AALBORG UNIVERSITET

CURRICULUM FOR THE NORDIC MASTER IN SUSTAINABLE ICT SOLUTIONS, 2021

MASTER OF SCIENCE (MSC) IN ENGINEERING
COPENHAGEN

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

§ 2: BASIS IN MINISTERIAL ORDERS

The Master's programme is organised in accordance with the Ministry of Higher Education and Science's Order no. 20 of January 9, 2020 on Bachelor's and Master's Programmes at Universities (the Ministerial Order of the Study Programmes) with subsequent changes, Ministerial Order no. 247 of March 13, 2015 on International Programmes at Universities (the Ministerial Order of International Study Programmmes) with subsequent changes and Ministerial Order no. 22 of January 9, 2020 on University Examinations (the Examination Order) with subsequent changes. Further reference is made to Ministerial Order no. 153 of February 26, 2020 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order).

§ 3: CAMPUS

The programme is offered partly at Lappeenranta University of Technology (LUT), Finland and partly at Aalborg University 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:

- Elektronik og IT (AAU)
- Computerteknologi (former Internetteknologier og computersystemer) (AAU)
- Softwareteknologi (DTU) (BSc or BEng)
- Netværksteknologi og IT (DTU) (BSc)
- IT-Elektronik (DTU) (BEng)
- IT og økonomi (DTU) (BEng)

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 med specialiseringen Nordic Master in Sustainable ICT Solutions. The

English designation is: Master of Science (MSc) in Engineering (Innovative Communication Technologies and Entrepreneurship with the specialisation Nordic Master in Sustainable ICT Solutions)

§ 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
- has knowledge on sustainable ICT solutions 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
- has in depth knowledge about requirement engineering in development of sustainable ICT solutions
- has a holistic understanding of the environment of ICT services and solutions: Scenarios of use, target users, stakeholders, business aspects, and societal implications at large
- has in-depth knowledge of service enablers, personalization and the use of context information for enrichment of services
- has knowledge on state-of-the-art network technologies, Internet technologies and service architectures, e.g. Internet of Things, cloud architectures, heterpgeneous networks, distributed systems, and Application Programming Interfaces (APIs)
- has knowledge of machine learning algorithms and their application
- understands the importance of public and non-governmental governance structures for the development and use of ICTs
- has in-depth knowledge and understanding of ICT-related sustainable business models and green solutions

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 ICT
- Can apply research design principles in the development of semester projects
- 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 sustainable 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 apply machine learning techniques to analyse and process data as part of a service
- can assess the implications and business potential of new ICT solutions and services and develop viable business models and strategies
- can develop Green ICT solutions

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
- can mediate collaboration and information exchange between development- and business-related functions in organizations.
- has competencies in innovation and entrepreneurship that can be used to transform the potentials of new ICT technologies into new sustainable solutions and services with an engineering approach

- has competencies in sustainability that can be used to formulate strategies exploiting the potentials of new ICT technologies to develop state of the art ICT solutions

§ 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

Apart from these modes and methods of teaching the Nordic Maser in Sustainable ICT Solutions will utilize the potential of digital technologies and use distance-learning methods to enable collaboration in teaching and project supervision between AAU and LUT

§ 18: OVERVIEW OF THE PROGRAMME

The Nordic Master in Sustainable ICT Solutions will follow the structures depicted in the following figure.

First Semester at LUT (30 ECTS)
Project work - Services and Platforms Theme: ICT Solutions for SDGs – 15 ECTS
Introduction to Sustainability - 3 ECTS
Requirements Engineering – 6 ECTS
Research Design and Methods - 6 ECTS

Second Semester at AAU (30 ECTS)
Project work – IICT Service Development: Design and Architectures for sustainabilty - 15 ECTS
Identity and Access Management – 5 ECTS
User Experience and Computer Ethics - 5 ECTS
Electives (1 course): • Internet Services and Governance - 5 ECTS

- Machine Learning – 5 ECTS

Third Semester at AAU (30 ECTS)	Third Semester at LUT (30 ECTS)
Project work –Sustainable Digital Transformation – 15 ECTS	Project work – Innovation and Digital Sustainability – 12 ECTS
Green ICT – Sustainable Business Development – 5 ECTS	Software Engineering Models and Methods – 6 ECTS
Electives (2 courses): • Managerial Economics and Entrepreneurship – 5 ECTS • Internet Technologies and Service Architectures – 5 ECTS • Communication Systems – 5 ECTS • Privacy Engineering – 5 ECTS • Algorithmic content exposure – 5 ECTS	Electives (2 courses): • Personal Literature Study – 6 ECTS • Sustainability and IT – 6 ECTS • Sustainability Assessment in Software and Services - 6 ECTS • Digitalization and Sustainability - 6 ECTS
Project-oriented Study in an External Organisation – 25 ECTS	

Fourth Semester (30 ECTS)
Project work – Theme Master Thesis - 30 ECTS

In total, 85 ECTS out of 120 ECTS are common for all students. The common part consists of:

- All courses and the project on the first semester
- 2 mandatory courses and the semester project on the second semester
- The thesis project on the fourth semester

The first semester is offered at LUT, however, as the education is based on PBL all students who have not participated in Aalborg University's PBL introductory course during their Bachelor's programme must follow the PBL workshops from AAU in the beginning of the semester.

Electives: The remaining 35 ECTS can be obtained by choosing elective courses and projects on the 2nd and 3rd semester as described below. Note that elective courses might not be offered if less than 10 students sign up.

The master thesis project is carried out at the university, which is chosen for the third semester.

All semester projects as well as the master thesis project have joint supervision from AAU and LUT.

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 Specialisation: Nordic master in Sustainable ICT Solutions						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER LUT						

ICT Solutions for SDGs (ESNNORK1P1)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Introduction to Sustainability (ESNNORK1K1)	Course	3	7-point grading scale	Internal examination	Written or oral exam	English
Requirements Engineering (ESNNORK1K2)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English
Research Design and Methods (ESNNORK1K3)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English
2 SEMESTER AAU						
ICT Service Development: Design and Architectures for sustainability (ESNICTEK2P6)	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 (ESNICTEK2K8N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
2nd Semester elective courses (1 course) (AAU) Choose 1 course	Course	5				
3 SEMESTER Option A - AAU						
Sustainable Digital Transformation (ESNICTEK3P4N)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Green ICT - Sustainable Business Development (ESNICTEK3K7N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3rd Semester Elective Courses (2 Courses) AAU Choose 2 Course Modules	Course	10				
3 SEMESTER Option B - LUT						
Innovation and Digital Sustainability (ESNNORK3P1)	Project	12	7-point grading scale	Internal examination	Oral exam based on a project	English
Software Engineering Models and Methods (ESNNORK3K1)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English
3rd Semester Elective Courses (2 Courses) LUT Choose 2 Course Modules	Course	12				
3 SEMESTER Option C - AAU						
Project-Oriented Study in an External Organisation (ESNICTEK3P3N)	Project	25	Passed/Not Passed	Internal examination	Oral exam based on a project	English
Green ICT - Sustainable Business Development (ESNICTEK3K7N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
4 SEMESTER AAU / LUT						

Master's Thesis (ESNICTEK4P1)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English

2nd Semester elective courses (1 course) (AAU)
Choose 1 course

Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Internet Services and Governance (ESNICTEK2K6N)	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

3rd Semester Elective Courses (2 Courses) AAU
Choose 2 Course Modules

Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Managerial Economics and Entrepreneurship (ESNICTEK3K8N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Communication Systems (ESNICTEK1K4N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Privacy Engineering (ESNCYSK3K2)	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
Algorithmic Content Exposure (ESNICTEK3K6N)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

3rd Semester Elective Courses (2 Courses) LUT
Choose 2 Course Modules

Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Personal Literature Study (ESNNORK3K2)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English
Sustainability and IT (ESNNORK3K3)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English
Sustainability Assessment in Software and Services (ESNNORK3K4)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English
Digitalisation and Sustainability (ESNNORK3K5)	Course	6	7-point grading scale	Internal examination	Written or oral exam	English

§ 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.

The Study Board can grant exemption from the requirement that the student must complete compulsory courses abroad if there are special circumstances.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the dean and enters into force as of 01.09.2021.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

On January 30th, 2023, the Vice-Dean of Education has approved the revision of the 2. semester. The amendment is valid from spring 2023.

On September 20th, 2023, the Vice-Dean of Education has approved a revision of Section 18. On the 3rd Semester the module "Project-oriented Study in an External Organisation" has been added as an Option C. The elective course "Internet Technologies and Service Architectures" has replaced the module "Internet Services and Governance" on the 3rd Semester. The module "Algorithmic Content Exposure" has been added as an elective course on the 3rd Semester. The amendment is valid from autumn 2023.