AALBORG UNIVERSITET

CURRICULUM FOR THE MASTER'S PROGRAMME IN BUILDING ENERGY DESIGN, 2021

MASTER OF SCIENCE (MSC) IN TECHNOLOGY
AALBORG

Link to this studyline

TABLE OF CONTENTS

§ 1: PREFACE

Pursuant to consolidation Act 778 of August 7, 2019 on Universities (the University Act), the following is established.

The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for Aalborg University.

§ 2: BASIS IN MINISTERIAL ORDERS

The Master's programme is organised in accordance with the Ministry of Higher Education and Science's Order no. 20 of January 9, 2020 on Bachelor's and Master's Programmes at Universities (the Ministerial Order of the Study Programmes) and Ministerial Order no. 22 of January 9, 2020 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 153 of February 26, 2020 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order).

§ 3: CAMPUS

The Master's programme is offered in Aalborg.

§ 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 Built Environment.

§ 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 Engineering in Energy Management (top-up programme), University College Nordjylland
- 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 Makinmesterskole
- Bachelor of Technology Management and Marine Engineering, SIMAX (Svendborg International Maritime Academy)
- Bachelor of Technology Management and Marine Engineering, Maskinmesterskolen København

All applicants must, as a minimum, document English language qualifications comparable to an "English B level" in the Danish upper secondary school (gymnasium) (the Admission Order).

Admission to the master’s programme requires that the applicant has passed a relevant qualifying bachelor’s or professional bachelor’s degree programme. In order for a bachelor education to be considered relevant, it should include ECTS points within the following topics:

- Building Physics/HVAC systems/Indoor Environment (minimum 30 ECTS in total).

§ 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 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

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
- Must be able to assess and relate the content of the project to those of the UN World Goals that are relevant

§ 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

§ 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, 95-100 ECTS are assessed by the 7-point scale and 45-60 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 4th 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 3rd and 4th semester.

Offered as: 1-professional Study programme: Building Energy Design						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Building Energy Use and Indoor Environmental Quality (B-BED-K1-6)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Introduction to Problem Based Learning and Models in the Built Environment (B-BED-K1-7)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Introduction to Building Information Management (B-BED-K1-8)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Building Heat, Moisture and Energy Modelling (B-BED-K1-9)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

2 SEMESTER						
Building Ventilation, Heating and Cooling (B-BED-K2-9)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Indoor Environmental Analysis and Measurements (B-BED-K2-10)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Building Ventilation (B-BED-K2-11)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Heating and Cooling Systems (B-BED-K2-12)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
3 SEMESTER Option A						
Control and Analysis of Building Energy Systems (B-BED-K3-14)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Environmental Assessment Methods and LCC Analysis (B-BED-K3-15)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Energy Producing and Energy Converting System (B-BED-K3-16)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3. semester A: Project	Project	15				
4 SEMESTER						
Master's Thesis (B-BED-K4-15)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English
3-4 SEMESTER Option B						
Master's Thesis (B-BED-K4-16)	Project	45	7-point grading scale	External examination	Master's thesis/final project	English
Control and Analysis of Building Energy Systems (B-BED-K3-14)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Environmental Assessment Methods and LCC Analysis (B-BED-K3-15)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Energy Producing and Energy Converting System (B-BED-K3-16)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

On the 3rd semester students can choose to **study at another university**. The students must send an application to the Study Board before the study is commenced, where they apply for a preapproval of credit transfer of the contents of the modules at the other university.

3. semester A: Project						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Building Commissioning and Operation (B-BED-K3-18)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English

Integrated Design of Sustainable Buildings and Building Services (B-BED-K3-19)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	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 visit https://www.mp.aau.dk/education/study-board/Regler+og+retningslinjer/Problem+Based+Learning+and+Project+Management+%28Problembaseret+l%C3%A6ring+og+projektledelse%29/

§ 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 2021.

Students who wish to complete their studies under the previous curriculum from 2018 must conclude their education by the winter term 2022/2023 at the latest, since examinations under the previous curriculum are not offered after this time. The study board offers examinations in modules from the previous curriculum, in case there are students who have used attempts in a module without passing. The number of attempts follows the Examination Order.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

On 28 January 2025, the Vice dean for Education has approved a revised semester version on 3.- 4. semester (option a and b), valid as of spring 2025.