineering and Science and enters into force as of September 2017.

Students who wish to complete their studies under the former study regulations from 2016 must conclude their education by the summer examination period 2019 at the latest, since examinations under the former study regulations are not offered after this time.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

Minor editorial changes have been made in connection with digitisation of the study curriculum.