The Faculty of Engineering and Science
The Study Board of Mathematics, Physics and Nanotechnology

AALBORG UNIVERSITY
DENMARK

Curriculum for the Master's Programme in Mathematical Engineering

Aalborg University
September 2018

Campus Aalborg

Preface:

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum is stipulated. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for The Faculty of Engineering and Science, The Faculty of Medicine and The Technical Faculty of IT and Design.

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Chapter 1: Legal Basis of the Curriculum, etc.

1.1 Basis in ministerial orders

The Master's programme is organised in accordance with the Ministry Higher Education and Science's Ministerial Order no. 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). Further reference is made to Ministerial Order no. 111 of January 30, 2017 (the Admission Order) and Ministerial Order no. 114 of February 13, 2015 (the Grading Scale Order) with subsequent changes.

1.2 Faculty affiliation

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

1.3 Study Board affiliation

The Master's programme falls under the Study Board of Mathematics, Physics and Nanotechnology.

1.4 External Examiners Corps

The Master's programme is associated with the Body of External Examiners for Engineers (Ingeniørernes landsdækkende censorkorps (elektronik-delen)). The Body of External Examiners for Mathematics (Censorkorpset for matematik) can also be used.

Chapter 2: Admission, Degree Designation, Programme Duration and Competence Profile

2.1 Admission

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 (Mathematical Engineering), Aalborg University

Applicants without legal claim to admission:

- Bachelor of Science (BSc) in Engineering (Mathematical Engineering), Technical University of Denmark (DTU)

2.2 Degree designation in Danish and English

The Master's programme entitles the graduate to the designation civilingeniør, cand.polyt. (candidatus/candidata polytechnices) i matematik-teknologi. The English designation is: Master of Science (MSc) in Engineering (Mathematical Engineering).

2.3 The programme's specification 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.

2.4 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 on the basis of 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.

2.5 Competence profile of the programme:

The graduate of the Master's programme:

Knowledge

- has knowledge in one or more of the areas applied mathematics, engineering science, and their interaction. The knowledge should, in selected areas, be based on the highest level of international research.
- can understand and on a solid mathematical and engineering basis reflect over the area's knowledge base and be able to identify relevant mathematical and technological problems.

Skills

- excels in the subject area's(s') scientific methods and tools and general skills related to employment within the subject area(s)
- can evaluate and select among the subject area's(s') scientific theories, methods, tools and general skills and, on a scientific basis, advance new analyses and solutions
- can communicate scientific knowledge and discuss professional and scientific problems with both peers and non-specialists

Competencies

- 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 specialization

Chapter 3: Content and Organisation 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)
- teacher feedback
- reflection
- portfolio work

Overview of the programme:

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).

General provisions concerning courses:

- Only a limited number of elective courses will be offered at each semester.
- Some mandatory courses are only offered every other year.
- Students can only participate once in a course with a given title. In particular, they cannot follow a course if they have previously participated in a course with the same title as part of a bachelor programme.
- Courses from a bachelor programme must include extra competencies when followed on the master programme.

Semester		Project = P Course = C	Module	ECTS	Assessment	Exam
MATTEK7		P	Information Processing in Technical Systems	15	7-point scale	Internal
		C	Information and Coding Theory	5	7-point scale	Internal
		C	Machine Learning	5	Pass/Fail	Internal
		C	Array and Sensor Signal Processing	5	Pass/Fail	Internal
MATTEK8		P	Project – Signal/Data Processing Systems	15	7-point scale	External
		C	Compressive Sensing	5	Pass/Fail	Internal
			Elective courses (valgfag) The student selects courses equivalent to 10 ECTS:			
		C	Time Series and Econometrics (MATØK6+)	5	7-point scale	Internal
		C	Bayesian Inference and Mixed Models (MAT8)	5	Pass/Fail	Internal
		C	Spatial Statistics and Markov Chain Monte Carlo Methods (MATTEK6+)	5	Pass/Fail	Internal
MATTEK9	A	P	Selected Advanced Topics in Mathematics and Technology with a Focus on Mathematical Problems	30	7-point scale	Internal
	Or B	P	Selected Advanced Topics in Mathematics and Technology with a Focus on Technical Problems	30	7-point scale	Internal
	Or C		Study at another university, must be approved by the Study Board	30	Transfer of credits	Transfer of credits
	Or D	P	Long Master's Thesis[1] must be approved by the Study Board	+30	7-point scale	External
MATTEK10		P	Master's Thesis	30, possible 60	7-point scale	External
Total				120		

[1] See module description for the Master's thesis. The Long Master's thesis, which must be of experimental character, is prepared in the 3rd and 4th semesters; the extent is 60 ECTS.

3.1 Descriptions of modules

3.1.1 Project on 1'st semester, MATTEK7

Information Processing in Technical Systems / Informationsbehandling i teknologiske systemer

Objective: Students who have completed the module meet the following criteria:

Knowledge:
- have knowledge about modern statistical signal processing and its application to information processing systems
- have knowledge about information and coding theory and their application to information and communication technology systems and/or machine learning and its applications to technical science

Skills:
- must be able to perform an analysis of complex theoretical problems, where there is a need for tools from statistical signal processing, information theory or machine learning
- must be able to handle problems with noisy data and signals
- must be able to design algorithms solving a given technical problem

Competencies:
- must be able to discuss and reason at the given level using mathematical terms from modern signal processing, as well as information theory, coding theory or machine learning
- must be able to both orally and in writing to present precise and reproducible documentation for the solutions developed

Type of instruction: Project work.

Exam format: Group exam based on a written report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

3.1.2. Courses on 1'st semester, MATTEK7

Information and Coding Theory / Information og kodningsteori

Recommended academic prerequisites: The module builds on knowledge obtained by the modules Probability Theory and Linear Algebra on the Bachelor of Science (BSc) in Engineering (Mathematical Engineering)

Objective: Students who have completed the module meet the following criteria:

Knowledge:
- knowledge of information theoretical concepts such as entropy, mutual information, divergence, the chain rule for entropy, empirical entropy
- knowledge of lossless data compression, entropy coding, lossy data compression (rate distortion theory)
- knowledge of channel capacity and error-correcting codes
- knowledge of joint source-channel coding and the separation principle

Skills:
- are able to give a theoretical description of the entropy of a signal and in practice estimate the entropy of simple signals
- are able to design efficient entropy codes for simple signals
- are able to use information inequalities to provide bounds on optimal performance of simple systems
- arte able to construct error-correcting codes with good properties and parameters
- are able to decode error-correcting codes efficiently (e.g. Reed-Solomon codes)
- understand the interaction between bitrate and distortion (reconstruction error) in connection with source coding
- understand the interaction between bitrate and error probability in connection with channel coding
- are able to perform calculations in finite fields

Competencies:
- have a good intuition and understanding of the concept of entropy and its significance regarding the information within a signal
- be able to use mathematical tools to discover and investigate the fundamental mathematical tools that describes data transmission, data reduction and data storage

Type of instruction: As described in the introduction to Chapter 3.

Exam format: Individual oral or written exam. In order to participate in the course evaluation, students must have actively participated in course progress by way of one or several independent oral and/or written contributions.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Machine Learning / Machine Learning

Recommended academic prerequisites: The module builds on knowledge obtained by the modules Probability Theory, Spatial Statistics and Markov Chain Monte Carlo Methods, and Linear Algebra with Applications from the Bachelor of Science (BSc) in Engineering (Mathematical Engineering).

Objective: The course gives a comprehensive introduction to machine learning, which is a field concerned with learning from examples and has roots in computer science, statistics and pattern recognition. The objective is realised by presenting methods and tools proven valuable and by addressing specific application problems.

Students who complete the module will gain knowledge, skills and competences as follows:

Knowledge:

- must have knowledge about supervised learning methods including K-nearest neighbours, decision trees, linear discriminant analysis, support vector machines, and neural networks
- must have knowledge about unsupervised learning methods including K-means, Gaussian mixture model, hidden Markov model, EM algorithm, and principal component analysis
- must have knowledge about probabilistic graphical models, variational Bayesian methods, belief propagation, and mean-field approximation
- must have knowledge about Bayesian decision theory, bias and variance trade-off, and cross-validation
- must be able to understand reinforcement learning

Skills:

- must be able to apply the taught methods to solve concrete engineering problems
- must be able to evaluate and compare the methods within a specific application problem

Competencies:

- must have competencies in analysing a given problem and identifying appropriate machine learning methods to the problem
- must have competencies in understanding the strengths and weaknesses of the methods

Type of instruction: Lectures followed by laboratory exercises, in addition to a mini-project where students will apply appropriate methods to application problems selected from a list of suggestions or proposed by the students themselves.

Exam format: Individual oral exam on the basis of the mini project and the lectures.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Array and Censor Signal Processing / Array- og sensor signalbehandling

Recommended academic prerequisites: The module builds on knowledge obtained by the modules Stochastic Processes and Optimization Methods from the Bachelor of Science (BSc) in Engineering (Mathematical Engineering)

Objective: Students who complete the module:

Knowledge:
- must have knowledge about the Cramér-Rao lower bound (CRLB) as well as (asymptotic) optimal unbiased estimators such as minimum variance unbiased estimator, maximum likelihood, and least-squares
- must have knowledge about 1- and 2-dimensional spectral estimation methods such as the period gram, the Yule-Walker equations, subspace-based methods (MUSIC and ESPRIT), and filter-bank methods (Capon's method and Amplitude and Phase EStimation (APES))
- must have knowledge about fundamental terms and methods applied for design and analysis of adaptive filter such as Steepest descent, least-mean-square (LMS), normalized LMS (NLMS), affine projections (AP), recursive least-squares (RLS), transient and steadystate performance
- must have knowledge about terms and methods applied for design and analysis of multirate signal processing systems, such as Hilbert transform, Noble identities, poly-phase decomposition, commutators, re-sampling, as well as up- and down-sampling

Skills:
- must be able to compare the estimation performance of unbiased estimators by using the CRLB
- must be able to apply methods and algorithms for parametric and non-parametric spectral estimation on 1- and 2-dimensional signals
- must be able to implement fundamental adaptive filters such as the (normalized) leastmean-square filter, the affine projection filter, and the recursive least-squares filter
- must be able to apply fundamental methods for analysis, design, and implementation of poly-phase filters

Competencies:
- must have competencies in analysing a given problem which in its solution requires advanced signal processing methodologies and next identify appropriate methods and algorithms to solve the problem

- must have competencies in understanding the strengths and weaknesses of the methods

Type of instruction: As described in the introduction to Chapter 3.

Exam format: Individual oral or written examination.

Evaluation criteria: Are stated in the Joint Programme Regulations.

3.2.1 Project on 2'nd semester, MATTEK8

Signal/Data Processing Systems / Signal/databehandlende systemer

Objective: Students who have completed the module meet the following criteria:

Knowledge:

- must have knowledge about compression of one and two dimensional signal/data representations
- must have knowledge about classical and Baysian statistical methods for processing of noisy signals
- must have knowledge about simulation techniques and in particular about Markov chain and Monte Carlo methods
- must have knowledge about how sparse representations and statistical techniques influences real-world data/signals

Skills:

- must be able to use Baysian and hierarchical statistical methods to analyse time series and lattice data and to evaluate the validity of the results obtained
- must be able to use compressed signal/data representations on real or synthetic data and be able to evaluate the quality of the signal/data reconstruction

Competencies:

- are able to communicate results of statistical analyses to non-specialists within advanced signal processing
- are able to independently develop statistical models suitable for analysis of real-world signals such as noisy digital images or communication signals
- are able to use sparse representations and/or statistical methods to solve a given practical problem and, if needed, make minor adjustments to the methods to obtain the wanted functionality

Type of instruction: Project work.

Exam format: Group exam based on a written report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

3.2.2. Courses on 2'nd semester, MATTEK8

The student follows courses equivalent to 15 ECTS. The course Compressive Sensing is mandatory.

Compressive Sensing / Komprimeret signal-/dataanalyse og syntese (obligatorisk)

Objective: Students who have completed the module meet the following criteria:

Knowledge:
- must have knowledge of compressed (sparse) representation of signals/data in one and two dimensions
- must have knowledge of the concepts measurement matrix and dictionary
- must have knowledge of hardware realizations at block level, which use compressive representation of signals/data (e.g. multi-coset and random demodulator architectures)
- must have knowledge of the relation between compressed representation and classical representation of signals/data
- must have knowledge of key concepts and methods within compressed signal/data representation
- must have knowledge of formulation of signal/data reconstruction as different types of optimization problems (e.g. Greedy Pursuit and Orthogonal Matching Pursuit)

Skills:
- must be able to apply compressed signal/data representation in analysis- and/or synthesis-related applications
- must be able to simulate and assess the quality of signals/data which are represented in compressed form

Competencies:
- must be able to assess when compressed signal/data representation is appropriate
- must be able to formulate the basic elements for a given signal/data type and assess the signal/data quality in relation to the number of signal/data components

Type of instruction: As described in the introduction to Chapter 3.

Exam format: Individual oral or written exam. In order to participate in the course evaluation, students must have actively participated in course progress by way of one or several independent oral and/or written contributions.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Time Series and Econometrics / Tidsrækkeanalyse og økonometri

Recommended academic prerequisites: The module builds on knowledge obtained by the module Statistical Inference for Linear Models from the Bachelor of Science (BSc) in Engineering (Mathematical Engineering)

Objectives: Students who have completed the module meet the following criteria:

Knowledge:

- know about conditioning in the multivariate normal distribution as well as ordinary and generalized least squares methods
- are able to understand a time series as a stochastic process and understand the connection between stochastic processes and dynamical systems, and in particular the Box-Jenkins models (ARMA-type models)
- know about various stationarity and non-stationarity concepts for Time Series: Weak and strong stationarity, causality, autocovariance- and autocorrelation functions, integrated models, long memory models, volatility models, and basic state-space models
- know about various modern time series and econometric models within financial econometrics and financial engineering in discrete time

Skills:

- are able to interpret the statistical and possibly econometric properties of time series
- are able to implement all phases in a classical time series analysis: Identification, estimation, diagnostic checking, prediction, and statistical/econometric interpretation
- are able to use correlograms and other graphical tools in the identification phase
- are able to apply and make themselves acquainted with new statistical methods to analyse time series

Competencies:

- are able to apply the concepts from time series in an econometric or other broader context
- are able to perform qualified econometric analyses of financial and other data including estimation and prediction using available software
- are able to reflect on the discipline's approach to academic problems at a high level and the discipline's relationship to other subject areas
- are able to involve the knowledge area in solving complex problems and thus achieve a new understanding of a given subject area

Type of instruction: As described in the introduction to Chapter 3.

Exam form: Individual oral or written exam. In order to participate in the course evaluation, students must have actively participated in course progress by way of one or several independent oral and/or written contributions.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Bayesian Inference and Mixed Models / Bayesiansk inferens og modeller med tilfældige effekter

Recommended academic prerequisites: The module builds on knowledge obtained by the module Statistical Inference for Linear Models from the Bachelor of Science (BSc) in Engineering (Mathematical Engineering.

Objective: Students who have completed the module meet the following criteria:

Knowledge:
- have knowledge of the general linear model with random effects
- have knowledge of maximum likelihood inference for the general linear model with random effects
- have knowledge of prediction of random effects
- have knowledge of Bayesian inference
- have knowledge of prior distributions in Bayesian inference
- have knowledge of computational aspects of Bayesian inference

Skills:
- can for a specific dataset identify possible sources of random variation and formulate a relevant model with random effects
- can perform maximum likelihood- and Bayesian inference for the formulated model

Competencies:
- can account for methodology and practical inference for different approaches to models with random effects

Type of instruction: As described in the introduction to Chapter 3.

Exam format: Individual oral or written exam. In order to participate in the course evaluation, students must have actively participated in course progress by way of one or several independent oral and/or written contributions.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Spatial Statistics and Markov Chain Monte Carlo Methods / Rumlig statistik og Markovkæde Monte Carlo-metoder

Recommended academic prerequisites: The module builds on knowledge obtained by the module Statistical Inference for Linear Models from the Bachelor of Science (BSc) in Engineering (Mathematical Engineering)

The course deals with Markov chain Monte Carlo methods as well as one or more of the three main topics within spatial statistics.

Objective: Students who have completed the module meet the following criteria:

Knowledge:

- know the fundamental models and methods within the chosen main topics (geostatistics, lattice processes or spatial point processes) as well as Markov chain Monte Carlo.
- have knowledge about the following subjects within the chosen main topic(s)
    - Geostatistics:
      Theory for second order stationary processes, variograms/covariograms, prediction and kriging, as well as model based geostatistics
    - Lattice processes:
      Markov fields, Brook's factorisation and Hammersley-Clifford's theorem and likelihood based statistical analysis
    - Spatial point processes:
      Poisson processes, Cox processes and Markov point processes, as well as statistical analyses based on non-parametric methods (summary statistics) and likelihood based methods
    - Markov chain Monte Carlo:
      Fundamental theory of Markov chains with a view to simulation, Markov chain Monte Carlo methods for simulation of distributions, including the Metropolis-Hastings algorithm and the Gibbs sampler

Skills:

- are able to explain the main theoretical results from the course
- are able to perform statistical analyses of concrete datasets
- are able to simulate the examined models

Competencies:

- are able to interpret a spatial statistical model in relation to a concrete dataset and give an account of the limitations of the model with respect to describing the variation in the dataset using the theoretical results within spatial statistics
- are able to simulate distributions using Markov chain Monte Carlo methods and evaluate the output of the Markov chain

Type of instruction: As described in the introduction to Chapter 3.

Exam format: Individual oral or written exam, or individual ongoing evaluation. In order to participate in the exam, students must have actively participated in course progress by way of one or several independent oral and/or written contributions.

Evaluation criteria: Are stated in the Joint Programme Regulations.

3.3.1 Projects on 3'rd semester, MATTEK9

Project A

Selected Advanced Topics in Mathematics and Technology with a Focus on Mathematical Problems / Specialisering i videregående matematiske og teknologiske emner med fokus på matematiske problemstillinger

Objective: Students who have completed the module meet the following criteria:

Knowledge:
- must have extensive knowledge of relevant theory and methods within one or more selected areas of mathematics, and to a lesser degree, knowledge about one or more areas within engineering science
- must have extensive knowledge about one or more applications of the theory and methods
- must be able to understand, and to reflect scientifically over knowledge within mathematics and engineering science and to be able to identify mathematical and technological problems

Skills:
- are able to independently to apply relevant mathematical theory and methods to identification, statement and analysis of technological problems
- are able to communicate research based knowledge, and is able to discuss professional and scientific problems with peers both within mathematics and engineering science, as well as with non-specialists

Competencies:
- are able to independently to initiate and complete interdisciplinary development projects based on advanced mathematical modelling and methods from engineering science, and is able in that context, to professionally take charge of implementing derived models and methods
- are able to independently to take charge of self-development and one's own professional development and specialization within mathematics and engineering science

Type of instruction: Project work.

Exam format: Group exam based on a written report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Project B

Selected Advanced Topics in Mathematics and Technology with a Focus on Technical Problems / Specialisering i videregående matematiske og teknologiske emner med fokus på teknologiske problemstillinger

Objective: Students who have completed the module meet the following criteria:

Knowledge:

- must have extensive knowledge of relevant theory and methods within one or more selected areas of engineering science, and to a lesser degree, knowledge about one or more areas within mathematics
- must have extensive knowledge about one or more applications of the theory and methods
- must be able to understand, and to reflect scientifically over knowledge within mathematics and engineering science and to be able to identify mathematical and technological problems

Skills:

- are able to independently to apply relevant mathematical theory and methods to identification, statement and analysis of technological problems
- are able to communicate research based knowledge, and is able to discuss professional and scientific problems with peers both within mathematics and engineering science, as well as with non-specialists

Competencies:

- are able to independently to initiate and complete interdisciplinary development projects based on advanced mathematical modelling and methods from engineering science, and is able in that context, to professionally take charge of implementing derived models and methods

- are able to independently to take charge of self-development and one's own professional development and specialization within mathematics and engineering science

Type of instruction: Project work.

Exam format: Group exam based on a written report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

3.4.1 Project on 4'th semester, MATTEK10

Master's Thesis / Kandidatspeciale
The student has the possibility to write a Long Master's Thesis (over 2 semesters: 60 ECTS), if the thesis is of experimental character and approved by the study board. The amount of experimental work must reflect the allotted ECTS.

Objectives: Students who have completed the module meet the following criteria within at least one central mathematical/statistical area:

Knowledge:

- have expert understanding within one or a few selected elements of a central mathematical or engineering science subject area based on international research on a high level, or has a broader insight into a central mathematical or engineering subject area regarding theories and methods as well as central elements and their interrelationships
- must be able to understand and on a scientific basis reflect upon the knowledge of the subject area and be able to identify scientific problems within mathematics and engineering science

Skills:

- must be able to identify, formulate and to analyze a scientific mathematical technological problem independently, systematically and critically
- must be able to relate the problem to the mathematical and engineering subject area, including explaining the choices that have been made in connection to the delimitation of the problem
- must be able to independently make and justify the choice of mathematical theories and scientific theoretical and/or experimental methods
- must be able to independently and critically evaluate the chosen theories and methods as well as the analyses, results and conclusions in the project, both during and at the end of the project period
- must be able to evaluate and choose between the scientific theories, methods, tools, and general skills within the mathematical subject area

Competencies:

- must be able to control work and development situations which are complex, unpredictable and require new mathematical and/or engineering models or methods for solution
- must be able to initiate and complete mathematically and/or engineering oriented collaborations, and if relevant also interdisciplinary collaborations, as well as assume professional responsibility
- must be able to independently assume responsibility for own professional development and specialisation

Type of instruction: Project work.

Exam format: Group exam based on project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Chapter 4: Entry into Force, Interim Provisions and Revision

The curriculum is approved by the Dean and enters into force as of September 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.

Chapter 5: Other Provisions

5.1 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 spelling and formulation 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.[2] If the project is written in English, the summary must be in Danish.[3] The summary must be at least 1 page and not more than 2 pages. The summary is included in the evaluation of the project as a whole.

5.2 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.

5.3 Rules for examinations

The rules for examinations are stated in the Examination Policies and Procedures published by The Faculties of Engineering and Science on their website.

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.

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[2] Or another foreign language (upon approval from the study board.

[3] The study board can grant exemption from this.

5.4 Exemption
In exceptional circumstances, the study board 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.

5.5 Rules and requirements for the reading of texts
At programmes that are taught in Danish, it is assumed that the student can read academic texts in modern Danish, Norwegian, Swedish and English and use reference works, etc., in other European languages. At programmes taught in English, it is assumed that the student can read academic text and use reference works, etc., in English.

5.6 Additional information
The current version of the curriculum is published on the study board's website, including more detailed information about the programme, including exams.

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4. december 2017/mnr