AALBORG UNIVERSITET

MASTER OF SCIENCE (MSC) IN ENGINEERING (WIRELESS COMMUNICATION SYSTEMS), 2018

MASTER OF SCIENCE (MSC) IN ENGINEERING
AALBORG

Link to this studyline

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§ 1: PREFACE

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum for the Master's programme in the Master's programme in Wireless Communication Systems is stipulated. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for The Technical Faculty of IT and Design

§ 2: BASIS IN MINISTERIAL ORDERS

The Master's programme is organised in accordance with the Ministry of Higher Education and Science's Order no. 1328 of November 15, 2016 on Bachelor's and Master's Programmes at Universities (the Ministerial Order of the Study Programmes) and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 111 of January 30, 2017 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order) with subsequent changes.

§ 3: CAMPUS

The programme is offered in Aalborg.

§ 4: FACULTY AFFILIATION

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

§ 5: STUDY BOARD AFFILIATION

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

§ 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

The Master's programme is associated with the external examiners for engineering educations: electro (In Danish: Censorkorps for Ingeniøruddannelsernes landsdækkende censorkorps; elektro).

§ 7: ADMISSION REQUIREMENTS

Applicants with a legal claim to admission (retskrav):

Applicants with one of the following degrees are entitled to admission:

- Bachelor of Science in Engineering (Electronic Engineering and IT with specialisation in Communication Systems), Aalborg University
- Bachelor of Science in Engineering (Internet Technologies and computer Engineering with specialisation in Communication Systems) , Aalborg University

Applicants without legal claim to admission:

Bachelor's programmes qualifying students for admission:

- Bachelor of Science (BSc) in Engineering (Electronic Engineering and IT with specialisation in Signal Processing) (AAU)
- Bachelor of Science in Engineering (Electronic Engineering and IT with specialisation in Control Engineering), Aalborg University (AAU)
- Bachelor of Science (BSc) in Engineering (Electronic Engineering and IT with specialisation in Informatics) (AAU)
- Bachelor of Science (BSc) in Engineering (Internet Technologies and Computer Engineering with specialization in Signal Processing) (AAU)
- Bachelor of Science (BSc) in Engineering (Internet Technologies and computer Engineering with specialisation in Control Engineering), Aalborg University (AAU)
- Bachelor of Science (BSc) in Engineering (Internet Technologies and Computer Engineering with specialization in Informatics) (AAU)

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Master's programme entitles the graduate to the designation civilingeniør, cand.polyt. (candidatus/candidata polytechnices) i trådløse kommunikationssystemer. The English designation is: Master of Science (MSc) in Engineering (Wireless Communication Systems).

§ 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 successfully completed (passed) programme elements from other Master's programmes in lieu of programme elements in this programme (credit transfer). The Study Board can also approve successfully completed (passed) programme elements from another Danish programme or a programme outside of Denmark at the same level in lieu of programme elements within this curriculum. Decisions on credit transfer are made by the Study Board based on an academic assessment. See the Joint Programme Regulations for the rules on credit transfer.

§ 11: EXEMPTIONS

In exceptional circumstances, the Study Board study can grant exemption from those parts of the curriculum that are not stipulated by law or ministerial order. Exemption regarding an examination applies to the immediate examination.

§ 12: RULES FOR EXAMINATIONS

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

§ 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 (or another foreign language: French, Spanish or German upon approval by the Study Board). If the project is written in English, the summary must be in Danish (The Study Board can grant exemption from this). The summary must be at least 1 page and not more than 2 pages (this is not included in any fixed minimum and maximum number of pages per student). 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 inhis or her native language as well as in English and use reference works etc.

§ 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

Knowledge:

- **Must know** fundamental theories and methods for analysis of a wireless communication system and its subcomponents,
- **Be able to understand** how to describe and account for a block level of a full wireless communication systems.
- **Must possess knowledge of** existing wireless communication systems, including their multiple access principle, basic terminology and overall architecture
- **Must know** some key features of international standards for one or several wireless communication systems
- **Must understand** channel allocation principles and radio resource management as it applies to wireless communication systems
- **Be able to understand** the terminology and methods used to characterize electromagnetic properties of antennas and propagation for wireless communication
- **Be able to understand** the terminology and parameters used to describe and characterize radio propagation mechanisms and channel response, including their impact to functionality and performance of multiple antenna systems

Skills:

- **Must be able to choose between** a series of advanced analysis, simulation or experiments and model tests with relevance to wireless communication
- **Must be able to conduct** a study within a limited context and **critically account** for the observations and their implication
- **Must be able to plan** a wireless communication system for a given set of relevant system specifications and requirements
- **Must be able to evaluate and select** among different multi antenna or radio system techniques for channel stabilization and capacity enhancement
- **Must be able to characterize** propagation channel response as relevant for the wireless communications formats under investigation
- **Must be able to choose** between and **apply** different numerical methods and theories, for the solution of electromagnetic antenna and wave propagation behaviors in wireless communication settings
- **Must be able to communicate** orally and in writing on topics within the field of knowledge, and in particular on the application of relevant techniques, procedures and algorithms used in the solution of the aforementioned problems.

Competences:

- **Must be able to formulate and hypothesize** problems of relevance to the performance of practical wireless communication systems and critically **analyze** these on a link or system level
- **Must be able to account** for the complex multi-agent interaction on a link or system level
- **Must be able to choose between and apply** relevant methods and theories for evaluation and design of specific subsystems or components of particular wireless communication systems under investigations
- **Must be able to perform** a rational selection of practical communication system solutions, including a judicious selection of techniques, procedures and algorithms within the field of knowledge

§ 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 organised 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

Offered as: Study programme: MSc Wireless Communication Systems					
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method
1 SEMESTER					
Wireless Radio Transmission	Project	20	7-point grading scale	Internal examination	Oral exam based on a project
Stochastic Processes	Course	5	7-point grading scale	Internal examination	Written or oral exam
Wireless PHY/MAC Fundamentals	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
2 SEMESTER Option A					
Wireless Communication in Dynamic Settings with focus on Antenna System	Project	25	7-point grading scale	External examination	Oral exam based on a project
Wireless Systems Performance	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
2 SEMESTER Option B					
Wireless Communication in Dynamic Settings with focus on Radio System	Project	25	7-point grading scale	External examination	Oral exam based on a project
Wireless Systems Performance	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
3 SEMESTER Option A					
Multi Agent Wireless Systems	Project	20	7-point grading scale	Internal examination	Oral exam based on a project
Multi Agent Wireless Systems	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
Antennas and Propagation	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
3 SEMESTER Option B1					
Academic Internship	Project	20	7-point grading scale	Internal examination	Oral exam based on a project
Multi Agent Wireless Systems	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
Antennas and Propagation	Course	5	Passed/Not Passed	Internal examination	Written or oral exam

3 SEMESTER Option B2					
Academic Internship	Project	25	7-point grading scale	Internal examination	Oral exam based on a project
3rd Semester Elective courses Choose 1 course	Course	5			
3 SEMESTER Option B3					
Academic Internship	Project	30	7-point grading scale	Internal examination	Oral exam based on a project
3-4 SEMESTER Long Master's Thesis					
Master's Thesis	Project	50	7-point grading scale	External examination	Oral exam based on a project
Multi Agent Wireless Systems	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
Antennas and Propagation	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
4 SEMESTER Master's Thesis					
Master's Thesis	Project	30	7-point grading scale	External examination	Oral exam based on a project

3rd Semester Elective courses Choose 1 course					
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method
Multi Agent Wireless Systems	Course	5	Passed/Not Passed	Internal examination	Written or oral exam
Antennas and Propagation	Course	5	Passed/Not Passed	Internal examination	Written or oral exam

§ 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.

The number of ECTS for the project unit has to be reflected in the scope of the project (e.g. by the theories, methods, and experiments addressed).

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the Dean of The Technical Faculty of IT and Design and enters into force as of 01.09.2018.

Students who wish to complete their studies under the previous curriculum from 2017 must conclude their education by the summer examination period 2019 at the latest, since examinations under the previous curriculum are not offered after this time.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

Minor editorial changes have been made in connection with the digitisation of the study curriculum.