AALBORG UNIVERSITET

CURRICULUM FOR THE BACHELOR OF SCIENCE PROGRAMME IN APPLIED INDUSTRIAL ELECTRONICS, 2025

BACHELOR OF SCIENCE (BSC) IN ENGINEERING
ESBJERG

Link to this studyline

Link(s) to other versions of the same line:

Curriculum for the Bachelor of Science (BSc) in Applied Industrial Electronics 2021
Curriculum for the bachelor's programme in Applied Industrial Electronics, 2022
Curriculum for the Bachelor of Science Programme in Applied Industrial Electronics, 2023
Curriculum for the Bachelor of Science Programme in Applied Industrial Electronics, 2024
Curriculum for the Bachelor of Science (BSc) in Applied Industrial Electronics 2020

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§ 1: PREFACE

Pursuant to consolidation Act 391 of April 10, 2024 on Universities (the University Act), the following is established.

The programme also follows the Examination Policies and Procedures incl. the Joint Programme Regulations for Aalborg University.

§ 2: BASIS IN MINISTERIAL ORDERS

The Bachelor's programme is organised in accordance with the Ministry of Higher Education and Science's Order no. 2285 of December 1, 2021 on Full-time University Programmes (the University Programme Order) with subsequent change and Ministerial Order no. 2271 of December 1, 2021 on University Examinations (the Examination Order) with subsequent change. Further reference is made to Ministerial Order no. 69 of January 26, 2023 (the Admission Order) and Ministerial Order no. 1125 of July 4, 2022 (the Grading Scale Order).

§ 3: CAMPUS

The programme is offered in Esbjerg.

§ 4: FACULTY AFFILIATION

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

§ 5: STUDY BOARD AFFILIATION

The Bachelor's programme falls under the Study Board of Build, Energy, Electronics and Mechanics in Esbjerg.

§ 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

The Bachelor's programme is associated with the external examiners corps on Civil engineering corps of external examiners.

§ 7: ADMISSION REQUIREMENTS

Admission requires an upper secondary education.

According to the Admission Order, the programme's specific entry requirements are:

- English B
- Mathematics A with a minimum grade of 4.0 in average
- Physics B or Geoscience A

Please note that A, B and C refer to the course level - not grades.

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Bachelor's programme entitles the graduate to the designation:

- Bachelor (BSc) i teknisk videnskab (Anvendt Industriel Elektronik med specialisering i Industriel Elektronik). The English designation is: Bachelor of Science (BSc) in Engineering (Applied Industrial Electronics with specialisation in Industrial Electronics).
- Bachelor (BSc) i teknisk videnskab (Anvendt Industriel Elektronik med specialisering i IT og Cyber Systemer). The English designation is: Bachelor of Science (BSc) in Engineering (Applied Industrial Electronics with specialisation in IT and Cyber Systems).

§ 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 that passed programme elements from other educational programmes at the same level replaces programme elements within this programme (credit transfer).

Furthermore, the Study Board can, upon application, approve that parts of this programme is completed at another university or a further education institution in Denmark or abroad (pre-approval of credit transfer).

The Study Board's decisions regarding credit transfer are based on an academic assessment.

§ 11: EXEMPTIONS

The Study Board's possibilities to grant exemption, including exemption to further examination attempts and special examination conditions, are stated in the Examination Policies and Procedures published at this website: https://www.studyservice.aau.dk/rules

§ 12: RULES FOR EXAMINATIONS

The rules for examinations are stated in the Examination Policies and Procedures published at this website: https://www.studyservice.aau.dk/rules

§ 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. If the project is written in English, the summary can be in Danish. 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 in English and use reference works etc. in other European languages.

§ 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

The graduate of the Bachelor's programme has the following qualifications:

Knowledge

- Knowledge about theory, method and practice in central subject areas within industrial electrical applications
- Understanding of and reflection on theory, method and practice of the subject areas within applied industrial electronics

- Fundamental knowledge about project organisation and project management including planning of meetings, problem solving and process control
- Fundamental knowledge about business cases, understanding business processes, entrepreneurship and innovation methods
- Knowledge about digitalization within applied industrial electronics
- Knowledge about digital learning processes
- Knowledge about and insight into the mathematical foundation in engineering
- Can analyse, design, implement, test and document micro-processor-based systems
- Knowledge about the interaction between electronic and physical systems, including feedback mechanisms, electronic circuits, automation and control systems, and data structures and algorithms
- Insight into analysis, design and test methods for feedback control and digital signal processing systems
- Knowledge about and insight into fundamental control theory, laboratory technology and data acquisition including storage and processing in practice

In addition, students from the different specialisations have the following knowledge

- The specialisation in Industrial Electronics:
  - Power electronics and electrical machines and test and validation techniques
- The specialisation in IT and Cyber Systems:
  - Cyber physical programming and communication, introduction to artificial intelligence and programming paradigms and translators

Skills

- Be able to apply problem based learning in an engineering context
- Be able to use up-to-date methods and tools to solve problems within applied industrial electronics and also to apply these skills when employed
- Be able to evaluate theoretical and practical industrial electronic problems and also to give reasons for their choice and select a relevant solution based on set up mathematical, simulation and/or analysis models
- Be able to manage a project process towards the project goals based on an iterative and reflecting process towards the project solution
- Be able to communicate academic problems and solutions to both peers and non-specialists or collaborative partners and users
- Be able to operate and control units in the applied industrial electronic area
- Be able to make scientific analysis and simulations in different suitable tools based on results achieved from models or practical measurements on industrial electronic systems

In addition, students from the different specialisations have the following skills

- The specialisation in Industrial Electronics:
  - Be able to set up laboratory test set ups within power electronics and electrical machines
  - Be able to model and simulate systems and apparatus containing power electronics and electrical machines
- The specialisation in IT and Cyber Systems:
  - Be able to build and configure laboratory test set ups containing cyber physical systems programmed to communicate and perform automatisation tasks,
  - Be able to apply artificial intelligence methods and programming paradigms in industrial systems

Competences

- Be able to handle complex and development-oriented situations in a study or work context
- Be able to participate in an effective team based on personal cooperation competences including ability to actively listen and be able to provide constructive feedback and motivate in the cooperation
- Be able to identify own learning needs and structure own learning in different learning environments including also e-learning
- Be able to work with different project types including discipline oriented, multi- (with more groups in a larger joint project, where each group take care of a sub part) and interdisciplinary projects
- Be able to transfer academic knowledge and skills to problem solving in practice
- Have gained the ability to make an overall assessment and make critical reflection on problems

In addition, students from the different specialisations have the following competences

- The specialisation in Industrial Electronics:
  - Be able to be part of discipline-specific and interdisciplinary cooperation with a professional approach within systems and apparatus containing power electronics and electrical machines
- The specialisation in IT and Cyber Systems:
  - Be able to be part of discipline-specific and interdisciplinary cooperation with a professional approach within the area of cyber physical systems implementation and programming, and the use of artificial intelligence and programming paradigms in industrial systems

At the end of the Bachelor's programme in Applied Industrial Electronics the graduate has achieved professional competences in planning and operation of industrial electrical systems. The achieved skills enable the graduate to perform design, development, consultancy and research in Danish and international companies or public institutions. Examples could be energy supply companies, wind energy, machine or process industry and electro-technical companies and consultants.

§ 17: STRUCTURE AND CONTENTS OF THE PROGRAMME

The Bachelor's programme is structured in modules and organised 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. Examinations are defined in the curriculum.

Types of instruction

The Bachelor's programme is based on a combination of academic, problem oriented and interdisciplinary approaches and organised based on the following types of instruction that combine skills and reflection:

- Lectures
- Class teaching
- Project work
- Workshops
- Exercises (individually and in groups)
- Digital learning in different ways including flipped class room, blended learning, game or quiz
- Supervisor feedback
- Professional reflection
- Portfolio work
- Laboratory work

Rules concerning the Progress of the Bachelor's Programme

The student must participate in all first year examinations by the end of the first year of study in the Bachelor's programme, in order to be able to continue the programme. The first year of study must be passed by the end of the second year of study, in order that the student can continue his/her Bachelor's programme.

In special cases, however, the Study Board may grant exemption from the above.

AAU micro modules

During the study programme, a number of AAU micro modules are offered.

AAU micro modules are small voluntary learning modules within a defined subject. AAU micro modules can be used as supporting learning modules in connection with projects as well as other modules of the study programme.

§ 18: OVERVIEW OF THE PROGRAMME

All modules are assessed through individual grading according to the 7-point grading scale or Passed/Not passed. All modules are assessed by external assessment (an external examiner) or by internal assessment (an additional examiner or no additional examiner).

Programme modules of the first four semesters

Joint study programme for all students at Applied Industrial Electronics of 1st – 4th semesters. From 5th semester the student chooses one of two specialisations: Industrial Electronics or IT and Cyber Systems.

Offered as: 1-professional Study programme: Industrial Electronics / IT and Cyber Systems						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Basic Electronic Systems (25E-AIE1-1)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Calculus (MATCAL1345GB)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Energy Systems and Electro Physics (25E-EN1-1)	Course	5	Passed/Not Passed	Internal examination	Oral exam	English
Problem Based Learning (TECENGPBLE20)	Course	5	Passed/Not Passed	Internal examination	Written exam	English
2 SEMESTER						
Programming of Microprocessor Based Systems (25E-AIE2-1)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Introduction to Electrical Engineering (25E-EN2-1)	Course	5	7-point grading scale	Internal examination	Written exam	English
Linear Algebra (MATLIA1234GB)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Real-Time Systems and Graphical Programming Languages (25E-EN4-2)	Course	5	Passed/Not Passed	Internal examination	Oral exam based on a project	English
3 SEMESTER						
Instrumentation (25E-AIE3-1)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
AC Circuit Theory (25E-EN3-1)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Applied Engineering Mathematics (24ETMATDELE2)	Course	5	7-point grading scale	Internal examination	Written exam	English
Data Structures and Algorithms (25E-AIE3-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
4 SEMESTER						
Control Systems (25E-AIE4-1)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Fundamental Control Theory (25E-EN4-1)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Modelling and Signal Processing (25E-AIE4-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Power Electronics (25E-EN6-4)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Offered as: 1-professional Specialisation: Industrial Electronics						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
5 SEMESTER						
Automation including Power Electronics (25E-AIE5-1)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Electrical Machines (25E-EN5-3)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Modern Digital Control (25E-EN5-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Numerical Methods (M-MP-B5-3C)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
6 SEMESTER						
Bachelor Project: Modelling and Control of Industrial Electronic Applications (25E-AIE6-1)	Project	15	7-point grading scale	External examination	Master's thesis/final project	English
Introduction to Artificial Intelligence (25E-AIE6-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Modelling and Control of Robot Manipulator (25E-AIE6-3)	Course	5	7-point grading scale	External examination	Written or oral exam	English
Test and Validation including System Set-up and Understanding (25E-AIE6-4)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Offered as: 1-professional Specialisation: IT and Cyber Systems						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
5 SEMESTER						
Cyber-Physical Systems (25E-AIE5-2)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Cyber Physical Systems Design and Programming (25E-AIE5-3)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Modern Digital Control (25E-EN5-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Numerical Methods (M-MP-B5-3C)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
6 SEMESTER						
Bachelor Project: Autonomous Robotic Systems and Languages (25E-AIE6-5)	Project	15	7-point grading scale	External examination	Master's thesis/final project	English
Introduction to Artificial Intelligence (25E-AIE6-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Modelling and Control of Robot Manipulator (25E-AIE6-3)	Course	5	7-point grading scale	External examination	Written or oral exam	English
Programming Paradigms and Translators (25E-AIE6-6)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Theory of science and scientific methods are included in the project modules (15 ECTS credits) as the project work is based on Problem Based Learning as a scientific method. Besides Problem Based Learning other scientific tools are taught in the course *Problem Based Learning*.

Commencement of Studies Exam (Studiestartsprøve)

Size:
The commencement of studies exam does not yield ECTS credits and will not appear on the diploma

The purpose of the commencement of studies exam is to ascertain whether students have actually commenced their studies. The students must participate in and pass the commencement of studies exam in order to continue on their studies. If the students do not participate in or pass the commencement of studies exam or re-exam, the students' enrollment at their studies will be terminated immediately after the re-exam.

The commencement of studies exam will be held within the first weeks of the semester.

Contents:
The commencement of studies exam is based on the instruction course and contains for instance general questions about the students' expectations and motivation for their choice of studies.

Re-exam:
There will be only one commencement of studies re-exam. If the students do not participate in or do not pass the commencement of studies exam or re-exam, the students' studies will be terminated before 1 October. The Study Board can grant exemption from the rules regarding the commencement of studies exam if there are unusual circumstances.

Examination format:
Written exam

Assessment:
Internal assessment. The students receive the assessment "Approved" or "Not approved" based on their answers to the written exam. The students receive the assessment "Approved" when the written exam is answered and handed in.

Appeal:
The students can complain about the commencement of studies exam to the University. The complaint must be submitted to the University at sl-klager@adm.aau.dk within two weeks from the result of the commencement of studies exam is announced. If the University rejects the complaint, the decision may be appealed to the Danish Agency of Science and Higher Education, if the appeal concerns legal issues.

§ 19: ADDITIONAL INFORMATION

When writing a project report the following extent and format must be adhered to:

Maximum number of pages

The allowed maximum number of pages for a report is determined by semester and number of students in the project group, and is calculated using the following formula:

Max number of pages = fixed value + factor x ECTS x number of students

'ECTS' refers to the number of ECTS for the project module.

'Fixed value' is:

- 5 pages for mini projects

- 20 pages for 1st – 5th semester Bachelor studies
- 30 pages for Bachelor of Engineering internship report, Bachelor of Engineering project, and Bachelor of Science and case-based project report (traineeship)
- 30 pages for 1st – 4th semester Master of Science studies

'Factor' is:

- 0.8 for mini projects
- 1.0 for semester projects
- 1.2 for long Master of Science theses
- 1.5 for Bachelor of Science, Bachelor of Engineering, and Master of Science theses
- 1.5 for Bachelor of Engineering internship report and case-based project report (traineeship)

An example of calculating the maximum number of pages for a Bachelor of Science thesis by 4 students: 30 + 1.5 x 15 x 4 = 120 pages.

The number of pages is counted from the first content page, incl. appendix. Appendices are a compilation of material which is relevant for the project, but not part of the main focus and therefore does not belong inside the report; e.g. detailed description of test setups, additional experimental or model results, theoretical derivations, etc. Front page, title page, summary, table of contents, list of table and figures, nomenclature, and references, are not included in the page count. Enclosures are not included in the page count either. An enclosure is technical documentation which does not include significant portions of text composed by the students. It can be data sheets from instruments, print out of program code, diagrams, additional tables or figures compiling data without accompanying text, copy of communication with external contact etc. Additionally, blank pages prior to the beginning of a new chapter are not counted.

The character size should be minimum 11 pt.

Current version of study curriculum

The current version of the study curriculum is published on the Aalborg University website for study curricula.

Semester descriptions

Additional information about semester descriptions is available in Moodle. Moodle provides study-related information, i.e. course descriptions, course literature, timetables and information about activities and events.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the dean and enters into force as of September 1, 2025.

The Study Board does not offer teaching after the previous curriculum from 2024 after the summer examination 2027.

The Study Board will offer examinations after the previous curriculum, if there are students who have used examination attempts in a module without passing. The number of examination attempts follows the rules in the Examination Order.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS