AALBORG UNIVERSITET

CURRICULUM FOR THE MASTER'S PROGRAMME IN ENGINEERING (SUSTAINABLE DESIGN), 2022, COPENHAGEN

MASTER OF SCIENCE (MSC) IN ENGINEERING
COPENHAGEN

Link to this studyline

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

Curriculum for the Master's Programme in Sustainable Design, 2020, Copenhagen
Curriculum for the Master's Programme in Sustainable Design - 2017 - Copenhagen

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§ 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 Examination Policies and Procedures incl. the Joint Programme Regulations 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. 2285 of December 1, 2021 on Full-time University Programmes (the University Programme Order) and Ministerial Order no. 2271 of December 1, 2021 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 104 of January 24, 2021 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order).

§ 3: CAMPUS

The programme is offered in Copenhagen.

§ 4: FACULTY AFFILIATION

The Master's programme falls under The Technical Faculty of IT and Design, Aalborg University.

§ 5: STUDY BOARD AFFILIATION

The Master's programme falls under Study Board of Techno-Anthropology and Sustainable Design.

§ 6: AFFILIATION TO CORPS OF EXTERNAL EXAMINERS

The Master's programme is associated with the Civil engineering corps of external examiners.

§ 7: ADMISSION REQUIREMENTS

Applicants with a legal right of admission (retskrav)

- Bachelor of Science in Sustainable Design (AAU)

Admission to the master's programme in Sustainable Design requires that the applicant has passed a relevant qualifying bachelor's or professional bachelor's degree programme. A bachelor's or professional bachelor's degree programme is defined as relevant if the degree programme provides competencies to a minimum of ECTS within the following subject areas:

- 20 ECTS of basic university level science courses (mathematics, physics, chemistry and/or biology).
- 10 ECTS of engineering or design/architecture sciences (fx. thermodynamics, statics, dynamics, circuits, programming, materials, structures, system modelling, measuring and testing, etc.).
- 15 ECTS of basic theory and methods in engineering design, industrial design or architecture.

Applicants without legal right of admission:

- Bachelor of Science in Design and Innovation (DTU)
- Bachelor of Science in Integrated Design (SDU)
- Bachelor of Science in Architecture and Design, specialisation in Industrial Design (AAU)
- Bachelor of Science in Engineering (General Engineering with specialisation in Technology and Design) (AAU)

As a prerequisite for admission to the master's programme, students must have completed a bachelor programme in technical sciences, a bachelor of engineering programme or a bachelor in natural science.

All applicants without a legal claim must prove that their English language qualifications is equivalent to level B (Danish level) in English

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Master's programme entitles the graduate to the Danish designation Civilingeniør, cand.polyt. i bæredygtigt design. The English designation is: Master of Science (MSc) in Engineering (Sustainable 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

It is assumed that the student can read academic texts 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

A graduate of the Master's programme in Sustainable Design has aquired the following competencies:

Knowledge

- Has knowledge, which in chosen areas, is based on the highest international level of research, within the following areas:
  - sustainable design
  - sustainable transitions
  - innovation and organizational change processes
  - designerly thinking

Skills

- can identify critical problems and structure strategically defined problem formulations that will open for the development of design projects to produce intended sociotechnical changes for sustainability (PBL)
- master engineering and science related methods, methods from innovation studies and methods from socio-technical analysis of organizations and systems
- can critically consider theories and methods, develop new models for sustainable technological innovation and in collaboration with networks of different actors further elaborate these into plans of action
- can discuss and communicate professional and scientific issues regarding sustainable innovation and strategic design for sustainable transitions with technical experts, decision-makers, senior executives, government officers, NGO's and various users
- can stage and facilitate collaborative technology, service and system design processes involving a variety of actors including end-users

Competencies

- can stage and facilitate work- and development projects that require dealing with complexities, and uncertainties that require new solutions
- can independently initiate and complete professional and disciplinary collaborations and take a professional responsibility and leadership within collaborative design- and transition processes
- can independently take responsibility for own professional and d cross-disciplinary development within the scientific fields of design, transitions, technology innovation and sustainability
- ccan assess the strengths and limitations of his/her own competencies, identify the need for new competencies and acquire them in order to continuously improve

§ 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.

Teaching methods and exams

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
- instructions
- project work
- work in laboratories and workshops
- workshops
- written assignments (individually and in groups)
- Quantitative modelling exercises
- teacher feedback
- reflections

- portfolio work
- external activities
- case work
- peer assessment
- study groups

Curriculum content

The Master's is an engineering education programme with special emphasis on design, technological innovation, transitions and design of sustainable solutions. The programme includes interdisciplinary components to meet the need for combining methods from social sciences and technology studies with technical subjects and design practices.

The education will provide the student with the ability to understand, stage and carry out innovative processes leading to design and the implementation of sustainable products, services, and socio-material system solutions through processes that involve relevant actors.

The programme's focus on sustainability reflects the challenges that development, production, consumption and dismantling of unsustainable technologies poses for today's society, including resource utilization, climate and welfare. It builds on the broad notion of sustainability, which is currently under development that spans from the Brundtland Report to most recently the 17 Sustainability Development Goals and further to understanding sustainability as social processes. The realization of these societal goals require a focus on sustainable transitions in a design perspective as the core to the programme's activities.

§ 18: OVERVIEW OF THE PROGRAMME

The table below shows all project and course modules on the Master's programme, the amount of ECTS's and the assessment for each.

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).

Offered as: 1-professional						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Staging Collaborative Design for Sustainability (TBSDK20101)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Design in Organisations (TBSDK20102)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Production Systems and Sustainability (TBSD22103)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Design for Sustainability (TBSD22104)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
2 SEMESTER						
Design for Sustainable Transitions (TBSDK20201)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Market Creation and Entrepreneurship (TBSDK20202)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Sustainable Transitions (TBSD22203)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Concept Driven Change (TBSDK20204)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3 SEMESTER Version A						
Design Research Project (TBSDK20301)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
3 SEMESTER Version B						
Project-Oriented Study in an External Organisation (TBSDK20302)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
3 SEMESTER Version C						
International Design Project (TBSDK20303)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
3 SEMESTER Version D						
Entrepreneurship Design Project (TBSDK22304)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
4 SEMESTER						
Master's Thesis (TBSDK20401)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English

The Master's programme is based on a progression in which the complexity of the themes is progressively increasing:

1st semester: Staging Design for Sustainability

On this semester the focus is on understanding and facing the challenges that pose designing for sustainability within an organisation. The most salient is that current methods and tools for design needs to be reconsidered, therefore the need to stage collaborative design processes. The organisational context where design and innovation unfolds is introduced through the course module Design in organisations. Production Systems and Sustainability is a technical course where the students learn how current production systems operate, including IT aspects, and consider that changes to product design are restricted by production or IT systems. Therefore designing for sustainability requires also considering adjustments to the production systems. Design for Sustainability offers quantitative tools to assess environmental impacts and to consider their use in the context of existing sustainability challenges. The project module Staging Collaborative Design for Sustainability offers an opportunity for the students to put into practice and expand their knowledge of their course modules by staging collaborative design processes for the design of products, product service systems, services or systems that have a positive impact in sustainability. In each course, the students learn how to stage collaborative design processes.

2nd semester: Design for Sustainable Transitions

On this semester the focus is on understanding that achieving sustainability require the re-design of systems that support societal functions in a long-term systemic perspective. In the course module Sustainable Transitions the students will dive into the most recent developments of the research field Sustainable Transitions, they will learn about the most established theories in the field and they will discuss how design can contribute to the necessary systemic changes that sustainability require. The course module Market Creation and Entrepreneurship will offer an understanding that the needed changes will not happen in existing markets and will not be performed by existing organizations and companies necessarily, but that new markets and new organizations need to be created in novel ways to achieve transitions to sustainability. In the course Concept Driven Change focus will be on understanding, staging and performing the changes that needs to take place on an organisational and individual level, often based on conceptualisations of innovation, work and change management.

3rd semester: Sustainable Design in Practice

On this semester the students are given the opportunity to study a semester at another university, carry out a sustainable design project in an international development context, carry out a design research project or conduct a sustainable design project in collaboration with a company or organization in Denmark or another country.

4th semester: Master's Thesis

During the last semester the students will write their Master's Thesis. The Master's Thesis should be a serious attempt to produce new knowledge and make a meaningful contribution to the emerging field and profession of Sustainable Design Engineering. For this the students are encouraged to develop a sustainable design project in collaboration with external partners like private companies, non-governmental and public organizations or start-ups. Agreements with external partners have to be organized in collaboration with supervisors. The students are encouraged to work in groups of two or three in the spirit of team collaboration of PBL.

The figure below shows a schematic view of the Master's programme.

Point		5	10	15	20	25
Semester	1	Staging Collaborative Design for Sustainability		Design in Organisations	Production Systems and Sustainability	Design for Sust
Semester	2	Design for Sustainable Transitions		Market Creation and Entrepreneurship	Sustainable Transitions	Concept Driven
	3	Design Research Project				
		Project-Oriented Study in an External Organisation				
		International Design Project				
Semester	4	Master's Thesis				

§ 19: ADDITIONAL INFORMATION

Preparatory e-course

Prior to study start students are advertised to follow and complete the digital course on Sustainable Design. Especially students that do not have a bachelor in Sustainable Design are encouraged to update their knowledge by completing the course, since this knowledge is advised in order to be able to follow the courses and projects at the Master's programme of Sustainable Design. Sustainable Design bachelors can also benefit from a refreshment of these insights and theories.

PBL introductory course at 1st semester

All students who have not participated in Aalborg University's PBL introductory course during a Bachelor's degree at Aalborg University must attend the introductory course "Problem-based Learning and Project Management" at 1st semester. The student must pass the introductory course in order to participate in the 1st semester project examination. For further information, please see the Department of Planning's website.

Competence profile workshop at 2nd semester

All students must participate in the competence profile workshop at 2nd semester and pass the assignment in order to participate in the 2nd semester the project examination. For further information, please see the Department of Planning's website.

Pre-approval of credit transfer

It is recommended that completion of parts of the programme at other national or international educational institutions is placed on the 3rd semester of the study programme.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the dean and enters into force as of September 1, 2022.

The Study Board does not offer teaching after the previous curriculum from 2020 after the summer examination period 2023.

The Study Board will offer examinations after the previous curriculum, if there are students who have used examination attempts in a module without passing. The number of examination attempts follows the rules in the Examination Order.

§ 21: AMENDMENTS TO THE CURRICULUM AND REGULATIONS

The Vice-dean has on June 7, 2022 approved that the module *"Entrepreneurship Design Project"* is added as an option on the 3rd Semester as of Autumn 2022.

On 8 May 2024, the Vice-dean of Education has approved that the degree "Bachelor of Science in Engineering (General Engineering with specialisation in Technology and Design)" from Aalborg University is added to the list of qualifying programmes for admission in Section 7. The amendment is valid as of Autumn 2024.

The Vice dean of Education has on February 12, 2025, approved that the prerequisite for enrollment for the exam is erased in the module *Design for Sustainable Transitions*, valid from Spring 2025.