



AALBORG UNIVERSITET

# **CURRICULUM FOR THE MASTER'S PROGRAMME IN BUILDING ENERGY DESIGN, 2018**

MASTER OF SCIENCE (MSC) IN TECHNOLOGY  
AALBORG

[Link til denne studieordning](#)

## Curriculum for the Master's Programme in Building Energy Design, 2018

Link(s) til andre versioner af samme studieordning:

[Curriculum for the Master of Science \(MSc\) in Technology \(Building Energy Design\), 2015](#)

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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 is stipulated. The program 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.

## § 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 Master's programme is offered in Aalborg.

## § 4: FACULTY AFFILIATION

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

## § 5: STUDY BOARD AFFILIATION

The Master's programme falls under the Study Board of Civil Engineering.

## § 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

The Master's programme falls under the external examiners corps on Nationwide engineering examiners/Building.

## § 7: ADMISSION REQUIREMENTS

### Applicants with a legal right of admission (retskrav):

- Aalborg University offers no bachelor's programmes with a legal right of admission to this Master's program.

### Applicants without legal right of admission

Bachelor's programmes qualifying students for admission:

- Bachelor of Science in Civil Engineering; Structural and Civil Engineering, Aalborg University
- Bachelor of Science in Engineering (Civil Engineering with specialisation in Structural and Civil Engineering)
- Bachelor of Science in Civil Engineering; Indoor Environmental and Energy Engineering, Aalborg University
- Bachelor of Science in Engineering (Civil Engineering with specialisation in Indoor Environmental Engineering)
- Bachelor of Science in Civil Engineering; Water and Environment, Aalborg University
- Bachelor of Science (BSc) in Engineering (Civil Engineering with specialisation in Water and Environment)
- Bachelor of Science in Civil Engineering; Transportation Engineering, Aalborg University
- Bachelor of Science (BSc) in Engineering (Civil Engineering with specialisation in Traffic and Highway Engineering)
- Bachelor of Science (BSc) in Engineering (Structural and Civil Engineering), Aalborg University, Campus Esbjerg
- Bachelor of Science (BSc) in Engineering (Mechanical Engineering and Manufacturing), Aalborg University, Campus Aalborg
- Bachelor of Science (BSc) in Engineering (Mechanical Design), Aalborg University, Campus Esbjerg
- Bachelor of Engineering in Civil Engineering, Structural and Civil Engineering, Aalborg University

- Bachelor of Engineering in Civil Engineering; Indoor Environmental and Energy Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering; Water and Environment, Aalborg University
- Bachelor of Engineering in Civil Engineering; Transportation Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering, Traffic and Highway Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering, Aalborg University, Campus Esbjerg
- Bachelor of Engineering in Mechanical Engineering, Aalborg University, Campus Aalborg
- Bachelor of Engineering in Mechanical Engineering, Aalborg University, Campus Esbjerg
- Bachelor of Architectural Technology and Construction Management, University College of Northern Denmark
- Bachelor of Architectural Technology and Construction Management, VIA University College
- Bachelor of Architectural Technology and Construction Management, Erhvervsakademi Sydvest
- Bachelor of Architectural Technology and Construction Management, Erhvervsakademiet Lillebælt
- Bachelor of Architectural Technology and Construction Management, Erhvervsakademi Sjælland
- Bachelor of Architectural Technology and Construction Management, Københavns Erhvervsakademi
- Bachelor of Technology Management and Marine Engineering, MARTEC (Maritime and Polytechnic University College)
- Bachelor of Technology Management and Marine Engineering, Aarhus Maskinmesterskole
- Bachelor of Technology Management and Marine Engineering, Fredericia Maskinmesterskole
- Bachelor of Technology Management and Marine Engineering, SIMAX (Svendborg International Maritime Academy)
- Bachelor of Technology Management and Marine Engineering, Maskinmesterskolen København

From February 2019 Mathematics C or documentation of equivalent qualifications is required.

### **§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH**

The Master's program entitles the graduate to the designation Cand.tech. i bygningers energidesign. The English designation is: Master of Science (MSc) in Technology (Building Energy Design).

### **§ 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 by the faculty on their website.

## § 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

At programmes 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.

## § 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 knowledge in Building Energy Design and Operations that, in Building Energy Design, is based on the highest international research
- Can understand and, on a scientific basis, reflect on the Building Energy Design and Operation's knowledge and identify scientific problems
- Must have knowledge about basic architectural design methodology, the integrated design process and integrated building concepts
- Must understand the relationship between the thermal comfort, indoor air quality and health issues and the heat, moisture, mass and momentum transfer in buildings
- Be able to critically evaluate knowledge and identify new scientific problems within the field of Building Energy Design and Operations
- Must have knowledge about Life cycle cost analysis
- Must have knowledge about Environmental Assessment Methods and Tools

### Skills

- Excels in Building Energy Design and Operation's scientific methods and tools and general skills related to employment within consulting engineering

- Can evaluate and select among the Building Energy Design and Operation's scientific theories, methods, tools and general skills and, on a scientific basis, advance new analyses and solutions
- Can communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists
- Must be able to apply both simple and advanced calculation methods for analysis and simulation of temperature conditions and heat flows in buildings and elements in HVAC systems under dynamic load conditions
- Must be able to apply, combine and evaluate advanced methods for analysis of the interplay between energy systems, architectural concepts, building design, building use, outdoor climate and HVAC systems
- Be able to apply a wide range of engineering methods in research and development in the field of Building Energy Design and Operations
- Must be able to measure the indoor environmental quality and energy consumption of a building and its systems
- Must be able to apply, combine and evaluate advanced methods for Life cycle cost analysis
- Must be able to apply, combine and evaluate advanced methods for Environmental Assessment Methods and Tools
- Must be able to design buildings using advanced methods at the highest international level

### 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
- Can optimise the operation of buildings based on measurement and analysis of the performance of the building
- Can combine, optimise and evaluate models for energy transport in buildings and HVAC systems
- Must be able to handle complex and research-oriented cases related to development of energy efficient buildings
- Be competent to solve new and complicated technical problems by the use of advanced scientific and technological knowledge
- Can design buildings using advanced methods at the highest international level

## § 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
- study groups
- exercises (individually and in groups)
- laboratory tests
- measurements and testing in the field
- teacher feedback

- reflection
- portfolio work
- independent study

The modules are evaluated either through written or oral exams as stated in the description of the modules.

For individual written exams the study board selects among the following possibilities:

- Written exam based on handed out exercises
- Multiple choice
- Ongoing evaluation of written assignments

For individual oral exams the study board selects among the following possibilities:

- Oral exam with or without preparation
- Oral exam based on project report (individually graded through group exam)
- Oral exam based on presentation seminar
- Portfolio based oral exam

If the number of students following a module is small and/or if the number of students having to attend a re-exam is small the study board can decide that an exam is conducted either as an oral or written individual exam for economic reasons. In the first case decision must be notified before the start of the teaching activity, in the latter case the students must be notified when the examination date is decided.

## § 18: 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).

Of a total of 120 ECTS, 90-120 ECTS are assessed by the 7-point scale and 45-75 ECTS are assessed by external examination.

The students are given options in the project modules as they can select among different projects within the same general theme. Moreover, the Master Thesis on the 4<sup>th</sup> semester can be selected freely within the field of Building Energy Design and Operations. The students have the choice of making a long master's thesis comprising of both 3<sup>rd</sup> and 4<sup>th</sup> semester.

The study board of civil engineering can decide, that the contents of a course module on a semester is taught in the project module in the same semester, by increasing the ECTS extend of the project module by the same number of ECTS. The decision is taken regarding to capacity and/or economy.

Offered as:					
Study programme: Cand. tech. in building energy design 2018					
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method
<b>1 SEMESTER</b>					
<a href="#">Building Energy Use and Indoor Environmental Quality</a>	Project	15	7-point grading scale	Internal examination	Oral exam based on a project
<a href="#">Introduction to Problem Based Learning and Models in the Built Environment</a>	Course	5	Passed/Not Passed	Internal examination	Oral exam based on a project
<a href="#">Introduction to Building Information Management</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam



<a href="#">Building Heat, Moisture and Energy Modelling</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<b>2 SEMESTER</b>					
<a href="#">Building Ventilation, Heating and Cooling</a>	Project	15	7-point grading scale	External examination	Oral exam based on a project
<a href="#">Indoor Environmental Analysis and Measurements</a>	Course	5	7-point grading scale	Internal examination	Oral exam based on a project
<a href="#">Building Ventilation</a>	Course	5	7-point grading scale	Internal examination	Oral exam based on a project
<a href="#">Heating and Cooling Systems</a>	Course	5	7-point grading scale	Internal examination	Oral exam based on a project
<b>3 SEMESTER Version A</b>					
<a href="#">Building Commissioning Operation and Environmental Impact</a>	Project	15	7-point grading scale	Internal examination	Oral exam based on a project
<a href="#">Control and Analysis of Building Energy Systems</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<a href="#">3. semester Electives A: Courses</a>		10			
<b>3 SEMESTER Version B</b>					
Study at Other University		30			
<b>4 SEMESTER Version C</b>					
<a href="#">Master's Thesis</a>	Project	30	7-point grading scale	External examination	Master's thesis/final project
<b>3-4 SEMESTER</b>					
<a href="#">Master's Thesis</a>	Project	45	7-point grading scale	External examination	Master's thesis/final project
<a href="#">3. semester Electives B: Courses</a>		15			

If option **Study at Other University** is chosen on the 3<sup>rd</sup> semester - the study board must approve on the contents before the study is commenced.

3. semester Electives A: Courses					
Module name	Course type	ECT S	Applied grading scale	Evaluation Method	Assessment method
<a href="#">Environmental Assessment Methods and LCC Analysis</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<a href="#">Energy Producing and Energy Converting System</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<a href="#">Integrated Building Energy Design</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam

### 3. semester Electives B: Courses

Module name	Course type	ECT S	Applied grading scale	Evaluation Method	Assessment method
<a href="#">Control and Analysis of Building Energy Systems</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<a href="#">Environmental Assessment Methods and LCC Analysis</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<a href="#">Energy Producing and Energy Converting System</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam
<a href="#">Integrated Building Energy Design</a>	Course	5	7-point grading scale	Internal examination	Written or oral exam

## § 19: ADDITIONAL INFORMATION

### 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 Board of Studies 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 must be in Danish.\*\* 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.

\* Or another foreign language (upon approval from the Board of Studies).

\*\* The Board of Studies can grant exemption from this.

### 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

In the individual case, the Board of Studies can approve successfully completed (passed) programme elements from other Master's programmes in lieu of programme elements in this programme (credit transfer). The Board of Studies 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 Board of Studies based on an academic assessment. See the Joint Programme Regulations for the rules on credit transfer.

### Rules for examinations

The rules for examinations are stated in the Examination Policies and Procedures published by The Technical Faculty of IT and Design, The Faculty of Engineering and Science, and the Faculty of Medicine 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.

### Exemption

In exceptional circumstances, the Board of Studies 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.

### Additional information

The current version of the curriculum is published on the Board of Studies' website, including more detailed information about the programme, including exams.

## **§ 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 1 February 2018.

Students who wish to complete their studies under the previous curriculum from 2015 must conclude their education by the winter term 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.

April 9, 2019: Starting from February 2019 Mathematics C or documentation of equivalent qualifications is required.