



Curriculum Part 2018

National Part
IT Network and Electronics Technology

IT-teknolog

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This national part of the curriculum for IT Technology has been released in accordance with §18, section 1 in the Ministerial Order for technical and commercial Academy Profession Programmes and Professional Bachelor Programmes. This curriculum is supplemented with an institutional part of the curriculum, which is provided by the individual institution that offers the programme.

It has been prepared by the Educational Committee for IT Technology and approved by the Board of Directors (or the Rectors) after consultation with Business Academy Aarhus' educational network and the chairmanship of IT Technology external examiners.

1. The programme's goals for learning outcomes

Knowledge

The graduate has knowledge about:

- communication and interface technique in general and specifically what is used in embedded and network-based solutions
- programming in both embedded and network-based solutions and the use of algorithms and design patterns to ensure effective interaction between hardware, network and software
- innovative problem-solving methods, project management of technical projects as well as general information about companies and their structure.
- customer needs, quality and resource management as well as advisory and consultative functions for technical problem solutions
- technologies in a broad sense, and especially concerning network, server, components and electronics
- security in the network as well as data management in order to understand how secure integrated solutions are designed
- basic parts of the technologies, including operating systems, protocols, signal handling and the use of components
- sustainability in IT solutions and how this can be included in IT-based solutions.

Skills

The graduate is able to:

- evaluate technical solutions based on the needs of the company and the customer's needs
- communicate and document tasks and solutions
- use tools and equipment related to the design, development and testing of both hardware and software
- communicate in writing and orally concerning network technology and embedded systems
- apply innovative approaches focusing on customer needs, in order to ensure effective solutions involving hardware, network and software
- use the technology and tools for the design, implementation, testing and quality assurance of secure and sustainable solutions.

Competencies

The graduate is able to:

- manage the interaction between hardware, software and a network in integrated solutions
- independently handle planning and quality management of their own technical tasks
- participate in real-life development processes for academic and interdisciplinary collaboration
- handle customer tasks in order to convert customer needs into reliable solutions
- in a structured context, acquire knowledge, skills and new competencies by understanding companies and customers' use of IT
- handle analysis, needs identification, design, implementation and testing of secure and sustainable solutions for network-based and integrated technologies.

2. The programme includes 4 national subject elements

2.1. Network technology

Content

This national subject element consists of network and server technologies, operating systems, network security and communication including protocols and services. The subject element also contains design and the use of networks and network-based/cloud solutions. Generally, work is done with design, development, testing and documentation as well as the dissemination of secure and sustainable solutions.

Learning objectives for Network technology

Knowledge

The student will gain knowledge and understanding about:

- network and server technologies overall, and the difference between physical and virtual technologies
- operating systems as well as the difference between different systems
- data management, including security
- network security, including different products
- communication protocols and their use for different architecture.

Skills

The student will get the skills to:

- apply network technology and hardware in connection with design, planning and implementation of complex, secure and sustainable network solutions
- apply network technological knowledge in connection with administration, operation and monitoring of complex network solutions
- communicate and document tasks and solutions within networks
- use tools and equipment related to the design, development and testing of solutions
- evaluate network security in concrete products.

Competencies

The student will learn to:

- manage analysis, needs identification, design, development and testing of secure network solutions
- manage planning and quality management of own network and server technology-related tasks
- acquire new knowledge, skills and competencies within network and server technologies
- participate in practice-orientated development processes in teams

ECTS weight

The subject element Network technology is weighted 18 ECTS credits.

2.2. Embedded systems

Content

This national subject element contains signal handling, competent technology, communication, Internet of Things-techniques, protocols, interfacing, selection and application of embedded systems as well as components for integrated solutions. The subject element generally works with design, development, testing and documentation as well as the dissemination of secure and sustainable solutions.

Learning objectives for embedded systems

Knowledge

The student will gain knowledge and understanding about:

- communication and interface technique in general, as well as how they are used in selected solutions
- an overview of electronic modules, as well as how selected modules are built up
- protocols including communication protocols, their structure as well as what differences and uses there are
- Internet of Things-techniques, construction generally and selected solutions in more details
- applied technical mathematics within the subject area to understand electronics and/or communication
- operating systems, their distinctive features and use
- a general understanding of signal management as well an understanding of how it is used and included in solutions.

Skills

The student will get the skills to:

- evaluate, select, adapt and use embedded systems and components in secure and sustainable solutions
- build and use test systems
- document and disseminate tasks and solutions with the use of embedded components and systems.

Competencies

The student will learn to:

- manage analysis, needs identification, design, development and testing of secure embedded and sustainable solutions
- manage the analysis, diagnostics, testing and servicing of the technology involved in working with electronic systems, taking into account financial, environmental and quality requirements
- acquire new knowledge, skills and competencies within the subject area
- participate in practice-orientated development processes in teams

ECTS weight

The subject element Embedded systems is weighted 18 ECTS credits.

2.3. Programming

Content

The subject area consists of the basic elements of programming, use of environments and data handling as well as design, development, testing and documentation of solutions.

Learning objectives for Programming

Knowledge

The student will gain knowledge and understanding about:

- programming techniques in different types of language
- overall algorithms and design patterns and in connection with their selected programming language.

Skills

The student will get the skills to:

- use tools and equipment related to the design, development and testing of programmes
- document, disseminate and support programming-related solutions in connection with internal and customer-facing relationships
- evaluate and select simple algorithms for solving specific problems.

Competencies

The student will learn to:

- acquire new knowledge, skills and competencies within programming
- participate in practice-orientated development processes in teams
- manage the design, development and testing of larger solutions in multidisciplinary cooperation.

ECTS weight

The subject element Programming is weighted 14 ECTS credits.

2.4. Project management and business skills

Content

This subject element includes innovation, project management, economy, quality and resource management, advisory and consultative functions, as well as documentation and dissemination.

Learning objectives for project management and business skills

Knowledge

The student will gain knowledge and understanding about:

- what innovation is, and how to use innovative methods in problem solving
- project management in connection with development projects within IT

- how a company is organised, including the parts that control the company, as well as how one can describe the economic issues overall
- quality and resource management as part of a development project and as part of the management of maintenance of IT operations
- advisory and consultative functions when IT-specialists need to understand and solve the customer's needs.

Skills

The student will get the skills to:

- communicate in writing and orally to both professional people and customers
- apply innovative problem-solving methods, with a focus on customer needs
- evaluate the complexity of a given technical problem.

Competencies

The student will learn to:

- handle customer tasks in order to convert customer needs into reliable solutions
- manage planning and control their own technical tasks as well as engage in interdisciplinary projects
- in a structured context, acquire new knowledge, skills and competencies by understanding companies and customers' use of IT

ECTS weight

The subject element Project management and business understanding is weighted 10 ECTS credits.

2.5. The number of exams in the national subject elements

The national subject elements in the 1st academic year are weighted 60 ECTS and are all part of the exam, which is the first-year exam. The exam has an external co-examiner, and one overall individual mark is given according to the 7-point scale.

In addition, there is an exam in the final exam project with an external co-examiner. For the number of exams in the internship, please refer to section 3.

For a comprehensive overview of all the programme's exams, please refer to the institutional part of the curriculum, as the national subject elements described in this curriculum can be examined together with the subject elements specified in the institutional part of the curriculum.

3. Internship

The internship is organised in a way that, combined with the remaining parts of the course programme, they will contribute to the student developing practical competencies. The internship aims to enable the students to use the programme methods, theories and tools in solving practical tasks in network engineering and/or integrated solutions.

Learning objectives for programme's internship

Knowledge

The student will gain knowledge and understanding about:

- the most important academic methods and technologies used in embedded systems and network solutions in a concrete company situation.

Skills

The student will get the skills to:

- apply versatile technical and analytical methods of work related to employment within the industry
- evaluate practical issues and commission solutions
- organise and plan daily work assignments in the profession
- disseminate practice-orientated issues and reasoned solutions.

Competencies

The student will learn to:

- manage development-orientated practical and professional situations in relation to the profession and especially in relation to the internship company
- acquire new knowledge, skills and competencies in relation to the profession
- participate in disciplinary and interdisciplinary collaboration with a professional approach

ECTS weight

The internship is worth 15 ECTS credits.

Number of exams

The internship is completed with 1 exam.

4. Requirements for the main exam project.

The learning objectives for the main exam project are identical to the programme's learning objectives listed above under point 1.

The main exam project must demonstrate the student's understanding of practices and centrally applied theory and methods in relation to a real-life problem, which is based upon a specific task within the programme's area. The problem statement that must be central to the programme and profession is formulated by the student, possibly in collaboration with a private or public company. The Academy must approve the problem statement.

The project, which constitutes the written part of the exam, must contain something that looks like the following:

- Front page with title

- Table of contents
- Introduction, including presentation of the problem statement, thesis statement and approaches
- Background, theory, methodology, analysis, including a description of and justification for the choice of any empirical data¹, in connection with the thesis statement
- Conclusion (keep in mind that there must be coherence between the introduction and the conclusion. The two should in principle be able to be understood without reading the background and analysis sections)
- The broader perspective
- Bibliography (including all sources that have been referenced)
- Appendices (only include appendices essential to the report).

The main exam project must, as a minimum, fill 15 standard pages and as a maximum 20 standard pages. For each additional student that participates in the main exam project, the page number must be increased by a minimum of 10 standard pages and a maximum of 20 standard pages.

Group size	Minimum	Minimum
1 student	15 pages	20 pages
2 students	25 pages	40 pages
3 students	35 pages	60 pages

The front page, table of contents, bibliography and appendices do not count in the required number of pages. Appendices will not be assessed.

One standard page is 2,400 characters, which includes spaces and footnotes. This does not include front page, table of contents, bibliography and appendices. Appendices will not be assessed.

Exams for the main exam project

The main exam project completes the programme in the last semester once all the preceding exams have been passed.

ECTS weight

The main exam project is weighted 15 ECTS credits.

¹Empirical data is material which is the subject of the report and which can be referenced (observations, data, statements, texts, sources)'. Translated from:

Rienecker L. & Jørgensen P.S. 2005 Den gode opgave – opgaveskrivning på videregående uddannelser. 3rd Edition Frederiksberg: Samfundslitteratur.

Examination form

The exam is an oral and written examination with an external co-examiner; a combined mark is given based on the 7-point scale for the written project and the oral presentation.

5. Rules on credit

Passed programme elements are equivalent to similar programme elements taken at other educational institutions offering this programme.

The students are obliged to inform us of any completed educational elements from another Danish or foreign higher education programme or any jobs that are likely to provide credit.

The Academy approves, in each instance, credit on the basis of completed programme elements and any jobs which meet the objectives of the subjects, the educational part and the internship parts.

The decision is taken according to an academic assessment.

For prior credit approval of studies in Denmark or abroad, students are required to document each approved and completed programme element on the completion of these studies.

In connection with applying for prior credit approval, the students give permission that the institution can obtain the necessary information after the student's completion.

On approval according to the above, the programme element is deemed to be passed if it was passed according to the rules of the programme in question.

6. Commencement

This part of the national curriculum is valid from 15.02.2018 and is valid for students who are enrolled after 01.01.2018