

Revised 18/03/19



Curriculum for AP in Computer Science



Effective from 1st of August 2019

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The national part of the curriculum for the Academy Profession degree programmes in Computer Science (AP in Computer Science) has been issued pursuant to section 18(1) of the Executive Order on Admission to Technical and Vocational Academy Profession and Professional Bachelor Degree Programmes. This curriculum is supplemented by the institution specific part of the curriculum as laid down by the institution offering the degree programme.

The curriculum has been developed by the educational network for the Academy Profession degree programmes in Computer Science (AP in Computer Science) and has been approved by the boards – or the directors by authorisation – of the institutions offering the programme and in consultation with the education committees of the institutions and the chairmanship for external examiners of the programme.

1. The objectives of the programme in relation to learning achieved

Knowledge

The graduate has:

- development based knowledge about applied practice, theory and method in relation to software development and of relevance to the profession
- understanding of fundamental company operations in relation to software development
- understanding of the technological concepts and the technological platform of computer systems in relation to programming, error tracing and commissioning.

Skills

The graduate is be able to:

- apply key approaches and tools characteristic of this discipline to methodically identify requirements to IT systems, comprising assessment of whether the requirements are feasible within the set framework
- apply up-to-date programming techniques and tools for software building, including ensure the quality of the developed product, as is relevant for the profession
- present the work carried out and communicate problems and solutions with a practical bias in a form that renders the documentation useful for partners and users
- apply relevant knowledge in connection with systems development, programming and commissioning
- apply the skills associated with professional practice to systematically perform error tracing and error repairs in connection with IT systems
- assess practice-related problems in relation to computer systems and select solution options.

Competencies

The graduate is be able to:

- manage a process for development of a system applying up-to-date methods, techniques and tools
- participate in a technical and multidisciplinary collaborative effort and project work developing software with a professional approach and participate in the development of the practical aspects of software development
- in a structured context acquire new knowledge, skills and competencies in relation to the IT industry, including domain knowledge and technological knowledge and application of new methods, techniques and tools.

2. The programme comprises the following seven national programme elements:

The programme comprises the following seven national programme elements with a total weight of 90 ECTS credits.

2.1 Programming

Contents

This programme element is dedicated to design and programming of IT systems. The course will focus on high-quality IT systems programming in a tier architecture with user interface, functionality and database. The solutions will be built employing tools and technique employed by the profession with an emphasis of good programming design and development of systems of a high standard.

Learning objectives for Programming

Knowledge

The graduate has:

- development based knowledge about the specification of abstract data types and program quality criteria
- understanding of abstraction mechanisms in modern programming languages

Skills

The graduate will be able to:

- apply key methods to specify and create algorithms and assess the qualitative and quantitative properties of algorithms and data structures
- use key facilities in the programming language to realise algorithms, design patterns, abstract data types, data structures, design models and user interfaces
- use an integrated development tool extensively used by the profession, including a version control system and key software components/libraries, to design and build applications with a practical bias based on a tier architecture
- apply key methods and technologies to realise models in a database system and build programs that use a database interface
- apply key methods and technologies to design and build programs in the form of interrelated processes/threads
- apply key technologies and tools to perform tests and quality controls and to produce documentation in accordance with current professional standards.

Competencies

The graduate can:

-
- manage development focused situations in the context of programming
 - be part of development and maintenance projects as a professional programmer
 - acquire new knowledge, skills and competencies in a structured context of relevance to programming languages, development tools, programming techniques and program design.

ECTS credits

The Programming course totals 30 ECTS credits.

2.2 Systems Development

Contents

This programme element is dedicated to standard techniques and methods used for analysis of a problem and design of a system. The course employs widely used diagramming techniques and tools for modelling of the functionality and contents of database dependent systems. The course will focus on developing user-friendly, flexible and easily understandable basic system with simple user interfaces. The course also comprises techniques used for planning and implementation of quality assurance, such as review and testing.

Learning objectives for Systems Development

Knowledge

The graduate has:

- development based knowledge about the importance of quality criteria for the systems development process and the final system design
- understanding of the importance of experimenting as part of or as supplement to the systems development method

Skills

The graduate can:

- apply key techniques and tools specific for this discipline for modelling of IT systems at the level of analysis and design
- apply the techniques and tools of the profession to plan and perform tests and quality control
- apply principles and techniques of relevance to the profession to design user interfaces
- assess quality criteria and select and use an appropriate software architecture
- assess problems with a practical bias drawing on users and use appropriate patterns for the modelling process
- communicate the process and product resulting from the systems development process to relevant stakeholder, including ensuring traceability.

Competencies

The graduate can:

- manage development focused situations using systems development methods and relevant techniques
- participate in a competent manner in technical and multidisciplinary systems development projects.

ECTS credits

The Systems Development course totals 15 ECTS credits.

2.3 Technology

Contents

This programme element is dedicated to the technological aspects and problems of systems development and programming of IT systems. The course will focus on database systems and operative systems.

Knowledge

The graduate has:

- development based knowledge about up-to-date operative systems and database systems, including their structure and facilities
- understanding of the theory and practice of concurrency problems

Skills

The graduate can:

- apply key methods and tools to synchronise processes and threads
- apply key facilities in database systems and operative systems in an appropriate manner

Competencies

The graduate can:

- acquire new knowledge about and skills in relation to new operative systems and database systems in a structured context

ECTS credits

The Technology course totals 5 ECTS credits.

2.4 Understanding Business

Contents

This programme element is dedicated to business understanding in general and creating value in a business. The course addresses the relationship between commerce and information technology. The course focuses on how a systems development organisation addresses the aspects of development, improvement and integration of information systems and information technology.

Learning objectives for Understanding Business

Knowledge

The graduate has:

- development knowledge about how information systems and information technology can improve business processes and develop the business
- development knowledge about IT implementation and change management
- understanding of strategic problems in relation to IT investments and IT security
- understanding of the human interaction in a company

Skills

The graduate can:

- apply innovative methods focused on project work in practice-related development projects
- apply key methods to communicate internally and externally
- assess business processes with a practical bias based on key analysis methods

Competencies

The graduate can:

- manage the relationship between the design of business processes and the design of IT systems
- participate in project work and work with the stakeholders of IT projects with a professional approach
- acquire new knowledge, skills and competencies about new technology in a structured context from a professional perspective

ECTS credits

The Understanding Business course totals 10 ECTS credits.

2.5 Programming 2

Contents

This programme element is dedicated to design, programming and realisation of distributed software systems. The course focuses on frontend and backend programming as well as the underlying communication.

Learning objectives for Programming 2

Knowledge

The graduate has:

- development based knowledge about the integration of heterogeneous components and platforms
- understanding of the theory and practice of distributed programming

Skills

The graduate can:

- apply key techniques to design and build programs with several concurrent users based on collaborative processes in a distributed architecture
- apply design patterns for distributed software architecture to build programs that use up-to-date network technologies
- apply key methods and tools to develop software components and web applications
- assess the qualitative consequences of a proposed solution

Competencies

The graduate can:

- work as a professional programmer in integration projects
- participate actively in major programming projects
- acquire new knowledge, skills and competencies of relevance to programming languages, development tools, programming techniques and program design in a structured context

ECTS credits

The Programming course totals 10 ECTS credits.

2.6 Technology 2

Contents

This course is dedicated to technological problems and aspects within the context of networks, distributed systems and security. The course focuses on the use of the aspects mentioned within systems development, programming and operation.

Learning objectives for Technology 2

Knowledge

The graduate has:

- development based knowledge about practical problems and key applied theory within the context of designing and realising distributed systems
- understanding of basic network concepts.

Skills

The graduate will be able to:

- apply key tools for virtualisation purposes
- apply key application protocols used in practice
- assess problems with a practical bias relating to key security-related concepts and threats
- assess relevant technological aspects when developing distributed systems

Competencies

The graduate can:

- select an infrastructure in connection with the development of distributed systems
- acquire new knowledge about and skills in relation to distributed systems in a structured context

ECTS credits

The Technology course totals 10 ECTS credits.

2.7 Systems Development 2

Contents

This programme element is dedicated to the quality of products and processes. The course looks at how to ensure the proper quality using systems development methods and processes selected for and adapted to the situation. The course works with methods for pre-feasibility studies and agile methods used in the development of various types of systems, including distributed systems.

Learning objectives for Systems Development 2

Knowledge

The graduate has:

- development based knowledge about systems development methods and the importance of processes to the quality of products and processes

Skills

The graduate can:

- apply a chosen systems development method and use it in a systematic manner for a project with a practical bias
- apply key principles for the development of project plans and evaluate and adjust these in an appropriate manner
- assess problems with a practical bias and select a process model and a systems development method that fits the situation
- communicate the systems development process and the resulting product to partners and users.

Competencies

The graduate can:

- adapt systems development methods and processes according to the situation in a specific project with a practical bias
- participate in a competent manner in technical and multidisciplinary systems development projects using adapted methods
- acquire new knowledge about process models and systems development methods in a structured context

The compulsory programme element concludes with an exam.

ECTS credits

The Systems Development course totals 10 ECTS credits.

2.8 Number of exams for the national programme elements

In the first year of studies, the national programme elements total 60 ECTS credits, of which a minimum of 60 ECTS credits are included in the exam for the first year exam.

In addition to this, the other national programme elements comprise one exam and an additional exam in the Final Exam Project. For information about the number of internship exams, see section 3.

For a total list of all exams under the degree programme, please see the institution-specific part of the curriculum, since the students can sit exams in the national programme elements specified in this curriculum together with the programme elements specified for the institutions-specific part of the curriculum.

3. Internship

Learning objectives for the internship

The internship is organised so that it – when combined with the other parts of the degree programme – helps the student develop practical competencies. The objective of the internship is to enable the student to apply the methods, theories and tools taught by the programme and thereby address specific practical assignments within the scope of information technology.

Learning objectives for the internship

Knowledge

The graduate has:

- knowledge about and understanding of the day-to-day operation of the internship company, especially in relation to the tasks carried out during the internship.

Skills

The graduate can:

- apply a variety of the technical and analytical approaches associated with employment within this industry
- assess practice-related problems and propose solutions
- communicate practice-related problems and state reasons for the proposed solution(s).

Competencies

The graduate can:

- manage development-oriented practical and professional situations as encountered in the industry
- structure and plan typical day-to-day tasks of relevance to the profession
- participate in professional and interdisciplinary cooperation with a professional approach.
- acquire new knowledge, skills and competencies relevant to the profession

ECTS credits

The internship totals 15 ECTS credits.

Number of exams

The internship is rounded off with an exam. Further details about the format and organisation of the exam etc. can be found in the institution-specific part of the curriculum.

4. What is required for the Final Exam Project

The learning objectives of the Main Exam Project are identical to the learning objectives of the degree programme (see item 1 above).

The objective of the Main Exam Project is to document the student's understanding of practice and key theories and methods in relation to a practice-related problem based on a specific assignment within the subject matter covered by the programme. The problem to be addressed must be a key issue within the degree programme and the profession and the student must formulate it, if relevant jointly with a private or a public company. The problem is subject to the institution's approval.

What is required for the Final Exam Project

The student must submit a project report, and if applicable a product.

The project report constitutes the written part of this exam. As a minimum this report must comprise:

- Cover page with title
- Table of contents
- Introduction and problem statement
- Methodology
- Analysis
- Proposed solution(s), if applicable
- Conclusion
- References (including all sources referred to in the project)
- Appendices (only appendices of key importance to the report will be accepted)

Project reports written by a single student may total 40 standard pages as a maximum; reports written by several students may total an additional 20 standard pages per student.

Cover page, table of contents, references and appendices are not included in the required number of pages. Appendices are not subject to assessment.

A standard page contains 2,400 characters including spaces and footnotes. Cover page, table of contents, bibliography and appendices are not included. Appendices are not subject to assessment.

Exam in the Final Exam Project

The Final Exam Project completes the last semester of the degree programme after the student has passed all previous exams.

ECTS credits

The Final Exam Project totals 15 ECTS credits.

Form of exam

The exam comprises an oral and a written part with an external examiner. A single grade is given according to the 7-point scale for the written project and the oral performance.

5. Rules about credits

Successfully completed programme elements are equivalent to the same programme elements taught at other educational institutions offering the same degree programme.

The student is obliged to provide information about any programme elements completed at other Danish or foreign institutions of further education and about any past employment that may qualify for credits.

The educational institution approves credits on a case-by-case basis based on successfully completed programme elements and any employment equivalent to courses, programme elements and internship elements.

The decision will be based on an academic assessment.

A student who has obtained advance approval of studies in Denmark or abroad must document successful completion of such studies upon his/her return to this Academy.

In connection with the advance approval, the student must grant the institution the right to collect the necessary information upon completion of the studies abroad.

On acceptance as set out above, the programme element is considered completed, provided it was passed in accordance with the rules for the programme in question.

6. Effective date

This national curriculum takes effect by 1 August 2019. Students admitted after this date will follow this curriculum, also all previously admitted students will be transferred to this curriculum as of 1 August 2019. Students who have commenced exams prior to this date will sit the exams according to the relevant curriculum in force until 1 August 2019.

At the same time, the national part of the curriculum of January 2015 is cancelled.