AALBORG UNIVERSITET

CURRICULUM FOR THE MASTER OF SCIENCE (MSC) PROGRAMME IN INTELLIGENT RELIABLE SYSTEMS 2014

MASTER OF SCIENCE (MSC) IN ENGINEERING
ESBJERG

Link to this studyline

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§ 1: PREFACE

Pursuant to Act 367 of March 25, 2013 on Universities (the University Act) with subsequent changes, the following curriculum for the Master's programme in Intelligent Reliable Systems is stipulated. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures of the Faculty of Engineering and Science.

§ 2: BASIS IN MINISTERIAL ORDERS

The Master’s programme is organised in accordance with the Ministry of Science, Innovation and Higher Education’s Order no. 814 of June 29, 2010 on Bachelor’s and Master’s Programmes at Universities (the Ministerial Order of the Study Programmes) and Ministerial Order no. 666 of June 24, 2012 on University Examinations (the Examination Order) with subsequent changes. Further reference is made to Ministerial Order no. 1488 of December 16, 2013 (the Admission Order) and Ministerial Order no. 250 of March 15, 2007 (the Grading Scale Order) with subsequent changes.

§ 3: CAMPUS

The programme is offered in Esbjerg.

§ 4: FACULTY AFFILIATION

The Master’s programme falls under the The Faculty of Engineering and Science, Aalborg University.

§ 5: STUDY BOARD AFFILIATION

The Master’s programme falls under the Study Board of Build, Energy, Electronics and Mechanics in Esbjerg

§ 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

The Master's programme is affiliated to the nationwide engineering examiners corps: Ingeniøruddannelsernes landsdækkende censorkorps.

§ 7: ADMISSION REQUIREMENTS

Admission to the Master’s programme requires a Bachelor’s or Bachelor of Engineering degree in:

- Electronic Engineering and IT (AAU)
- Computer Engineering (AAU)
- Electronic and Computer Engineering (AAU)
- Electrical Engineering (DTU)

or similar.

Students with another Bachelor's degree, upon application to the Study Board, will be admitted after a specific academic assessment if the applicant is deemed to have comparable educational prerequisites. The University can stipulate requirements concerning conducting additional exams prior to the start of study.

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.

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Master’s programme entitles the graduate to one of the following designations:

Civilingeniør, cand.polyt. (candidatus/candidata polytechnices) i intelligente pålidelige systemer. The English designation is: Master of Science (MSc) in Engineering (Intelligent Reliable 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 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 in modern English and use reference works, etc., in other European languages.

§ 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 of Science programme has the following qualifications

Knowledge

- Has knowledge in one or more subject areas that, in selected areas within intelligent reliable systems, is based on the highest international research in a subject area

- Can understand and, on a scientific basis, reflect over subject area's related to information technology and identify scientific problems within that area
    - Demonstrate an understanding of research work and be able to become a part of the research environment
    - Has knowledge and comprehension within advanced control theory and its applications
    - Has a thorough understanding of probabilistic, statistics and stochastic theories and methods, and their application in the reliability modeling and analysis
    - Has understanding of fault detection, diagnosis and fault tolerant control of engineering systems

Skills

- Excels in scientific methods, tools and general skills within information technology
- Can evaluate and select among the subject area's(s') scientific theories, methods, tools and general skills and, on a scientific basis, advance new analyzes and solutions
- Can communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists
- Have obtained skills which are related to the employment area within intelligent information and control technology
- Can design and develop intelligent reliable systems using state of the art theories and methods within control engineering
- Able to apply systematic methods for modelling complex mechanical structures dynamically in both planar and spatial cases

Competences

- Can manage work and development situations that are complex, unpredictable and require new solutions within the area of information technology
- Can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility.
- Can independently take responsibility for own professional development and specialization
- Has competencies in design, development and test of intelligent and reliable automation systems
- Has competencies within system identification, fault detection, reliability and diagnosis
- Can contribute to the scientific development within intelligent reliable systems
- Can prioritize and build optional competencies in: modeling of mechanical structures, Kalman filtering, adaptive control, supervised/unsupervised learning and artificial intelligence

§ 17: STRUCTURE AND CONTENTS OF THE PROGRAMME

The programme is structured in modules and organized 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)
- teacher feedback
- reflection
- portfolio work

Completion of the Master's programme

The Master's programme must be completed no later than four years after it was begun.

AAU Micro

AAU Micro are small e-learning modules of limited, well-defined scope. AAU Micro modules are extra-curricular but may be employed to support learning in curricular course and project modules.

§ 18: OVERVIEW OF THE PROGRAMME

An overview of the four semesters is shown in the table below.

Offered as: 1-professional						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
System Identification and Estimation (N-IRS-K1-1)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Stochastic Processes (N-IRS-K1-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
System Identification and Diagnosis (N-SEE-K1-3)	Course	5	7-point grading scale	Internal examination	Oral exam	English
Elective Courses 1st Semester One course must be chosen	Course	5				
2 SEMESTER						
Fault Diagnosis and Reliability Analysis (N-IRS-K2-1)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Control and Surveillance Processes and Systems (N-IRS-K2-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Fault Detection and Diagnosis Techniques (N-IRS-K2-3)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Reliability Modeling and Analysis (N-IRS-K2-4)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3 SEMESTER						
Elective Projects 3rd Semester One project must be chosen	Project	20				
Elective Courses 3rd Semester Two courses must be chosen	Course	10				
4 SEMESTER Master's Thesis						
Master's Thesis (N-IRS-K4)	Project	30	7-point grading scale	External examination	Oral exam based on a project	English
3-4 SEMESTER Long Master's Thesis						
Master's Thesis (N-IRS-K4LONG)	Project	50	7-point grading scale	External examination	Oral exam based on a project	English

Elective Courses 3rd Semester Two courses must be chosen	Course	10				

Thesis project: Students may choose either a 30 ECTS or a 50 ETCS thesis project. In the latter case the learning objectives for the thesis include both the learning objectives for the projects on 3rd and 4th semesters.

Elective Courses 1st Semester One course must be chosen						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Advanced Modeling of Dynamic Systems (N-IRS-K1-4)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Kalman Filter Theory and its Application (N-IRS-K1-5)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Structural Mechanics and Dynamics (N-IRS-K1-6)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Elective Projects 3rd Semester One project must be chosen						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Advanced Control and Estimation (N-IRS-K3-1)	Project	20	7-point grading scale	Internal examination	Oral exam based on a project	English
Design of Intelligent Reliable Systems (N-IRS-K3-2)	Project	20	7-point grading scale	Internal examination	Oral exam based on a project	English

Elective Courses 3rd Semester Two courses must be chosen						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Machine Learning (N-IRS-K3-3)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Intelligent Control and Reliability Oriented Design (N-IRS-K3-4)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Adaptive and Optimal Control (N-IRS-K3-5)	Course	5	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 the School of Engineering and Science's website on Problem Based Learning and Project Management.

The current version of the study curriculum is published on the Aalborg University website for study curricula.

Additional information about semester descriptions is available in Moodle which is the school room for School of Engineering and Science (SES). Moodle provides study-related information, i.e. course descriptions, course literature, timetables and information about activities and events.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the Dean of the Faculty of Engineering and Science and enters into force as of September 2014.

Students who wish to complete their studies under the previous curriculum from Intelligent Information Systems must conclude their education by the summer examination period Summer 2015 at the latest, since examinations under the previous curriculum are not offered after this time.

In accordance with the Joint Programme Regulations of the Faculty of Engineering and Science at Aalborg University, the curriculum must be revised no later than 5 years after its entry into force.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

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

The Vice-dean has on November 24, 2023, approved an addition of Micro Modules in section 17, valid from spring 2024.