CURRICULUM FOR THE MASTER’S PROGRAMME IN COMPUTER SCIENCE (IT), 2020

MASTER OF SCIENCE (MSC)
AALBORG

MODULES INCLUDED IN THE CURRICULUM
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SECURE, SCALABLE AND USEFUL SYSTEMS
2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The project must include considerations on all three aspects: security, scalability and usability. But the project is expected to go particularly deep with one of these topics.

LEARNING OBJECTIVES

KNOWLEDGE

• concepts, results and theoretical basis in an advanced field of computer science

• safety, scalability and usability in general as well as how it relates to the project work

SKILLS

• to apply knowledge from an area of computer science to select and argue for a model specification in an advanced computer science field

• modeling and being able to model a computer science problem and use that model to understand the problem

• ensuring that the designed systems balances security, scalability and usability in a way that can be described, explained, and defended

COMPETENCES

• identify a problem within a computer science research or application area

• contribute to solving the problem by using a model specification based on theories within computer science

• analyze and assess the resulting contribution to the solution. Analyze and evaluate applications of relevant computer science models for solving the problem

• an assessment of scalability, safety and/or usefulness using experimental or analytical methods

• be able to argue for and apply key elements of security, scalability and / or usability

TYPE OF INSTRUCTION

The project work is supported with digital resources on research methods and applied statistics.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 450 hours.
EXAM

EXAMS

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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-en@cs.aau.dk or 9940 8854

FACTS ABOUT THE MODULE

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PROGRAMMING PARADIGMS

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should gain knowledge of the important concepts and terminology of programming paradigms. Furthermore, the student must gain a deeper understanding of one or more paradigms in relation to the prerequisites described. Specifically, the student should gain knowledge of at least the following:

- advanced function oriented programming, including referential transparency, evaluation order, closures, higher order functions, continuations and type systems for feature programming including parametric polymorphism.
- programming in languages with dynamic types
- programming techniques within one or more of the four main paradigms: the function-oriented, the imperative, the object-oriented and the logical programming paradigm

SKILLS

- apply concepts and terminology important to the paradigm in question to describe and reason about programs from this paradigm.
- explain how a program within the illuminated paradigms should be executed.
- construct programs with high paradigmatic attention.
- assess the strengths and weaknesses of each paradigm in relation to a specific programming problem.

COMPETENCES

- choose a suitable paradigm for a given task and argue for the choice made
- identify concepts and constructions in a given paradigm and argue how these differ from concepts and constructions in other paradigms
- apply paradigmatic constructions in smaller programs

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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MACHINE INTELLIGENCE

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
It is recommended that the student has knowledge of discrete mathematics, algorithms and data structures

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should gain knowledge of the following theories and methods:

- problem solving using search and inference
- model-based decision making
- inference under uncertainty
- learning from experience and learning from data
- basic techniques and methods in machine intelligence including their theoretical foundations and practical applications

SKILLS

- use correct technical notation and terminology in writing as well as speech
- apply basic techniques presented in the course to solve a specific problem
- explain key principles and algorithms presented in the course

COMPETENCES

- be able to evaluate, compare and select techniques and methods within machine intelligence based on a specific problem

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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RELIABLE INNOVATIVE SYSTEMS

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

PURPOSE
That the students work on creating advanced computer science models of a problem and use these to develop innovative solutions balanced in relation to the reliability of the solution

LEARNING OBJECTIVES

KNOWLEDGE

• be able to explain concepts, results and theory in an advanced field of computer science

• have knowledge of empirical and formal-based methods for securing and assessing the reliability of a system

SKILLS

• apply knowledge from a domain in computer science to select and argue for a model specification in an advanced computer science field

• be able to model a computer science problem from such a model specification and use that model to understand the problem

• argue for an appropriate choice of method (empirical or formal-based) to assess the reliability of the solution developed for the problem

COMPETENCES

• identify a problem within a research or application area of computer science

• contribute to solving the problem using a model specification based on theories of computer science

• analyze and evaluate the contributions to the solution

• analyze and evaluate applications of relevant computer science models for solving this problem

• assess the reliability of the developed solution based on either an empirical, statistical, or mathematically oriented method

TYPE OF INSTRUCTION

The project work is supported by digital resources on empirical / qualitative and mathematical methods for assessing the reliability of a solution
EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 450 hours.

EXAM

PREREQUISITE FOR ENROLLMENT FOR THE EXAM

• An approved PBL competency profile is a prerequisite for participation in the project exam.

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MACHINE LEARNING

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Key models in machine learning and their associated learning and inference techniques, such as:

- Statistical linear models
- Markov chains and hidden Markov models
- Support Vector machines
- Neural Net
- Probabilistic Graphic Models
- Matrix factorization

The use of machine learning methods in selected fields of application, such as:

- Web and network mining
- Recommendation Systems
- Computer games
- Image analysis
- Text mining

SKILLS

- be able to apply advanced techniques from machine learning to the construction of intelligent systems

COMPETENCES

- to understand advanced machine learning methods for designing intelligent systems
- to analyze their usefulness and impact in solving specific tasks

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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SELECTED TOPICS IN MODELLING AND VERIFICATION

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should gain knowledge of recent research in advanced mathematical models for formal description and verification of programs, software systems and programming languages. These can, e.g. be

- Binary Decision Diagrams (BDD)
- SAT algorithms
- predicate logic
- Petri nets, temporal logic
- mobile process calculations.

SKILLS

- be able to explain precisely and using the terminology and notation of the subject important theories for description and analysis of software systems;
- be able to use specification and verification methods based on formal models;
- be able to make use of the necessary writing skills in this context

COMPETENCES

- be able to use formal models and associated verification tools for description, analysis and verification of software systems

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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SOFTWARE INNOVATION

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained in the 3rd and 4th semesters of the bachelor's degree programmes in Computer Science and Software, including System Development and Agile Software Engineering.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE
By software innovation is meant innovation based on software. The emphasis is on innovation in products and processes, but also the management of the innovation part in development projects is included in the subject.

LEARNING OBJECTIVES

KNOWLEDGE
The student should gain knowledge of the following:

• software Innovation theory:
  • central paradigms and theories of innovation and innovation processes
  • personal and organizational prerequisites for innovation
  • theories and concepts of software innovation
  • Innovation Methods:
    • methodologies and methods to support innovation
    • techniques and tools for software innovation
  • Innovation Practice:
    • experience with methods and techniques in innovative processes
    • assessing the strengths and weaknesses of innovative software development processes

SKILLS

• be able to explain precisely and using the concepts of the subject the subject's theories
• be able to explain approaches to selecting and leading innovative processes in software development
• be able to discuss types and prerequisites for software innovation
• be able to explain and discuss tools and techniques to support software innovation

COMPETENCES

• be able to assess the innovative potential of a software-intensive product or software-intensive process

TYPE OF INSTRUCTION
The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD
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<tr>
<td>Faculty</td>
<td>Technical Faculty of IT and Design</td>
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</table>
DESIGN, DEFINITION AND IMPLEMENTATION OF PROGRAMMING LANGUAGES

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

PURPOSE
That the student learns how to design and implement a programming language and how this process can be supported by formal definitions of language syntax and semantics and techniques and methods of compiler and/or interpreter construction.

REASONS
All software is written in a programming language and translated or interpreted to be executable. The design, description and construction of programming languages, compilers, interpreters and similar tools are therefore central topics in computer science.

The project work therefore focuses on ensuring that students understand important underlying concepts in the world of programming languages, why these concepts have emerged and how they are formally described and represented in an implementation. Understanding these topics is fundamental for understanding new and existing programming languages and their applications.

Furthermore, many techniques and tools, originally developed for languages and compilers, are also used in other contexts of program development.

LEARNING OBJECTIVES

KNOWLEDGE

• understand and explain the basic concepts in a formal definition of a programming language’s syntax and semantics

• document knowledge and overview of the techniques and concepts involved in language design and compiler construction

• explain the individual phases and the relationship between the phases of a compiler or interpreter

• explain the implementation techniques used in the engineered compiler / interpreter

• use correct subject terminology
SKILLS

• describe the syntax and semantics of a programming language using relevant formal definitions

• implement a compiler or interpreter for a specific programming language or for an extension of an existing programming language

• test the implemented compiler or interpreter at all levels: unit, integration and acceptance test

• explain configuration management during the development of the compiler or interpreter

• from a computer science perspective reason about the concepts and techniques involved

COMPETENCES

• assess the use and applicability of known tools and techniques for defining and implementing programming languages

• understand and explain how specific linguistic concepts are represented at running time and in formal semantics

TYPE OF INSTRUCTION

Project work

The focus of the project is on an analysis of a computer science problem, for which the solution can naturally be described in the design of a specific programming language. The project includes a formal definition of relevant, central parts of this programming language. Central parts of the programming language are realized by constructing a (prototype) compiler / interpreter for the language.

Digital support for competency development in configuration management

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 450 hours

EXAM

EXAMS

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<tr>
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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854
### FACTS ABOUT THE MODULE

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Curriculum for the Master’s Programme in Computer Science (IT), 2020
AGILE SOFTWARE ENGINEERING

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

• The student should gain knowledge of leading paradigms (e.g. traditional and agile) in professional development of software

• The student should also gain knowledge of theories, methods and techniques involved in these paradigms (e.g. process modelling, management of requirements, design, project management, testing, process improvement) as well as an overview of theory of science for software engineering

SKILLS

• the ability to explain course concepts precisely using the terminology of the discipline, and be able to distinguish between and compare the software engineering paradigms

• be able to explain accurately and using the terminology of the discipline, the theories, methods and techniques of software engineering paradigms and their application in the professional development of software intensive systems

COMPETENCES

• be able to select, justify and use appropriate paradigms, theories, methods and techniques in their own development contexts.

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

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LANGUAGES AND COMPILERS

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The student is recommended to have programming experience and knowledge of imperative and object-oriented programming.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students should acquire knowledge about essential principles of programming languages, and understand techniques for description and translation of languages in general, including:

- the principle of abstraction, control and data structures, explicit and implicit execution order, block structure and scope concept, parameter mechanisms, types and type equivalence
- translation, including lexical, syntactic, and static semantic analysis, as well as code generation
- driving time environments, including data presentation, storage allocation, and sub-program support structures: methods, procedures, and functions
- Concepts and techniques for the description and implementation of object-oriented and function-oriented languages.

SKILLS

- be able to explain the relevant techniques and concepts in language design and compiler construction using the terminology and notation for the description and implementation of programming languages
- be able to explain how implementation techniques influence language design
- be able to reason about concepts and techniques relevant for computer science

COMPETENCES

- be able to describe, analyze and implement programming languages
- be able to explain each step and the relationship between the phases of a compiler

TYPE OF INSTRUCTION

See the general description of the types of instruction described in § 17.
EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours.

EXAM

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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-en@cs.aau.dk or 9940 8854

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</table>
COMPUTABILITY AND COMPLEXITY

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained in Syntax and Semantics

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students should achieve knowledge on the following theories and methods:

Computability:
• deterministic and nondeterministic Turing machines; decidable and recognizable languages and their properties: Church-Turing thesis
• acceptance problem for Turing machines; other undecidable problems for Turing machines; reductions and their properties

Complexity theory:
• time complexity of deterministic and nondeterministic Turing machines; time complexity classes, polynomial reductions and their uses; NP-completeness; satisfiability problem (SAT); other NP-complete problems
• space complexity of deterministic and nondeterministic Turing machines; space complexity classes, the relationship between time and space complexity

SKILLS
• the ability to explain course concepts precisely using the terminology and notations of the discipline for important achievements in the theory of computability and computational complexity, and how and to what extent these results can be used to classify computational problems
• the ability to make use of the necessary writing skills in these contexts

COMPETENCES
• be able to apply concepts and techniques from the theory of computability and computational complexity for the analysis of computational problems

TYPE OF INSTRUCTION

See the general description of the types of instruction described in § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours
### EXAMS

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### ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-en@cs.aau.dk or 9940 8854

### FACTS ABOUT THE MODULE

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</table>
PRE-SPECIALISATION IN COMPUTER SCIENCE

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained in CSIT7 and CSIT8 project and course modules. A course module from CSIT9 is followed simultaneously with project work.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

Purpose:
The student should gain insight into a current research problem in computer science and be able to communicate this problem so that the student can make the thesis on this basis.

Reason:
University educations are research-based educations. On the master programmes, all students must achieve in-depth insight into current research issues and methods.

LEARNING OBJECTIVES

KNOWLEDGE

• demonstrate in-depth knowledge and overview of a current problem within the research area of computer science.

SKILLS

• use and reason about relevant concepts and techniques within the discipline
• use and create theories within the discipline in the formulation and analysis of a problem within the research area
• communicate a current computer science problem as well as the related concepts in the framework of the research area

COMPETENCES

• apply concepts and reasoning within the discipline to formulate and analyse a current open challenge within the research area

TYPE OF INSTRUCTION

Project work, including:
• formulation and analysis of a problem in the research area

• reasoned reflection on solving this problem

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 600 hours

EXAM

EXAMS

<p>| Name of exam | Pre-Specialisation in Computer Science |</p>
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**ADDITIONAL INFORMATION**

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

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ENTREPRENEURSHIP

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should achieve knowledge about entrepreneurship and business development related to software (information and communication technologies) including typically:

- different scientific approaches to entrepreneurship, including effectuation
- intra-/entrepreneurship
- competition and market conditions
- business models and business plans
- intellectual property rights
- market development and marketing
- growth strategies
- open entrepreneurship

SKILLS

- the ability to explain course concepts precisely using the professional terminology of the discipline
- the ability to use those concepts to explain practical and empirical (case based) contexts

COMPETENCES

- should be able to formulate, develop and present their own software-related business ideas to a qualified audience.

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

EXAM

EXAMS

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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

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MASTER'S THESIS

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to knowledge obtained during the project and course modules from previous semesters

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

PURPOSE
That the student can formulate, analyze and contribute to solving a current research problem in computer science independently, systematically and critically through the application of scientific theory and method

REASON
University programs are research-based programs; all students must obtain in-depth knowledge of the current research problem and methods in the master's program, so that this insight can be used to solve problems in research

LEARNING OBJECTIVES

KNOWLEDGE

• document in-depth knowledge and overview of a current problem in computer science research and its possible solutions

SKILLS

• be able to reason about and with the concepts and techniques concerned
• be able to apply and create theory courses in the subject area in connection with the formulation and analysis and solution of a problem in computer science research
• be able to convey a current computer science problem, a contribution to its solution and the related conceptual apparatus within the framework of the research area

COMPETENCES

• be able to use the concepts and reasoning in the subject area to formulate, analyze and contribute to solving a problem within a current problem in computer science research

TYPE OF INSTRUCTION

Project work

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 450 hours
EXAMS

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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

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SELECTED TOPICS IN DATABASE RESEARCH AND PRACTICE

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should gain knowledge of the following topics in advanced databases:

- concepts and techniques within multidimensional databases, such as data warehousing, On-Line Analytical Processing, and data mining
- concepts and techniques within spatial (spatial) and spatiotemporal databases, including query indexing and processing
- distributed and parallel database systems
- concepts and techniques in complex data in databases, e.g., XML or the like.

In addition, one or more optional topics will be included within data-intensive systems, including but not limited to:

- concepts and techniques within temporal databases
- other scalable data management and analysis techniques
- relevant topics in database research

SKILLS

- be able to explain concepts and techniques in advanced databases
- be able to select and discuss relevant concepts and techniques for a given problem within advanced databases
- be able to apply relevant concepts and techniques to a given problem within advanced databases

COMPETENCES

- be able to apply concepts and techniques from advanced databases, including in the design and implementation of advanced databases

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

EXAM

EXAMS

<table>
<thead>
<tr>
<th>Name of exam</th>
<th>Selected Topics in Database Research and Practice</th>
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**Assessment**
- 7-point grading scale

**Type of grading**
- Internal examination

**Criteria of assessment**
- The criteria of assessment are stated in the Examination Policies and Procedures

**ADDITIONAL INFORMATION**

Contact: The Study board for Computer Science at [cs-en@cs.aau.dk](mailto:cs-en@cs.aau.dk) or 9940 8854

**FACTS ABOUT THE MODULE**

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<td>Lone Leth Thomsen</td>
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DISTRIBUTED SYSTEMS

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should gain knowledge of basic and advanced theories and methods in distributed systems:

- Distributed systems models: structuring (including, e.g., peer-to-peer, client-server, service-oriented architecture) and behavior (communication, error, and security models)
- Time concept in distributed systems (clock synchronization and logical time)
- Distributed algorithms, such as algorithms for mutual exclusion, selection, consensus, transactions, replication, and error tolerance
- Programming of distributed systems, e.g., languages, coordination models, principles for distribution of calculation and data
- One or more topics among:
  - Techniques for analysis, such as monitoring, testing, formal verification, and benchmarking
  - Designing and building complex distributed infrastructures and applications for e.g., IoT, cloud, peer-to-peer, distributed embedded systems
  - System and network software for (distributed) embedded systems
  - Distributed and parallel computation, parallel algorithms
  - Advanced security solutions

SKILLS

- Be able to explain precisely and using the terminology and notation of the subject
- Assess how and to what extent the results presented can be used
- Designing and deploying distributed applications

COMPETENCES

- Be able to apply concepts and techniques from distributed systems to the design and analysis of distributed systems

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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Assessment: 7-point grading scale
Type of grading: Internal examination
Criteria of assessment: The criteria of assessment are stated in the Examination Policies and Procedures

ADDITIONAL INFORMATION
Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

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SELECTED TOPICS IN HCI

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student must gain knowledge in selected topics within human-computer interaction (HCI) in theory or practice. Topics may include but are not limited to:

- concepts, methods and techniques within selected topics in interaction design
- concepts, methods and techniques within selected topics in usability evaluation or user experience

SKILLS

- be able to accurately and in-depth explain issues, theory, methods, results and conclusions within HCI
- be able to apply theories and methods to solve a specific problem
- critically relate to theories and methods within HCI

COMPETENCES

- be able to use the concepts, techniques and methods to understand a given problem and to design and / or evaluate a specific system

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854
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SPECIALISATION COURSE IN HUMAN-COMPUTER INTERACTION

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained during the 1st - 2nd semester at the Master's Programme in Computer Science or Software

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE
The student should achieve in-depth insight into key issues in contemporary research in human-computer interaction

SKILLS
Based on a scientific article in the course's central themes, the student should be able to:
- give a clear and understandable presentation of the article's key elements, including its premises, issue(s), theory, methods, results and conclusions
- explain relevant theories, methods and arguments presented in articles

COMPETENCES
Based on a scientific article in the course's central themes, the student should be able to:
- relate the theories, methods and results presented in the article to the course topics
- assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective.

TYPE OF INSTRUCTION
The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD
It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

EXAM

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### Type of grading
External examination

### Criteria of assessment
The criteria of assessment are stated in the Examination Policies and Procedures

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### ADDITIONAL INFORMATION
Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

### FACTS ABOUT THE MODULE

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SPECIALISATION COURSE IN DATABASE TECHNOLOGY

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained during the 1st - 2nd semester of the Master's Programme in Computer Science or Software

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should achieve in-depth insight into key issues in contemporary research in database technology.

SKILLS

Based on a scientific article in the course's central themes, the student should be able to:

• give a clear and understandable presentation of the article's key elements, including its premises, issue(s), theory, methods, results and conclusions
• explain relevant theories, methods and arguments presented in the article

COMPETENCES

Based on a scientific article in the course's central themes, the student should be able to:

• relate the theories, methods and results presented in the article to the course topics
• assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective.

TYPE OF INSTRUCTION

The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours.

EXAM

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Type of grading | External examination
Criteria of assessment | The criteria of assessment are stated in the Examination Policies and Procedures

**ADDITIONAL INFORMATION**

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

**FACTS ABOUT THE MODULE**

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SPECIALISATION COURSE IN DISTRIBUTED SYSTEMS

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained during the 1st - 2nd semester of the Master's Programme in Computer Science or Software

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE
The student should achieve in-depth insight into key issues in contemporary research in distributed systems

SKILLS
Based on a scientific article in the course's central themes, the student should be able to:

- give a clear and understandable presentation of the article's key elements, including its premises, issue(s), theory, methods, results and conclusions
- explain relevant theories, methods and arguments presented in the article

COMPETENCES
Based on a scientific article in the course's central themes, the student should be able to:

- relate the theories, methods and results presented in the article to the course topics
- assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective.

TYPE OF INSTRUCTION
The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD
It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

EXAM

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### ADDITIONAL INFORMATION

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SPECIALISATION COURSE IN SEMANTICS AND VERIFICATION

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained during the 1st - 2nd semester of the Master's Programme in Computer Science or Software

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE
The student should achieve in-depth insight into key issues in contemporary research in semantics and verification.

SKILLS
Based on a scientific article in the course's central themes, the student should be able to:
• give a clear and understandable presentation of the article's key elements, including its premises, issue(s), theory, methods, results and conclusions
• explain relevant theories, methods and arguments presented in the article

COMPETENCES
Based on a scientific article in the course's central themes, the student should be able to:
• relate the theories, methods and results presented in the article to the course topics
• assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective.

TYPE OF INSTRUCTION
The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD
It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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**ADDITIONAL INFORMATION**

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SPECIALISATION COURSE IN MACHINE INTELLIGENCE
2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained during the 1st - 2nd semester of the Master's Programme in Computer Science or Software

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE
The student should achieve in-depth insight into key issues in contemporary research in machine intelligence

SKILLS
Based on a scientific article in the course's central themes, the student should be able to:

• give a clear and understandable presentation of the article's key elements, including its premises, issue(s), theory, methods, results and conclusions
• explain relevant theories, methods and arguments presented in the article

COMPETENCES
Based on a scientific article in the course's central themes, the student should be able to:

• relate the theories, methods and results presented in the article to the course topics
• assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective

TYPE OF INSTRUCTION
The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD
It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

EXAM

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Criteria of assessment

The criteria of assessment are stated in the Examination Policies and Procedures

ADDITIONAL INFORMATION

Contact: The Study board for Computer Science at cs-sn@cs.aau.dk or 9940 8854

FACTS ABOUT THE MODULE

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<tr>
<th>Danish title</th>
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SPECIALISATION COURSE IN PROGRAMMING TECHNOLOGY

2021/2022

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE
The module adds to knowledge obtained during the 1st - 2nd semester of the Master's Programme in Computer Science or Software

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE
The student should achieve in-depth insight into key issues in contemporary research in programming technology

SKILLS
Based on a scientific article in the course's central themes, the student should be able to:

• give a clear and understandable presentation of the article's key elements, including its premises, issue(s), theory, methods, results and conclusions
• explain relevant theories, methods and arguments presented in the article

COMPETENCES
Based on a scientific article in the course's central themes, the student should be able to:

• relate the theories, methods and results presented in the article to the course topics
• assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective.

TYPE OF INSTRUCTION
The type of instruction is organised in accordance with the general instruction methods of the programme, cf. § 17.

EXTENT AND EXPECTED WORKLOAD
It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

EXAM

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SPECIALISATION COURSE IN SYSTEM DEVELOPMENT

2021/2022

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

The student should achieve in-depth insight into key issues in contemporary research in system development

SKILLS

Based on a scientific article in the course’s central themes, the student should be able to:

• give a clear and understandable presentation of the article’s key elements, including its premises, issue(s), theory, methods, results and conclusions

• explain relevant theories, methods and arguments presented in the article

COMPETENCES

Based on a scientific article in the course’s central themes, the student should be able to:

• relate the theories, methods and results presented in the article to the course topics

• assess the proposed solutions, results and/or conclusions of the article as well as assess their qualities and practicality and put them into perspective.

EXTENT AND EXPECTED WORKLOAD

It is expected that the student uses 30 hours per ECTS, which for this activity means 150 hours

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