AALBORG UNIVERSITET

CURRICULUM FOR THE MASTER'S PROGRAMME IN INNOVATIVE COMMUNICATION TECHNOLOGIES AND ENTREPRENEURSHIP, 2024

MASTER OF SCIENCE (MSC) IN ENGINEERING
COPENHAGEN

Curriculum for the Master's Programme in Innovative Communication Technologies and Entrepreneurship, 2024

Link to this studyline

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

Curriculum for the master's programme in Innovative Communication Technologies and Entrepreneurship, 2021
Curriculum for the Nordic Master in Sustainable ICT Solutions, 2021
Curriculum for the master's programme in Innovative Communication Technologies and Entrepreneurship, 2023
Curriculum for the Nordic Master in Sustainable ICT Solutions, 2023
Curriculum for the Nordic Master in Sustainable ICT Solutions, 2024
Curriculum for the Master's Programme in Innovative Communication Technologies and Entrepreneurship, 2019
Curriculum for the Master's Programme in Innovative Communication Technologies and Entrepreneurship, 2020

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§ 1: PREFACE

Pursuant to consolidation Act 778 of August 7, 2019 on Universities (the University Act), the following is established. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for Aalborg University.

This programme also offers a specialisation in *"Nordic Master in Sustanable ICT Solutions"*. The curriculum for the Nordic Master's Programme in Sustanable ICT Solutions can be found here: https://studieordninger.aau.dk/InnovativeCommunicationTechnologiesandEntrepreneurship-Masterdegree-Copenhagen-English-MasterofScienceMScinEngineering

§ 2: BASIS IN MINISTERIAL ORDERS

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

§ 3: CAMPUS

The programme is offered in Copenhagen.

§ 4: FACULTY AFFILIATION

The Master's programme falls under the The Technical Faculty of IT and Design.

§ 5: STUDY BOARD AFFILIATION

The Master's programme falls under the Study Board of Electronics and IT.

§ 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

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

§ 7: ADMISSION REQUIREMENTS

Applicants with a legal right of admission (retskrav):

Applicants with the following bachelor's degree are entitled to admission:

- Bachelor of Science (BSc) in Engineering (IT, Communication and New Media), Aalborg University

Applicants without legal right of admission

Bachelor's programmes qualifying students for admission:

- Electronic and IT (AAU)
- Computer Engineering (former Internetteknologier og computersystemer) (AAU)
- Cyber and Computer Engineering (AAU)
- Softwareteknologi (DTU) (BSc or BEng)
- Netværksteknologi og IT (DTU) (BSc)
- IT-Elektronik (DTU) (BEng)
- IT og økonomi (DTU) (BEng)

Only applicants holding a Bachelor of Science in Engineering, a Bachelor of Engineering (diplomingeniøruddannelse) or a Bachelor of Natural Science degree can be admitted to a Master of Science in Engineering programme.

Assessment of qualifications obtained from other technical or natural science bachelor educations will emphasize qualifications in mathematics, computer science, computer engineering, and software engineering, corresponding to a total of 60 ECTS credits. Equivalent qualifications can be accepted, although for the emphasized topics certain specific minimum requirements apply:

- **Mathematical** competences at BSc level equivalent to at least **10 ECTS**, covering two or more of the subjects linear algebra, calculus, discrete mathematics, probability and statistics, optimization, algorithms and data structures.
- **Computer science or computer engineering** competences at BSc level equivalent to at least **25 ECTS**, covering experience with declarative or imperative programming, e.g., Java, C, C++ , C# and Python, and other topics such as software and requirements engineering, user experience, application development, AI, distributed systems, and software architectures.
- Competences at BSc level equivalent to at least **5 ECTS**, covering one or more of the following topics: communication technologies, cyber security, and business understanding.

In order to get the optimal benefit of the MSc programme, it is recommended that elective parts of the bachelor education are used to build up the right prerequisites for admission.

As a prerequisite for admission to the master's programme, students must have completed a bachelor programme in technical sciences, a bachelor of engineering programme or a bachelor in natural science.

All applicants without a legal right must prove that their English language qualifications is equivalent to level B (Danish level) in English

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Master's programme entitles the graduate to the designation: Civilingeniør, cand.polyt. i innovativ kommunikationsteknik og entrepreneurskab. The English designation is: Master of Science (MSc) in Engineering (Innovative Communication Technologies and Entrepreneurship).

§ 9: PROGRAMME SPECIFICATIONS IN ECTS CREDITS

The Master's programme is a 2-year, research-based, full-time study programme. The programme is set to 120 ECTS credits.

§ 10: RULES CONCERNING CREDIT TRANSFER (MERIT), INCLUDING THE POSSIBILITY FOR CHOICE OF MODULES THAT ARE PART OF ANOTHER PROGRAMME AT A UNIVERSITY IN DENMARK OR ABROAD

The Study Board can approve that passed programme elements from other educational programmes at the same level replaces programme elements within this programme (credit transfer).

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

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

§ 11: EXEMPTIONS

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

§ 12: RULES FOR EXAMINATIONS

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

§ 13: RULES CONCERNING WRITTEN WORK, INCLUDING THE MASTER'S THESIS

In the assessment of all written work, regardless of the language it is written in, weight is also given to the student's formulation and spelling ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination can be assessed as 'Pass' on the basis of good language performance alone; similarly, an examination normally cannot be assessed as 'Fail' on the basis of poor language performance alone.

The Study Board can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Master's Thesis must include an English summary. If the project is written in English, the summary can be in Danish. The summary is included in the evaluation of the project as a whole.

§ 14: REQUIREMENTS REGARDING THE READING OF TEXTS IN A FOREIGN LANGUAGE

It is assumed that the student can read academic texts and use reference works, etc., in English.

§ 15: COMPETENCE PROFILE ON THE DIPLOMA

The following competence profile will appear on the diploma:

A Candidatus graduate has the following competency profile:

A Candidatus graduate has competencies that have been acquired via a course of study that has taken place in a research environment.

A Candidatus graduate is qualified for employment on the labour market based on his or her academic discipline as well as for further research (PhD programmes). A Candidatus graduate has, compared to a Bachelor, developed his or her academic knowledge and independence so as to be able to apply scientific theory and method on an independent basis within both an academic and a professional context.

§ 16: COMPETENCE PROFILE OF THE PROGRAMME

The graduate of the Master's programme:

Knowledge:

- has knowledge on information and communication technologies (ICT) that, in selected areas, is based on the highest international research
- understands the relevance of the needs of the end users, their use of ICT, and the mechanisms that influence the user experience and the acceptance of new technologies
- understands the importance of innovation and entrepreneurship for ICT solutions and services
- understands and can reflect, on a scientific basis, on the technical drivers in the convergence of ICT, as well as the interplay between technology, market and user issues
- understands how ICT services and solutions are used in different environments
- understands the importance of data and data analysis for value creation in service development
- has in-depth knowledge of service enablers, personalization and the use of context information for enrichment of services
- has in-depth knowledge and understanding of principles and technologies related to privacy, trust, computer ethics and identity and access management, in particular the use of personal data in services
- has knowledge on state-of-the-art network technologies, Internet technologies and service architectures, e.g., Internet of Things, cloud architectures, heterogeneous networks, distributed systems, Application Programming Interfaces (APIs) and security
- has knowledge of machine learning algorithms and their application
- has knowledge on ICT standards and standardization processes

Skills:

- can identify scientific problems within the field of ICT

- can evaluate and select among scientific theories, methods and tools, and – on a scientific basis – advance new analyses and solutions within applied IC
- can efficiently communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists
- can produce scientific writing: Articles, reports, documentation, etc.
- can apply scientific methods, tools and general skills within the field of ICT
- can identify and select among relevant standards, technologies and methods for development of ICT solutions and services
- can assess the ethical aspects of ICT solutions
- can develop innovative services, applications and solutions at a conceptual level, which are relevant in a user perspective
- can develop concepts, prototypes or demonstrators of viable ICT solutions and services,
    - based on an in-depth analysis of user requirements and technology issues,
    - using state-of-the-art methods, technologies and tools, and
    - addressing computer ethics, privacy protection and identity management
- can apply machine learning techniques to analyse and process data as part of a service

Competences:

- can manage work and development situations that are complex, unpredictable and require new solutions
- can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility
- can independently take responsibility for own professional development and specialisation
- has competencies in project work and problem-based learning in a global/multicultural environment
- has competencies in innovation and entrepreneurship that can be used to transform the potentials of relevant technologies into new ICT solutions and services with an engineering approach
- can contribute creatively and innovatively to propose and develop new ICT services and solutions, respecting and challenging established legal rules and design principles.

§ 17: STRUCTURE AND CONTENTS OF THE PROGRAMME

The programme is structured in modules and organised as a problem-based study. A module is a programme element or a group of programme elements, which aims to give students a set of professional skills within a fixed time frame specified in ECTS credits, and concluding with one or more examinations within specific exam periods. Examinations are defined in the curriculum.

The programme is based on a combination of academic, problem-oriented and interdisciplinary approaches and organized based on the following work and evaluation methods that combine skills and reflection:

- lectures
- classroom instruction
- project work
- workshops
- exercises (individually and in groups)

- self-study
- teacher feedback
- reflection
- portfolio work

§ 18: OVERVIEW OF THE PROGRAMME

In total, 95 ECTS out of 120 ECTS are common for all students. The common part consists of:

- All courses and projects on the first and second semester
- 1 mandatory course (5 ECTS) on the 3rd semester, and
- the thesis project on the 4th semester

Electives: The remaining 25 ECTS can be obtained by choosing elective courses and projects on the 3rd semester as described below. Note that elective courses might not be offered if less than 10 students sign up.

All modules are assessed through individual grading according to the 7-point scale or Pass/Fail. All modules are assessed by external examination (external grading) or internal examination (internal grading or by assessment by the supervisor only).

Offered as: 1-professional						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Services and Platforms (ESNICTEK1P3N)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Communication Systems (ESNICTEK1K4N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Internet Technologies and Service Architectures (ESNICTEK1K6N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Security in IoT and Cloud Architectures (ESNCYSK1K9)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
2 SEMESTER						
ICT Service Development: Design and Architectures (ESNICTEK2P7)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Identity and Access Management (ESNCYSK2K3)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
User Experience and Computer Ethics (ESNICTEK2K9N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Machine Learning (ESNICTEK2K7A)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3 SEMESTER Option A						

Advanced ICT Solutions (ESNICTEK3P5)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Data Mining and Analysis (ESNICTEK3K10)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3rd semester elective courses (2 courses) Choose 2 course modules	Course	10				
3 SEMESTER Option B						
Project-Oriented Study in an External Organisation (ESNICTEK3P3N)	Project	25	Passed/Not Passed	Internal examination	Oral exam based on a project	English
Data Mining and Analysis (ESNICTEK3K10)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3-4 SEMESTER Option C: Long Master's Thesis						
Master's Thesis (ESNICTEK4P5)	Project	45	7-point grading scale	External examination	Master's thesis/final project	English
Data Mining and Analysis (ESNICTEK3K10)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3rd semester elective courses (2 courses) Choose 2 course modules	Course	10				
3-4 SEMESTER Option D: Long Master's Thesis						
Master's Thesis (ESNICTEK4P6)	Project	50	7-point grading scale	External examination	Master's thesis/final project	English
Data Mining and Analysis (ESNICTEK3K10)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3rd semester elective courses (1 course) Choose 1 course module	Course	5				
4 SEMESTER						
Master's Thesis (ESNICTEK4P4)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English

3rd semester elective courses (2 courses) Choose 2 course modules						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Algorithmic Content Exposure (ESNICTEK3K6N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Enterprise Security and Compliance (ESNICTEK3K6)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Privacy Engineering (ESNCYSK3K7)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Green ICT - Sustainable Business Development (ESNICTEK3K11)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

3rd semester elective courses (1 course) Choose 1 course module						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Algorithmic Content Exposure (ESNICTEK3K6N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Enterprise Security and Compliance (ESNICTEK3K6)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Privacy Engineering (ESNCYSK3K7)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Green ICT - Sustainable Business Development (ESNICTEK3K11)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

The master's thesis can be conducted as a long master's thesis. If choosing to do a long master's thesis, it has to include experimental work and has to be approved by the study board. The amount of experimental work must reflect the allotted ECTS-credits.

§ 19: ADDITIONAL INFORMATION

All students who have not participated in Aalborg University's PBL introductory course during their Bachelor's degree must attend the introductory course "Problem-based Learning and Project Management". The introductory course must be approved before the student can participate in the project exam. For further information, please see Department of Electronics System's website.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the dean and enters into force as of 1 September 2024.

The Study Board does not offer teaching after the previous curriculum from 2023 after the summer examination 2025.

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

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

The Vice dean of Education has on February 12, 2025, approved that the prerequisite for enrollment for the exam is erased in the module *ICT Service Development: Design and Architectures*, valid from Spring 2025.