KØBENHAVNS ERHVERVSAKADEMI

Curriculum for the Academy Profession Degree Programme in Computer Science

2015

Erhvervsakademiuddannelsen (AK)
inden for informationsteknologi (datamatiker)
AP Degree Programme in Computer Science

August 2015

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1 Part 1 – common part

1.1 General remarks

1.1.1 The curriculum

The curriculum for the Academy Profession Degree Programme in Computer Science has been prepared in accordance with the guidelines set out in Ministerial Order no. 641 of 12 June 2014 on the Academy Profession Degree Programme in Computer Science (AP Graduate in Computer Science) (*Bekendtgørelse om erhvervsakademiuddannelse inden for informationsteknologi (datamatiker AK*). Link to the ministerial order (in Danish): https://www.retsinformation.dk/Forms/R0710.aspx?id=163912. The common part of the curriculum has been jointly prepared by the educational institutions offering the programme and applies to all approved programmes.
This curriculum is a translated version of the Danish curriculum. In case of discrepancies, the rules in the Danish curriculum apply.

1.1.2 Programme objective

The objective of the Academy Profession Degree Programme in Computer Science is to provide the students with the qualifications needed to independently analyse, plan and implement solutions related to the development, further development and integration of IT systems in private and public enterprises both nationally and internationally.

1.1.3 Study programme and graduate title

The study programme title is Academy Profession Degree Programme in Computer Science. The Danish programme title is *Erhvervsakademiuddannelsen inden for informationsteknologi.* Having completed the Academy Profession Degree Programme in Computer Science, graduates are entitled to use the title AP Graduate in Computer Science. The Danish title is *datamatiker AK*.

1.1.4 Qualification level

The programme is a level-5 programme in the Danish Qualifications Framework for Lifelong Learning.

1.1.5 Admission

Admission based on upper secondary school exam:
Specific admission requirements: Mathematics B

Admission based on vocational education and training:
Information and communications (with specialisations)
Specific admission requirements: Mathematics B

Admission based on relevant vocational education and training:
Specific admission requirements: Mathematics B

Admission based on other qualifications:
Admission test for the engineering study programmes
Specific admission requirements: Mathematics B

Admission to the study programme is based on the Ministerial Order on Admission to and Enrolment on Academy Profession Programmes and Professional Bachelor Programmes (*Bekendtgørelse om adgang til erhvervsakademiuddannelser og professionsbacheloruddannelser*).

Reference is made to www.retsinfo.dk

1.1.6 Duration

The programme is a full-time programme corresponding to two and a half student full-year equivalents, i.e. 150 ECTS points. One student full-year equivalent corresponds to one year of full time-time study and 60 ECTS points.

The workload expressed in ECTS comprises scheduled teaching and guidance, preparation and written assignments, other class-based activities, study stays and projects in cooperation with selected companies as well as independent study and exams.

1.1.7 Intended learning outcome

The intended learning outcome includes the knowledge, skills and competencies that an AP Graduate in Computer Science must acquire during the programme, see the Programme Order.

1.2 Study programme structure

		First year of study	*Second year of study*	*Third year of study*
Core area	Programming 40 ECTS	30 ECTS	10 ECTS	
	System Development 25 ECTS	15 ECTS	10 ECTS	
	Technology 15 ECTS	5 ECTS	10 ECTS	
	Business (10 ECTS)	10 ECTS		
Elective programme elements			30 ECTS	

Internship				15 ECTS
Final exam project				15 ECTS
ECTS in total	***90 ECTS***	***60 ECTS***	***60 ECTS***	***30 ECTS***

1.2.1 Programme core areas and no. of ECTS

The study programme contains the following core areas

1. Programming (40 ECTS)
2. System Development (25 ECTS)
3. Technology (15 ECTS)
4. Business (10 ECTS)

A total of 90 ECTS

1.2.2 Core area Programming

Contents

The core area is designed to provide the students with the competencies to efficiently and professionally implement IT systems with relevant qualities using modern, up-to-date programming techniques and software construction tools.

No. of ECTS

40 ECTS

Learning objectives

Knowledge

The student has acquired knowledge of

1. specification of abstract data types
2. criteria for program quality
3. abstraction mechanisms in modern programming languages
4. integration between heterogeneous components and platforms.

Skills

The student has acquired the skills needed to

1. specify and construct algorithms
2. use the programming language to implement algorithms, design patterns, abstract data types, data structures, design models and user interfaces
3. assess qualitative and quantitative algorithm and data structure properties
4. use a modern integrated development tool, including a version control system
5. implement models in a database system and construct programs using a database interface
6. design and construct programs as collaborating processes/threads
7. develop applications based on a layered software architecture
8. use software components/libraries
9. prepare documentation in relation to current de-facto standards in the profession

10. apply modern testing and quality assurance techniques and tools
11. use techniques to construct programs that support multiple simultaneous users
12. design and construct programs based on collaborating processes in a distributed architecture
13. construct programs that use up-to-date network technologies
14. use design patterns for distributed software architecture
15. develop software components
16. develop web applications.

Competencies

The student has acquired the competencies needed to

1. engage in development, integration and maintenance projects as a professional programmer
2. acquire new skills in programming languages, development tools, programming techniques and program design.

1.2.3 Core area System Development

Contents

The core area is designed to provide the student with the competencies to participate professionally and efficiently in the development of IT systems with relevant qualities.
Moreover, the core area is intended to enable the student to develop, from initial idea to running system, further develop and integrate IT systems on a systematic basis using situation-specific, modern system development methods and techniques.

No. of ECTS

25 ECTS

Learning objectives

Knowledge

The student has acquired knowledge of

1. the significance of experiments as part of or a supplement to the system development method
2. the significance of quality criteria in relation to the system development process and the final system design.

Skills

The student has acquired the skills needed to

1. model and design IT systems
2. use an appropriate software architecture
3. document and communicate product and process, and ensure traceability
4. quality assure product and process
5. use appropriate design patterns
6. involve users
7. situationally design user interfaces and select a process model and system development method
8. work systematically on a project based on a selected system development method
9. plan, assess and regulate a project
10. select and use appropriate design patterns and components
11. design systems that are integrated with other systems.

Competencies

The student has acquired the competencies needed to

1. participate competently in a development project
2. situationally adapt a system development method to a project
3. participate competently in a development project
4. acquire new process models and system development methods
5. reflect on and adapt processes and methods in practice.

1.2.4 Core area Technology

Contents

The core area is designed to provide the students with the competencies to help select and apply technology in connection with system development and programming of IT systems, and provide the student with basic knowledge of technological aspects.

No. of ECTS

10 ECTS

Learning objectives

Knowledge

The student has acquired knowledge of

1. facilities and construction of up-to-date operating systems
2. facilities and functioning of up-to-date database systems
3. multiple-user issues
4. principles for the design and implementation of distributed systems
5. fundamental network concepts.

Skills

The student has acquired the skills needed to

1. use mechanisms for synchronisation of processes and threads
2. use central security-related concepts and threats
3. use virtualisation
4. use services and programming interface for communication purposes
5. use common application protocols.

Competencies

The student has acquired the competencies needed to

1. obtain knowledge of new operating systems and database systems
2. reflect on the choice of infrastructure in connection with the development of distributed systems.

1.2.5 Core area Business

Contents

The core area is designed to provide the students with the competencies to incorporate relevant business aspects and business understanding in connection with system development. Moreover, the core area is intended to enable the student to work in a system development organisation, and to participate in the development, further development and integration of IT systems for different types of organisations.

No. of ECTS
10 ECTS

Learning objectives
Knowledge
The student has acquired knowledge of

1. ways that IT can improve business processes and develop a business
2. standard systems in the business, including organisational concepts
3. the rationale behind IT investments
4. IT security.

Skills
The student has acquired the skills needed to

1. analyse and model business processes
2. participate in project work
3. apply innovative methods with a focus on project work in practice-oriented development projects
4. communicate internally and externally
5. participate in IT implementation and change management.

Competencies
The student has acquired the competencies needed to

1. participate in and see the connection between business process design and IT system design
2. cooperate with representatives of the user organisation and development organisation based on business understanding
3. acquire knowledge of new technology in a business perspective.

1.3 Compulsory programme elements within the core areas of the programme

The compulsory programme elements comprise

1. Programming, System Development, Technology and Business (60 ECTS)
2. Programming and Technology (20 ECTS)
3. System Development (10 ECTS)

A total of 90 ECTS

All three compulsory programme elements are concluded with an exam.

1.3.1 Compulsory programme element: Programming, System Development, Technology and Business

Contents
The first compulsory programme element is intended to provide the student with the qualifications needed to

- efficiently and professionally implement IT systems with interfaces towards users and databases, and master fundamental elements of the computer science profession
- develop and further develop small database-based systems from idea to running system on a systematic basis using a specific, up-to-date method and related system development tools

- contribute to the selection and application of technology in connection with system development and programming of IT systems, and provide the student with basic knowledge of technological aspects
- incorporate relevant business aspects and business understanding in connection with system development and work in a system development organisation, as well as participate in the development, further development and integration of IT systems for different types of organisations.

No. of ECTS
60 ECTS, including
- 30 ECTS from the core area Programming
- 15 ECTS from the core area System Development
- 5 ECTS from the core area Technology
- 10 ECTS from the core area Business

Learning objectives
Knowledge (Programming)
The student has acquired knowledge of
1. specification of abstract data types
2. criteria for program quality
3. abstraction mechanisms in modern programming languages.

Knowledge (System Development)
The student has acquired knowledge of
1. the significance of experiments as part of or a supplement to the system development method
2. the significance of quality criteria in relation to the system development process and the final system design.

Knowledge (Technology)
The student has acquired knowledge of
1. facilities and construction of up-to-date operating systems
2. facilities and functioning of up-to-date database systems
3. multiple-user issues.

Knowledge (Business)
The student has acquired knowledge of
1. ways that IT can improve business processes and develop a business
2. standard systems in the business, including organisational concepts
3. the rationale behind IT investments
4. IT security.

Skills (Programming)
The student has acquired the skills needed to
1. specify and construct algorithms

2. use the programming language to implement algorithms, design patterns, abstract data types, data structures, design models and user interfaces
3. use a modern integrated development tool, including a version control system
4. implement models in a database system and construct programs using a database interface
5. design and construct programs as collaborating processes/threads
6. develop applications based on a layered software architecture
7. use software components/libraries
8. prepare documentation in relation to current de-facto standards in the profession
9. apply modern testing and quality assurance techniques and tools
10. assess qualitative and quantitative algorithm and data structure properties

Skills (System Development)

The student has acquired the skills needed to

1. model and design IT systems
2. use an appropriate software architecture
3. document and communicate product and process, and ensure traceability
4. quality assure product and process
5. use appropriate design patterns
6. involve users
7. design user interfaces.

Skills (Technology)

The student has acquired the skills needed to

1. use mechanisms for synchronisation of processes and threads.

Skills (Business)

The student has acquired the skills needed to

1. analyse and model business processes
2. participate in project work
3. apply innovative methods with a focus on project work in practice-oriented development projects
4. communicate internally and externally
5. participate in IT implementation and change management.

Competencies (Programming)

The student has acquired the competencies needed to

1. engage in development and maintenance projects as a professional programmer
2. acquire new skills in programming languages, development tools, programming techniques and program design.

Competencies (System Development)

The student has acquired the competencies needed to

1. participate competently in a development project
2. reflect on and adapt processes and methods in practice.

Competencies (Technology)

The student has acquired the competencies needed to

1. obtain knowledge of new operating systems and database systems.

Competencies (Business)
The student has acquired the competencies needed to
1. participate in and see the connection between business process design and IT system design
2. cooperate with representatives of the user organisation and development organisation based on business understanding
3. acquire knowledge of new technology in a business perspective.

The compulsory programme element is concluded with an exam (first-year exam).

Assessment
The exam is assessed according to the 7-point grading scale and corresponds to 60 ECTS.

The learning objectives defined for the programme element are identical to the learning objectives for the exam.

For further information on exam form and structure etc., reference is made to the institution-specific part of the curriculum.

1.3.2 Compulsory programme element: Programming and Technology

Contents
The second compulsory programme element is intended to provide the student with the qualifications needed to

- master more advanced elements in the computer science profession and implement distributed software systems
- contribute to the selection and application of technology in connection with system development and programming of IT systems, and provide the student with in-depth knowledge of technological aspects.

No. of ECTS
20 ECTS credits, including:
- 10 ECTS from the core area Programming
- 10 ECTS from the core area Technology

Learning objectives
Knowledge (Programming)
The student has acquired knowledge of
1. integration between heterogeneous components and platforms.

Knowledge (Technology)
The student has acquired knowledge of
1. principles for the design and implementation of distributed systems
2. fundamental network concepts.

Skills (Programming)
The student has acquired the skills needed to

1. use techniques to construct programs that support multiple simultaneous users
2. design and construct programs based on collaborating processes in a distributed architecture
3. construct programs that use up-to-date network technologies
4. use design patterns for distributed software architecture
5. develop software components
6. develop web applications.

Skills (Technology)
The student has acquired the skills needed to
1. Incorporate relevant technological aspects in the development of distributed systems, including:
    a. central security-related concepts and threats
    b. use of virtualisation
    c. use of services and programming interface for communication purposes
    d. use of common application protocols.

Competencies (Programming)
The student has acquired the competencies needed to
1. participate in integration projects as a professional programmer
2. acquire new skills in programming languages, development tools, programming techniques and program design.

Competencies (Technology)
The student has acquired the competencies needed to
1. reflect on the choice of infrastructure in connection with the development of distributed systems.

The compulsory programme element is concluded with an exam (Programming exam).

Assessment
The exam is assessed according to the 7-point grading scale.

The learning objectives defined for the programme element are identical to the learning objectives for the exam.

For further information on exam form and structure etc., reference is made to the institution-specific part of the curriculum.

1.3.3 Compulsory programme element: System Development

Contents
The *third* compulsory programme element is intended to provide the student with the qualifications needed to
develop, further develop and integrate distributed IT systems on a systematic basis using situation-specific, modern system development methods and techniques.

No. of ECTS
10 ECTS from the core area System Development.

Learning objectives

Knowledge
The student has acquired knowledge of

1. the significance of quality criteria in relation to the system development process and the final system design.

Skills
The student has acquired the skills needed to:

1. choose a situation-specific process model and system development method
2. work systematically on a project based on a selected system development method
3. plan, assess and regulate a project
4. document and communicate a product and a process, and ensure traceability
5. select and use appropriate design patterns and components
6. design systems that are integrated with other systems.

Competencies
The student has acquired the competencies needed to

1. situationally adapt a system development method to a project
2. participate competently in a development project
3. acquire new process models and system development methods
4. reflect on and adapt processes and methods in practice.

The compulsory programme element is concluded with an exam.

Assessment
The exam is assessed according to the 7-point grading scale.

The learning objectives defined for the programme element are identical to the learning objectives for the exam.

For further information on exam form and structure etc., reference is made to the institution-specific part of the curriculum.

1.4 Number of exams in compulsory programme elements

The three compulsory programme elements are each concluded with an exam. See the list of exams under 'Overview of exams'.
Correspondence between core areas and compulsory programme elements in terms of ECTS.

Compulsory programme elements	*Programming, System Development, Technology and Business*	*Programming and Technology*	*System Development*	
Core areas				
Business 10 ECTS	10 ECTS			**10 ECTS**
System Development 25 ECTS	15 ECTS		10 ECTS	**25 ECTS**

Programming 40 ECTS	30 ECTS	10 ECTS		**40 ECTS**
Technology 15 ECTS	5 ECTS	10 ECTS		**15 ECTS**
A total of 90 ECTS	**60 ECTS**	**20 ECTS**	**10 ECTS**	**A total of 90 ECTS**

1.5 Internship

Contents
The internship period is organised in such a way as to ensure that the internship, together with the rest of the programme, contributes to the student developing practical competencies. The objective of the internship period is to enable the student to apply programme methods, theories and tools through the performance of specific practical tasks within computer science.

No. of ECTS
15 ECTS

Learning objectives
Knowledge
The student has acquired knowledge of

- the day-to-day operation of the entire company hosting the internship.

Skills
The student has acquired the skills needed to:

- apply versatile technical and analytical working methods linked to employment within the sector
- evaluate practice-oriented issues and present possible solutions
- manage the structuring and project planning of day-to-day tasks within the sector
- communicate practice-oriented issues and reasoned solution proposals.

Competencies
The student has acquired the competencies needed to

- handle development-oriented, practical and professional situations in relation to the sector
- acquire new knowledge, skills and competencies in relation to the sector
- participate in disciplinary and interdisciplinary collaboration with a professional approach.

The internship is concluded with an exam.
The learning objectives defined for the programme element are identical to the learning objectives for the exam.

For further information on exam form and structure etc., reference is made to the institution-specific part of the curriculum.

1.6 Final exam project

No. of ECTS
15 ECTS

Final exam project requirements
The final exam project is to document the student's understanding of practice and central applied theory and method in relation to a practice-oriented issue based on a specific assignment within the area of the programme. The problem statement is prepared by the student, possibly in collaboration with a private or public enterprise, and must be of central relevance to the programme and the sector. The educational institution must approve the problem statement.
A project report and, if relevant, a product must be submitted.
The project report, which constitutes the written part of the exam, must as a minimum contain the following:

- Front page, including title
- Table of contents
- Introduction, including problem statement
- Main section
- Conclusion
- Bibliography (including all sources referenced in the project)
- Appendix (only appendices central to the report are to be included)

The project report cannot exceed 20 standard pages + 20 standard pages per student.
Front page, table of contents, bibliography and appendices are not included in the required number of pages. Appendices will not be assessed.
A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.

Spelling and writing skills
Spelling and writing skills are included in the assessment of the final exam project. The assessment should be regarded as an overall evaluation of the academic content and the student's spelling and writing skills.

Students who are able to document a relevant, specific impairment may apply for exemption from the requirement that spelling and writing skills are included in the assessment. The application must be submitted to the head of education no later than four weeks prior to the exam.

Learning objectives
The final exam project is intended to demonstrate that the student has achieved the final examination level of the programme, see Appendix 1 of the Ministerial Order on the Academy Profession Degree Programme in Computer Science:
The intended learning outcome includes the knowledge, skills and competencies that an AP Graduate in Computer Science is to acquire during the programme.
Knowledge
The student has acquired knowledge of

1) generally applied practice, theory and method within software development
2) basic business conditions related to system development
3) the technological foundation of technological concepts and IT systems in relation to programming, troubleshooting and initialisation.

Skills
The graduate has acquired the skills needed to

1) methodological identify IT system requirements, and assess the extent to which the requirements can be met within the given framework
2) use modern and up-to-date programming techniques and tools for software construction, and ensure the quality of the developed product
3) document the performed work and ensure that the documentation is useful for the given target group
4) apply the relevant knowledge in connection with system development, programming and initiation
5) conduct systematic troubleshooting and correct errors in connection with IT systems
6) assess practice-oriented IT issues, and propose and select possible solutions
7) communicate practice-oriented issues and possible solutions to partners and users.

Competencies
The graduate has acquired the competencies needed to
1) participate in the development of software development practice
2) competently participate in project work
3) take a professional approach to disciplinary and interdisciplinary collaboration in connection with software development
4) participate in system development using modern methods, techniques and tools
5) in a structured context acquire new knowledge, skills and competencies in relation to the IT sector, including domain knowledge and technological knowledge as well as application of new methods, techniques and tools.

Assessment
The exam is external and assessed according to the 7-point grading scale.
The exam consists of a project and an oral part. One aggregate grade is awarded. The exam cannot be conducted until the final internship exam and all other exams on the programme have been passed.
For further information on exam form and structure etc., reference is made to the institution-specific part of the curriculum.

1.7 Exam overview

Overview of all exams on the programme and exam order

Exam	No. of ECTS per exam (150 in total)	Assessment
1. Commencement of studies exam[1]	-	Pass/fail
2. First-year exam	60	7-point grading scale
3. Programming exam	20	7-point grading scale
4. System Development exam	10	7-point grading scale
5. Elective subject exam(s)[2]	30	7-point grading scale
6. Internship exam	15	7-point grading scale
7. Final exam project	15	7-point grading scale

1. The commencement of studies exam, if relevant, is described in Part 2 of the curriculum.
2. Elective subjects with related exam(s) are described in Part 2 of the curriculum.

1.8 Credit transfer

Successfully completed programme elements are equivalent to the corresponding programme elements at other educational institutions offering the programme.
Students are obliged to provide information on completed programme elements from other Danish or foreign higher education programmes and on any employment for which credit transfer may be granted. On a case-by-case basis, the educational institution approves credit transfers based on completed programme elements and employment comparable to subjects, programme components and internships. The decision is based on an academic evaluation.

1.8.1 Pre-approved credit transfer

Students may apply for pre-approved credit transfer. In case of pre-approval of a period of study in Denmark or abroad, the student is obliged, after completing the period of study, to document the programme elements completed during the approved period of study. Upon obtaining the pre-approval, the student must consent to the institution requesting the necessary information after the student has completed the period of study.
In connection with pre-approved credit transfer, programme elements are deemed to have been completed if passed in accordance with the rules applicable to the programme.

1.8.2 Credit transfer agreements

None.

1.9 Exemptions

In exceptional circumstances, the institution may grant exemptions from the rules in the common part of the curriculum that are laid down exclusively by the institutions. The institution collaborates on establishing uniform exemption practices.

1.10 Commencement and transitional provisions

The common part of the curriculum comes into effect on 1 August 2014 and applies to all students who currently are and will become enrolled on the programme, as well as to exams starting on this date or later.

Transitional provisions, if any, for students enrolled before August 2014 can be found in the institution-specific part of the curriculum.

2 Part 2 – institution-specific part

2.1 Order of programme elements

Computer Science – ECTS distribution	First semester	Second semester	Third semester	Fourth semester	Fifth semester
Programming	15 ECTS	15 ECTS	10 ECTS		
System Development	10 ECTS	5 ECTS	10 ECTS		
Technology		5 ECTS	10 ECTS		
Business	5 ECTS	5 ECTS			
Elective/specialisation				30 ECTS	
Internship					15 ECTS
Final project					15 ECTS

2.2 Exam order

Overview of all exams and exam order

Semester	Exam	No. of ECTS per exam (150 in total)	Internal/ external	Assessment
Second semester	First-year exam (compulsory programme element: Programming, System Development, Technology and Business)	60	**External**	7-point grading scale
Third semester	Programming and Technology	20	**External**	7-point grading scale
Third semester	System Development	10	Internal	7-point grading scale
Fourth semester	Elective subject exams	30	Internal	7-point grading scale
Fifth semester	Internship exam	15	Internal	7-point grading scale
Fifth semester	Final exam project	15	**External**	7-point grading scale

Information on time and place of exams is available on the student intranet, Fronter.

2.3 Framework and criteria for programme exams

In connection with all exams, students must read the information in the exam folder available on Fronter. The students are responsible for checking that their exam registration is correct and for knowing the deadlines for submission and exam dates as well as other relevant information regarding exams. All assignments must be submitted electronically via Fronter.

2.3.1 First-year exam

Programming, System Development, Technology and Business

Requirements for taking the exam
To take the exam, the following requirements apply:

There are seven mandatory activities linked to the exam, which are described in the relevant semester/class room on Fronter. Documentation of mandatory activities must be submitted via Fronter. Mandatory activities are distributed as follows:

First semester:	
Core area Programming	2
Core area System Development	2
Core area Business	1
Second semester:	
Core area Programming	1
Core area Technology	1

Students who fail to fulfil one or more study activities or to submit the first-year project, which constitutes the written part of the exam, in due time cannot participate in the exam and will have used one exam attempt.

Exam procedure
The exam takes the form of an external, individual oral exam based on a written group project and is assessed according to the 7-point grading scale. The examination covers the four core areas. Students must demonstrate an adequate level of performance in each of the four core areas.

Each group must normally be composed of at least two students and no more than four students.

The exam is equivalent to 60 ECTS.

One aggregate grade is awarded based on an overall assessment of the written assignment and the oral exam.
The project must be presented by the project group – 10 minutes per student; however, a maximum of 30 minutes in total. The group members are then examined individually – 30 minutes per examinee, including grading.

Formal requirements for the written project
Students must submit a project report and a product.
The project report, which constitutes the written part of the exam, must as a minimum contain the following:

- Front page, including title, name and date of birth, class and date
- Table of contents
- Problem statement or question
- Main section
- Conclusion
- Bibliography (including all sources referenced in the project)
- Appendix (only appendices central to the report are to be included)
- Enclose source code and, if relevant, specify the path to the version control server where the source code and executable product code can be retrieved

- All pages must be numbered

The written project must be at least 30 standard pages and cannot exceed 40 standard pages for one student. For each additional student, the total number of pages increases according to the table below:

Number of students	Minimum number of pages	Maximum number of pages
1	30	40
2	35	50
3	40	55
4	45	60

Front page, table of contents, bibliography and appendices are not included in the required number of pages. Appendices will not be assessed.

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.

Each figure or diagram is equivalent to 800 characters.

Assessment criteria
The assessment criteria for the exam correspond to the learning objectives for the compulsory programme element: Programming, System Development, Technology and Business
The learning objectives are set out in the common part of the curriculum.

Semester
The exam takes place at the end of the second semester. Further information on time and place as well as submission of the written group project is available on Fronter.
Exam language
English

To continue on the programme, students must pass the exam before the end of the first year of study.
In the event of illness, maternity/paternity leave or unusual circumstances, students may be granted an exemption from the deadlines for passing the exam.

Materials and aids
None.

2.3.2 Programming exam: Programming and Technology

Requirements for taking the exam
To take the exam, the following requirements apply:

There are three mandatory activities linked to the exam, which are described in the relevant semester/class room on Fronter. Documentation of mandatory activities must be submitted via Fronter. Mandatory activities are distributed as follows:
Core area Programming 2
Core area Technology 1

Students who fail to fulfil one or more study activities cannot participate in the exam and will have used one exam attempt.

Exam procedure
The exam is an external, individual exam assessed according to the 7-point grading scale. The students receive a main question related to Programming and a sub-question related to Technology. The students must demonstrate an adequate level of performance in each of the core areas.

Main question – Programming:
A list of the main topics in the Programming area will be published no later than one week before the exam. The main topics include the most important topics within the subject area and form the basis for the Programming part of the exam. The students are expected to present the Programming topics they have drawn. The presentation must include both a theoretical part and practical Programming examples.

Sub-question – Technology:
The question places emphasis on the subject 'Computer Networks and Distributed Systems'. The list of Technology topics will be published no later than one week before the exam.

The exam is equivalent to 20 ECTS.
The exam is assessed according to the 7-point grading scale.
In the assessment, the Programming question is weighted at 70% and the sub-question at 30%.

A total of 40 minutes are allocated per examinee, including grading.

Formal requirements for written product
N/A.

Assessment criteria
The assessment criteria correspond to the learning objectives for the exam, which are identical to the learning objectives for the compulsory programme element: Programming and Technology, see the common part of the curriculum.

Semester
The exam takes place at the end of the third semester. Further information on time and place is available on the student intranet Fronter.

Exam language
English.

Materials and aids
None.

2.3.3 System Development exam

Requirements for taking the exam
To take the exam, the following requirements apply:

There is one mandatory activity linked to the exam, which is described in the relevant semester/class room on Fronter. Documentation of mandatory activities must be submitted via Fronter.

System Development report. Group report – each group may be composed of a maximum of four students.

Formal requirements for System Development report

- Front page, including title, name and date of birth, class and date
- Table of contents
- Problem statement or question
- Main section
- Conclusion
- Bibliography (including all sources referenced in the project)
- Appendix (only appendices central to the report are to be included)
- All pages must be numbered

The written project must be at least 20 standard pages and cannot exceed 30 standard pages for one student.
For each additional student, the total number of pages increases according to the table below:

Number of students	Minimum number of pages	Maximum number of pages
1	20	30
2	25	40
3	30	45
4	35	50

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included.

Each figure or diagram is equivalent to 800 characters.

Students who fail to comply with the requirements cannot participate in the exam and will have used one exam attempt.

Exam procedure
The exam is an internal, individual oral exam assessed according to the 7-point grading scale.

The exam is equivalent to 10 ECTS.

One aggregate grade is awarded based on an overall assessment of the presentation and the following examination.
The project must be presented by the project group based on the System Development report – 10 minutes per student; however, a maximum of 30 minutes in total. The group members are then examined individually – 20 minutes per examinee, including grading.

Assessment criteria

The assessment criteria for the exam correspond to the learning objectives for the compulsory programme element: System Development

The learning objectives are set out in the common part of the curriculum.

Semester
The exam takes place at the end of the third semester. Further information on time and place is available on the intranet.

Exam language
English.

Materials and aids
None.

2.3.4 Elective programme element exams

Requirements for taking the exam
To take the exam, the following requirements apply:
There is one mandatory activity per 5 ECTS. A 10-ECTS module thus contains two mandatory activities, while a 5-ECTS module contains one mandatory activity. This is described in the relevant semester/class room on Fronter. Documentation of mandatory activities must be submitted via Fronter.

Contents
The elective subject elements allow the students to enhance their study-related and professional skills through specialisation and by gaining new perspectives on subjects of broad relevance to the IT field.
Every year, a number of specialisations are offered on the study programme, which can be found on Fronter.
Subject to agreement, students can also plan the elective programme elements themselves as a theoretical and/or practical course of study, which must be pre-approved by the institution.

No. of ECTS
The elective programme elements correspond to a total of 30 ECTS and will be offered as modules of varying scope equivalent to a multiple of 5 ECTS.

Learning objectives
The specific specialisations are described in the electives catalogue available on Fronter.
The general learning objectives are as follows:

Knowledge
The student has acquired knowledge of

- theory and practice linked to the chosen topic(s)
- the relevance of the chosen topic(s) to IT-related theory and practice.

Skills
The student has acquired the skills needed to

- select, describe and perform a literature search of an IT-related issue
- discuss the societal aspects linked to the chosen topic(s)

- assess issues and propose solutions in relation to the chosen topic(s)
- communicate key results.

Competencies
The student has acquired the competencies needed to

- independently study new topics related to theory and/or practice in the subject area
- elaborate on and relate the selected topics to other subject areas within the programme.

Semester
The elective programme elements are placed in the fourth semester of the programme.

Exams
Internal, oral exams are conducted in each specialisation and are assessed according to the 7-point grading scale. Unless otherwise explicitly stated for the elective subject module, the following applies:

One aggregate grade is awarded based on an overall assessment of the presentation and the following examination.

The student must give a 10-minute presentation, followed by a 20-minute examination of the student, including grading.

Exam language
Danish or English for Computer Science.

Materials and aids
None.

2.4 Internship

Requirements and expectations for completion of the internship
During the internship period, the students work with academically relevant issues within the core areas of the programme[3] and acquire knowledge about relevant professional functions. The students are linked to one or more companies throughout the internship. The internship period can be organised in a flexible and differentiated manner and form the basis for the student's final exam project.

The student and the supervisor/contact person jointly define specific objectives for the student's internship based on the learning objectives for the internship, see the common part of the curriculum.
This subsequently serves as a guide for planning the student's work during the internship period.
The internship is comparable with a full-time job with the requirements for working hours, performance, commitment and flexibility that AP Graduates in Computer Science are expected to be able to fulfil in their first job.

3. See section 10(2), item 1, section 11(2), item 1, and section 12(2), item 1, of the Danish Act on Academy Profession Programmes and Professional Bachelor Programmes.

2.4.1 Internship exam

The following requirements apply:

- The internship report constituting the basis for both the assessment and the exam must comply with the formal requirements, see below, and must be submitted in due time, see the exam schedule available on the intranet.

Students who fail to comply with the requirements for submission of the internship report will have used one exam attempt.

Exam procedure
The exam is an internal, individual written exam in the form of an internship report and is assessed according to the 7-point grading scale.

The exam is equivalent to 15 ECTS.

Formal requirements for the written project
An internship report must be submitted.
The internship report must, as a minimum, contain the following:

- Front page with name, date of birth, host company, educational institution, internship period as well as class and date
- Table of contents
- Problem statement or question
- Main section
- Conclusion
- Bibliography (including all sources referenced in the project)
- Appendix (only appendices central to the report are to be included)
- All pages must be numbered
- Appendix: Company statement and log

The internship report cannot exceed five standard pages, excluding appendices.

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.

Each figure or diagram is equivalent to 800 characters.

Students who fail to comply with the requirements cannot participate in the exam and will have used one exam attempt.

Assessment criteria
The assessment criteria for the exam are identical to the learning objectives for the internship.

Semester
The exam takes place upon completion of the internship. Further information on time and place as well as submission of the internship report is available on the student intranet, Fronter.

Exam language
English

Materials and aids
None.

2.5 Final exam project

For information about the requirements for the final exam project and the learning objectives, reference is made to the common part of the curriculum for the AP Degree Programme in Computer Science.

2.5.1 Exam in final exam project

Requirements for taking the exam

- The written project constituting the basis for both the assessment and the exam must
  - meet the formal requirements for the final exam project, see the common part of the curriculum
  - be submitted in due time, see the exam schedule available on Fronter.

Students who fail to comply with the requirements for submission of the written project constituting the written part of the exam cannot participate in the exam and will have used one exam attempt.

To sit the exam, students must have passed their internship exam and all other exams on the programme.

Exam procedure
The exam is an external, oral group exam based on a written group project.
One individual grade is awarded based on an overall assessment of the written assignment and the oral exam. The exam is assessed according to the 7-point grading scale.
A maximum of four students may constitute a group.

The project must be presented by the project group – 10 minutes per student; however, a maximum of 30 minutes in total. The group members are then examined individually – 20 minutes per examinee, including grading.

The exam is equivalent to 15 ECTS.

Assessment criteria
The assessment criteria correspond to the learning objectives for the exam, which are identical to the learning objectives for the final exam project, see the common part of the curriculum.

Semester
The exam takes place at the end of the fifth semester. Further information on time and place is available on the student intranet Fronter.

Exam language
English.

Materials and aids
None.

2.6 Programme elements which can be completed abroad

Following approval by the institution of an application for pre-approved credit transfer, students can complete programme elements abroad.

In case of pre-approval of a period of study abroad, the student is obliged, after completing the period of study, to document the programme elements completed during the approved period of study. Upon obtaining the pre-approval, the student must consent to the institution requesting the necessary information after the student has completed the period of study.
In connection with pre-approved credit transfer, programme elements are deemed to have been completed if passed in accordance with the rules applicable to the programme.

2.7 Applied teaching methods

The teaching method on the AP Degree Programme in Computer Science takes the form of a dynamic, interactive process with emphasis on active student participation. The teaching is based on relevant business practice, and combines practice and theory. Issues that appear in different types of enterprises in the IT industry are incorporated. The students are responsible for their own learning, and both they and the teachers make a constructive contribution to the learning process.

To ensure optimal academic learning and personal development for the individual students, the AP Degree Programme in Computer Science applies varied educational practices with emphasis on dialogue, discussion and projects.

The teaching is varied and includes classroom instruction, guest lectures, company visits, project work in groups and individual work – often with an interdisciplinary focus and always with a practice-oriented approach. In addition to the academic content, the various ways of learning are also intended to develop the student's ability to work independently and in cooperation with others.

Common to all the learning activities is that the programme always aims to define clear goals for the activities.

Classes can be organised so as to ensure that foreign languages are incorporated in the form of teaching material and as part of the teaching.

2.8 Mandatory activities

To ensure the efficiency of the teaching methods applied on the programme, students must participate in mandatory activities, including submission/presentation of assignments/projects. Mandatory activities may also be a requirement for participation in programme exams.
In addition, mandatory attendance requirements may apply to certain programme elements. Details on mandatory activities and, if relevant, mandatory attendance serving as a requirement for exam participation can be found in the description of the individual exams.
A semester can only be retaken if an exemption is granted. A decision to grant an exemption to retake a semester is made following an individual assessment by the student counsellor and the head of education, and only when there are substantial personal reasons for granting an exemption.

2.9 Assessment of active enrolment

Enrolment may be terminated for students who have not actively participated in the programme within a consecutive period of at least one year.
Active enrolment means that within the past 12 calendar months, students have

- participated in at least two different exams
- passed at least one exam
- fulfilled their obligation to participate in any kind of activity which forms part of the programme, including group work, joint projects, distance teaching, etc. as set out in the curriculum
- submitted, as set out in the curriculum, the assignments, reports, (learning) portfolios, etc. which are a requirement for exam participation with proper content, for instance not any material in their own name that others have produced
- attended activities subject to mandatory attendance, as set out in the curriculum.

Failure to comply with one or more criteria to qualify as an active student may justify termination of enrolment.
Periods during which students have not actively participated in the programme due to leave of absence, maternity/paternity leave, adoption, documented illness or compulsory military service are not included. Students must provide documentation of such circumstances upon request.
Under special circumstances, the institution may grant exemptions from the rules. Applications for exemption must be submitted to the head of education.
Prior to termination of enrolment, the individual student must receive written notification thereof. In this connection, the above rules are pointed out to the student. It must appear from the written notification to the student that he or she has 14 days to submit documentation proving that the periods during which the student has failed to comply with the active enrolment requirement on the programme should not be included, and a deadline for submission of an application for exemption must be fixed.

Students who do not respond within the deadline will be disenrolled from the programme.
If the student requests that the enrolment not be terminated, the request has a suspensive effect until the head of education has made a decision in the matter.
The student may submit an appeal to the head of education against the decision within two weeks of having been informed of the decision. Appeals have a suspensive effect. If the head of education maintains the decision, the student may submit an appeal to the Danish Agency for Higher Education within two weeks of having been informed of the decision if it concerns legal issues.
The rules governing exams in which students, in accordance with the Examination Order, must have participated and passed before the end of the second semester, and the deadlines for completion of the programme laid down in the Ministerial Order on the Academy Profession Degree Programme in Computer Science take precedence.

2.10 Language

The teaching material applied on the programme is in English and the teaching is in English.
No additional knowledge of foreign languages is required.

2.10.1 Exam language

Students must have sufficient English language skills.

2.11 Make-up exams and re-exams

2.11.1 Make-up exams

Students who have been unable to complete an exam due to documented illness or other documented reasons are given the opportunity to take the (make-up) exam as soon as possible. If the exam in question is scheduled for the final exam period, students will be given the opportunity to take the exam in the same exam period or immediately thereafter.
The make-up exam may be identical to the next ordinary exam. Students are responsible for finding out when the (make-up) exam is held.
Information on time and place of make-up exams is available on the student intranet, Fronter.
Illness must be documented by a medical certificate. The institution must have received the medical certificate no later than three working days after the date of the exam. Students who become acutely ill during an exam must document that they were ill on the date in question.
If illness is not documented in accordance with the above rules, the student will have used one exam attempt.
Students must pay for the required medical certificates themselves.

1.1 Re-exams

Students who do not pass an exam or fail to appear at an exam will automatically be registered for the re-exam, provided that they have any exam attempts left. The re-exam may be identical to the next ordinary exam.
Students are responsible for finding out when the re-exam is held.
Information on time and place of re-exams is available on Fronter.
In special circumstances, for example in connection with documented disabilities, the institution may grant an exemption from automatic registration for exams.

2.12 Materials and aids

Any restrictions of the use of materials and aids are stated in the description of the individual exam.

2.13 Special exam conditions

Students with physical or mental impairment may apply for special exam conditions. The application must be submitted no later than four weeks before the exam. Exemptions from the deadline may be granted in the case of sudden health problems. The application must be accompanied by a medical certificate, a statement from a speech, hearing or dyslexia institute or an institute for the blind or the like or other documentation of health issues or a specific impairment.

Applications for permission to bring other materials and aids must be submitted to the institution no later than four weeks before the exam.

2.14 Exam cheating

Upon submission of a written exam paper, examinees must provide their signature to confirm that the exam paper has been completed without obtaining unlawful help.

2.14.1 Use of own works and the works of others – plagiarism

Exam cheating in the form of plagiarism includes cases where a written assignment appears to be fully or partially prepared by the examinee(s), even though it

- contains identical or almost identical reproductions of wordings or works produced by someone else, but where the examinee has failed to put the reproduced text in quotation marks, italicise or indent it or in any other way clearly indicate the source, see the institution's requirements for written work
- contains large passages with terminology similar to the works or wordings etc. produced by someone else to the extent that when compared, it is evident that the passages could not have been written independently from the other work
- contains the use of words or ideas produced by someone else without giving proper credit
- reuses text and/or central ideas from the examinee's own previously assessed work without observing the rules set out in items 1 and 3.

2.14.2 Disciplinary measures in cases of exam cheating and disruptive behaviour during exams

If an examinee during an exam undoubtedly

- obtains unlawful help or
- unlawfully helps another examinee complete an assignment or
- uses non-permitted aids and materials

and
if an examinee during an exam

- exhibits disruptive behaviour

the head of education, or any person authorised by the head of education, or the assessors may agree to expel the examinee from the exam during the exam. Whether the expulsion was justified will be assessed in connection with the subsequent decision.
In less serious cases of disruptive behaviour, students will first receive a warning.

2.14.3 Suspected exam cheating, including plagiarism

If it is suspected that an examinee during or after an exam

- has obtained or provided unlawful help
- has submitted someone else's work as his/her own (plagiarism) or
- has used his/her own previously assessed work or parts thereof without stating the source (plagiarism), this will be reported to the institution.

2.14.4 Procedure for clarification of exam cheating, including plagiarism

Postponement of exam
If the reporting of exam cheating concerns plagiarism in a written assignment constituting the basis for the assessment of a subsequent oral exam, the head of education will postpone the exam if clarification of the matter cannot be obtained before the fixed exam date.

Reporting form and content
Cheating must be reported without undue delay. The reporting must contain a written presentation of the circumstances, including information to help identify the reported persons as well as a brief explanation and any available documentation of the matter. If one or more of the reported persons have previously been involved in exam cheating, it must be indicated.

When reporting plagiarism, the plagiarised parts must be marked, indicating clearly the sources from which the plagiarised parts originate. The plagiarised text must also be marked in the source text.

Involvement of the examinee – hearing of parties
The head of education decides whether the hearing of the student is to take place orally, in writing or as a combination of the two.
In connection with oral hearings, the examinee is invited for an interview to clarify the matter with the aim of presenting documentation of the suspected exam cheating to the examinee and hearing the examinee's views. The examinee is entitled to bring an accompanying person to the interview.
In connection with written hearings, any documentation of suspected exam cheating is submitted to the student with the aim of requesting the student's views in writing.
Sanctions in relation to exam cheating and disruptive behaviour during exams
If the head of education upon clarification of the matter has obtained confirmation of the suspected exam cheating, and the act has or could have affected the assessment, the head of education will expel the examinee from the exam.
In less serious cases, examinees will first receive a warning.
In aggravating circumstances, the head of education may expel examinees for shorter or longer periods of time. In such cases, a written warning is issued stating that repeated cheating may result in permanent expulsion.
Expulsion means that any grade awarded for the exam in question will be withdrawn, and the examinee will have used one exam attempt.
The examinee cannot participate in make-up exams/re-exams, but may participate in the next ordinary exam.
In aggravating circumstances, the head of education may decide to expel the examinee from the institution for a shorter or longer period of time. In such cases, a written warning is issued stating that repeated cheating may result in permanent expulsion.
Students are not entitled to participate in teaching activities or exams during the period of expulsion.

Appeals
Decisions on having used one exam attempt and expulsion due to exam cheating are final and cannot be appealed before any higher administrative authority.
Appeals concerning legal issues (e.g. legal incapacity, hearings, appeal procedures, whether the Examination Order has been interpreted correctly, etc.) may be submitted to the Danish Agency for Higher Education. Appeals must be submitted to the institution and addressed to the head of education, who issues an opinion on which the complainant must be given the opportunity to comment within a period of usually one week. The institution then submits the appeal, the opinion and any comments to the Danish Agency for Higher Education. Appeals must be submitted to the institution within two weeks of the complainant having been informed of the decision, see section 51 of the Examination Order.

2.15 Exam appeals and appeals against decisions[4]

2.15.1 Exam appeals

It is recommended that examinees seek guidance from a student counsellor in connection with the appeal procedure and preparation of an appeal.

4. See part 10 of the Examination Order: http://ufm.dk/en/legislation/prevailing-laws-and-regulations/education/files/ministerial-order-on-examinations-on-professionally-oriented-higher-education-programmes-161213.pdf

The exam appeal rules are set out in part 10 of the Examination Order.
The Examination Order distinguishes between appeals against

4. the basis for examination etc., the exam process and/or the assessment and
5. legal issues.

The two types of appeals are treated differently.

2.15.1.1 Appeals against the basis for examination etc., the exam process and the assessment

Examinees may submit a written, reasoned appeal within two weeks of the assessment being announced in the usual way against:

1. the basis for examination, including exam questions, assignments etc., and its link to programme objectives and requirements
2. the exam process
3. the assessment.

The appeal may concern all exams, including written and oral exams or combinations thereof as well as practical or clinical exams.
The appeal must be sent to KEA Quality Assurance at kvalitet@kea.dk.

2.16 Exemptions

In exceptional circumstances, the institution may grant exemptions from the rules in the curriculum that are laid down exclusively by the institution(s).

2.17 Commencement and transitional provisions

The institution-specific part of the curriculum comes into effect on 1 August 2014 and applies to all students who will be enrolled on the programme, as well as to all exams starting on this date or later.

The curriculum (common and institution-specific parts of the same curriculum) from September 2012 still applies to students enrolled pursuant to it. The curriculum will be repealed upon graduation of the last student enrolled under it; however, no later than 30 June 2016.

The curriculum (common and institution-specific parts of the same curriculum) from September 2013 still applies to students enrolled pursuant to it. The curriculum will be repealed upon graduation of the last student enrolled under it; however, no later than 30 June 2017.