AALBORG UNIVERSITET

CURRICULUM FOR THE MASTER'S PROGRAMME IN CONTROL AND AUTOMATION, 2019

MASTER OF SCIENCE (MSC) IN ENGINEERING
AALBORG

Link to this studyline

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

Curriculum for Master's Programme in Control and Automation, 2020

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§ 1: PREFACE

Pursuant to consolidation Act 172 of February 27, 2018 on Universities (the University Act) with subsequent changes, the following curriculum is established. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for The Faculty.

§ 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) with subsequent changes and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order) with subsequent changes. Further reference is made to Ministerial Order no. 106 of February 12, 2018 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order).

§ 3: CAMPUS

The programme is offered in Aalborg.

§ 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 programme is affiliated with the Nationwide engineering examiners/Electronics, IT and Energy (Electromagnetic direction).

§ 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 (BSc) in Engineering (Electronic Engineering and IT with specialisation in Control Engineering), Aalborg University
- Bachelor of Science (BSc) in Engineering (Internet Technologies and Computer Engineering with specialisation in Control Engineering), Aalborg University
- Bachelor of Science (BSc) in Engineering (Robotics); 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 Communication Systems) (AAU)
- Bachelor of Science (BSc) in Engineering (Electronic Engineering and IT with specialisation in Signal Processing) (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 Communication Systems) (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 specialization in Informatics)
- Bachelor of Science (BSc) in Engineering (Energy Engineering)
- Bachelor of Science (BSc) in Engineering (Mathematical Engineering)
- Bachelor of Science (BSc) in Engineering (Electronics and Computer Engineering) (AAU Esbjerg)

- Bachelor of Engineering (BScEE) in Electronics (AAU)
- Bachelor of Engineering (BScEE) in Electronics (AU)
- Bachelor of Engineering (BScEE) in Electronics (SDU)

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Master's programme entitles the graduate to the designation Civilingeniør, cand.polyt. i regulering og automation.

The English designation is: Master of Science (MSc) in Engineering (Control and Automation).

§ 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 his 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:

- Has scientifically based knowledge about modelling and control methods for complex control systems
- Has an understanding of the concept of modern control
- Must understand analytical, numerical and experimental methods for analysis and design of complex control systems
- Has knowledge about distributed systems and data networks for control purposes
- Has knowledge in one or more subject areas that is based on the highest international research within the fields of control engineering

Skills:

- Can analyse and apply modern control methods for multi input/multi output systems.
- Demonstrate insight in relevant theories, methods and techniques used for distribution, storage and processing of data in a distributed system
- Can apply data networks for control purposes
- Demonstrate insight in real-time, performance, safety and robustness aspects
- Can apply modeling methods for dynamic mechanical and thermal systems
- Can analyse specific control methods used for control of mechanical or thermal systems.
- Can select and apply advanced methods of control and estimation when applied to complex systems.
- Demonstrate comprehension of optimal and robust control theory
- Can apply appropriate methods of analysis for investigating control problems in industrial plants.
- Can communicate research-based knowledge and discuss professional and scientific problems with peers as well as non-specialists, using the correct terminology.

Competences:

- Can select and apply appropriate methods for solving a given problem within control and automation and evaluate the results regarding their accuracy and validity
- Can identify scientific problems within control and automation and select and apply proper scientific theories, methods and tools for their solution
- Can develop and advance new analyses and solutions within control and automation
- Can manage work-related situations that are complex and unpredictable, and which require new solutions
- Can initiate and implement discipline-specific as well as interdisciplinary cooperation and assume professional responsibility
- Can take responsibility for own professional development and specialisation.
- Work according to a scientific method and present results in the form of a scientific article and at a seminar/scientific conference
- Formulate and explain scientific hypotheses and results achieved through scientific work
- Analyse results and draw conclusions on a scientific basis

§ 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: 1-professional						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Networked Control Systems (ESNCAK1P1)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Stochastic Processes (ESNCAK1K1F)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Distributed Real Time Systems (ESNCAK1K2F)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Multivariable Control (ESNCAK1K3)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
2 SEMESTER						
Multivariable Process Control (ESNCAK2P1N)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Modeling of Mechanical and Thermal Systems (ESNCAK2K1)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Optimality and Robustness (ESNCAK2K2)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
2nd Semester Elective course (1 course) Choose 1 course module		5				
3 SEMESTER						

Option A						
Control of Complex Systems (ESNCAK3P1)	Project	20	7-point grading scale	Internal examination	Oral exam based on a project	English
3rd Semester Elective courses (2 courses) Choose 2 course modules		10				
3 SEMESTER Option B						
Project-Oriented Study in an External Organisation (ESNCAK3P2N)	Project	20	7-point grading scale	Internal examination	Oral exam based on a project	English
3rd Semester Elective courses (2 courses) Choose 2 course modules		10				
3 SEMESTER Option C						
Project-Oriented Study in an External Organisation (ESNCAK3P3N)	Project	25	7-point grading scale	Internal examination	Oral exam based on a project	English
3rd Semester Elective course (1 course) Choose 1 course module		5				
3 SEMESTER Option D						
Project-Oriented Study in an External Organisation (ESNCAK3P4N)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
3-4 SEMESTER Long Master's Thesis						
Master's Thesis (ESNCAK4P2)	Project	50	7-point grading scale	External examination	Master's thesis/final project	English
3rd Semester Elective courses (2 courses) Choose 2 course modules		10				
4 SEMESTER Master's Thesis						
Master's Thesis (ESNCAK4P1)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English

2nd Semester Elective course (1 course) Choose 1 course module						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Fault Detection, Isolation and Modelling (ESNNDSK2K1)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Robot Vision (ESNVGISK2K2)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English

3rd Semester Elective course (1 course) Choose 1 course module						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Systems of Systems/Complex Systems (ESNCAK3K1F)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Non-linear Control (ESNCAK3K2F)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Machine Learning (ESNSPAK3K2F)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English

3rd Semester Elective courses (2 courses) Choose 2 course modules						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Systems of Systems/Complex Systems (ESNCAK3K1F)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Non-linear Control (ESNCAK3K2F)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Machine Learning (ESNSPAK3K2F)	Course	5	Passed/Not Passed	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 course description.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the dean and enters into force as of 01.09.2019.

The Study Board does not offer teaching under the previous curriculum from 2018 after the summer examination period 2020.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

On December 5, 2019, the Pro-dean has approved that the students on their 2nd semester (spring 2020) can choose between the following courses:

- Fault Detection, Isolation and Modelling
- Robot Vision