AALBORG UNIVERSITET

CURRICULUM FOR THE MASTER'S PROGRAMME IN WATER AND ENVIRONMENTAL ENGINEERING, 2023

MASTER OF SCIENCE (MSC) IN ENGINEERING
AALBORG

Link to this studyline

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

Curriculum for the Master's Programme in Water and Environmental Engineering, 2020
Curriculum for the Master's Programme in Water and Environmental Engineering, 2022

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 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. 35 of January 13, 2023 (the Admission Order) and Ministerial Order no. 1125 of July 4, 2022 (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 Civil engineering corps of external examiners.

§ 7: ADMISSION REQUIREMENTS

Applicants with a legal right of admission (retskrav)
Applicants with one of the following degrees are entitled to admission:

- Bachelor of Science in Engineering (Civil Engineering with specialisation in Water and Environment), Aalborg University

Applicants without legal right of admission
Bachelor's programmes qualifying students for admission:

- Bachelor of Science in Environmental Engineering, Aalborg University
- Bachelor of Science in Environmental Science, Aalborg University
- Bachelor of Science in Environmental Engineering, Technical University of Denmark
- Bachelor of Engineering in Civil Engineering with specialisation in Water and Environment, Aalborg University
- Bachelor of Engineering in Civil Engineering, Aalborg University (campus Esbjerg)
- Bachelor of Engineering in Civil Engineering with specialisation in Environmental Engineering, VIA University College
- Bachelor of Engineering in Supply Engineering, VIA University College
- Bachelor of Engineering in Civil and Structural Engineering (with specialisation in Environmental Engineering), Aarhus University

Admission to the master's programme 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:

- Environmental hydraulics and fluid mechanics, hydrology, water supply and treatment, wastewater treatment and processes, environmental systems (streams, rivers, soil and groundwater), and environmental science and modeling (minimum 45 ECTS in total).
- Basic environmental chemistry and environmental microbiology (minimum 5 ECTS in total).
- Basic linear algebra, differential equations, and statistics and probability (minimum 10 ECTS in total).

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).

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.

§ 8: THE PROGRAMME TITLE IN DANISH AND ENGLISH

The Master's program entitles the graduate to the designation Civilingeniør, cand.polyt. i vand og miljø. The English designation is: Master of Science (MSc) in Engineering (Water and Environmental Engineering).

The Master's program with specialisation in Environmental processes entitles the graduate to the designation Civilingeniør, cand.polyt. i vand og miljø med specialisering i miljøprocesser. The English designation is: Master of Science (MSc) in Engineering (Water and Environmental Engineering) with specialisation in Environmental Processes.

§ 9: PROGRAMME SPECIFICATIONS IN ECTS CREDITS

The Master's programme is a 2-year, research-based, full-time study programme. The programme is set to 120 ECTS credits.

§ 10: RULES CONCERNING CREDIT TRANSFER (MERIT), INCLUDING THE POSSIBILITY FOR CHOICE OF MODULES THAT ARE PART OF ANOTHER PROGRAMME AT A UNIVERSITY IN DENMARK OR ABROAD

The Study Board can approve that passed programme elements from other educational programmes at the same level replaces programme elements within this programme (credit transfer).

Furthermore, the Study Board can, upon application, approve that parts of this programme is completed at another university or a further education institution in Denmark or abroad (pre-approval of credit transfer).

The Study Board's decisions regarding credit transfer are based on an academic assessment.

§ 11: EXEMPTIONS

The Study Board's possibilities to grant exemption, including exemption to further examination attempts and special examination conditions, are stated in the Examination Policies and Procedures published at this website: https://www.studyservice.aau.dk/rules

§ 12: RULES FOR EXAMINATIONS

The rules for examinations are stated in the Examination Policies and Procedures published at this website: https://www.studyservice.aau.dk/rules

§ 13: RULES CONCERNING WRITTEN WORK, INCLUDING THE MASTER'S THESIS

In the assessment of all written work, regardless of the language it is written in, weight is also given to the student's formulation and spelling ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination can be assessed as 'Pass' on the basis of good language performance alone; similarly, an examination normally cannot be assessed as 'Fail' on the basis of poor language performance alone.

The Study Board can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Master's Thesis must include an English summary. If the project is written in English, the summary can be in Danish. The summary is included in the evaluation of the project as a whole.

§ 14: REQUIREMENTS REGARDING THE READING OF TEXTS IN A FOREIGN LANGUAGE

It is assumed that the student can read academic texts in English and use reference works, etc., in English and other European languages.

§ 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

- Knowledge on technology and applicability of in-situ physical and biological methods for remediation of contaminated soil and groundwater zones at polluted soil sites.
- Understanding of the physics of the coastal zone and estuaries including currents, waves, sediment transport.
- Basic understanding of the ecological conditions in natural waters including the effect of various types of pollution on flora and fauna.
- Shall have knowledge on how numerical methods and experiments methods complement each other and how to use experimental data to improve numerical models.
- Shall have knowledge on how urban waste and storm water runoff interacts with our cities and its surrounding environment.
- Must have knowledge on effects and consequences of urban flooding.

Skills

- To analyze, synthesize and evaluate contaminant spill situations in regard to risk for area use and soil and groundwater resources around a polluted soil site.
- To apply selected methods to measure water transport parameters, solute transport parameters, gas transport parameters, and/or biodegradation coefficients in soil and groundwater.
- Explain the environmental impact of selected compounds on aquatic environments
- Identify the hydrological, chemical and biological processes that are central for the analysis and evaluation of a coastal marine environment and evaluate toxicological effects on an aquatic ecosystem.
- Use impact assessment methods.
- Build and analyze numerical water quality models.
- Plan and carry out the measurement program for field and laboratory measurements.
- Analyze errors and uncertainties in the measurement and modeling in natural or environmental engineering systems.
- Be able to evaluate the consequences of climate change for urban drainage systems.
- Combine knowledge on hydrodynamic performance of the storm drainage system with knowledge on the consequences in the receiving waters.
- Must be able to disseminate the results obtained from the project work in a project report.
- Must be able to work jointly with the project problem field project and make a joint presentation of the project work results.
- Be able to utilize and create digital solutions for data collection and storage, statistical data analysis, data visualization, modeling and simulation, for presentation of theories, hypotheses and results in writing as well as orally, as well as for organizing and implementing the collaboration internally in project groups as well as with external partners.

- Can utilize and create digital solutions for data collection and storage, statistical data analysis, data visualization, modeling and simulation, for presentation of theories, hypotheses and results in writing as well as orally, as well as for organizing and implementing the collaboration internally in project groups as well as with external partners.

Competencies

- To handle soil and groundwater pollution in relation to the groundwater resource, indoor climate, areal use.
- To structure and produce technical documentation of complex problems, methods and results.
- To communicate problems, findings and solutions graphical as well as oral to the relevant target audience.
- To perform water quality assessment studies for different types of impacts in natural waters.
- Be able to combine experimental data and numerical methods to develop better models within the area of water & environment.
- Be able to plan the drainage structure for an entire city with respect to flooding, receiving water quality and climate change.
- Must be able to assess and relate the content of the project to those of the UN World Goals that are relevant.
- Has competencies within and can participate in the development of digitization of the built environment and can digitally and effectively collaborate, communicate and exchange information, data and results with adjacent disciplines
- Have knowledge, skills, and competencies in sustainable use and protection of natural resources.

Candidates in Water and Environment will in addition:

- Have knowledge, skills, and competencies particularly in climate adaptation in the built environment and be able to analyze, predict, and design appropriate solutions in both technical and natural systems.

Candidates with specialisation in Environmental Processes will in addition:

- Have knowledge, skills, and competencies particularly in chemical and biological processes in natural environments and technical systems.
- Have particular knowledge, skills, and competencies in modeling and monitoring chemical processes in natural environments and technical systems.
- Have particular knowledge, skills, and competencies in modeling and monitoring biological/microbiological processses in natural environments and technical systems.
- Have particular knowledge, skills, and competencies in evaluating climate change effects on chemical and biological/microbiological processes in natural environments.

§ 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

Elective courses will only be offered if at least five students enrol in the elective courses.

§ 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, 95-110 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's thesis on the 4th semester can be selected freely within the field of water and environment.

Students following the specialisation in Environmental Processes can select between a 45 ECTS master's project and 3 elective courses or a 50 ECTS master's project and 2 elective courses on 3rd and 4th semester. The specialisation provides students the opportunity to specialize their master's thesis projects in chemical and biological processes in natural environments and technical systems, and in sustainable use and protection of natural resources, supported by elective courses.

Offered as: 1-professional						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Soil and Groundwater Pollution (B-VM-K1-5)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Hydrogeology and Groundwater Modelling (B-VM-K1-6)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English

Environmental Soil Science and Geostatistics (B-VM-K1-3)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Experimental Hydrology (B-VM-K1-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
2 SEMESTER						
Marine and Freshwater Pollution (B-VM-K2-11)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Environmental Hydrodynamics (B-VM-K2-6)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Marine Pollution (B-VM-K2-8A)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Advanced Limnology (B-VM-K2-5)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3 SEMESTER Version A						
Advanced Urban Drainage (B-VM-K3-12)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Advanced Hydrodynamic Modelling (CFD) and Visualisation (B-VM-K3-13)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Measurement Technology and Data Acquisition (B-VM-K3-16)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Urban Hydroinformatics (B-VM-K3-15)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
3 SEMESTER Version B [1]						
Project Oriented Study in an External Organisation (B-VM-K3-21)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
3-4 SEMESTER Version C						
Master's Thesis (B-VM-K3-20)	Project	60	7-point grading scale	External examination	Master's thesis/final project	English
3-4 SEMESTER Version D						
Master's Thesis (B-VM-K3-19)	Project	50	7-point grading scale	External examination	Master's thesis/final project	English
3. semester elective courses		10				
3-4 SEMESTER Version E						
Master's Thesis (B-VM-K3-18)	Project	45	7-point grading scale	External examination	Master's thesis/final project	English
Advanced Hydrodynamic Modelling (CFD) and Visualisation (B-VM-K3-13)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Measurement Technology and Data Acquisition	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English

(B-VM-K3-16)						
Urban Hydroinformatics (B-VM-K3-15)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
4 SEMESTER						
Master's Thesis (B-VM-K4-21)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English

Offered as: 1-professional Specialisation: Environmental Processes						
Module name	Course type	ECTS	Applied grading scale	Evaluation method	Assessment method	Language
1 SEMESTER						
Soil and Groundwater Pollution (B-VM-K1-5)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English
Hydrogeology and Groundwater Modelling (B-VM-K1-6)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Environmental Soil Science and Geostatistics (B-VM-K1-3)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Experimental Hydrology (B-VM-K1-2)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
2 SEMESTER						
Marine and Freshwater Pollution (B-VM-K2-11)	Project	15	7-point grading scale	External examination	Oral exam based on a project	English
Environmental Hydrodynamics (B-VM-K2-6)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Marine Pollution (B-VM-K2-8A)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
Advanced Limnology (B-VM-K2-5)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English
3 SEMESTER Version A						
Advanced Urban Drainage (B-VM-K3-12)	Project	15	7-point grading scale	Internal examination	Oral exam based on a project	English

Advanced Hydrodynamic Modelling (CFD) and Visualisation (B-VM-K3-13)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Measurement Technology and Data Acquisition (B-VM-K3-16)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Urban Hydroinformatics (B-VM-K3-15)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
3 SEMESTER Version B [1]						
Project Oriented Study in an External Organisation (B-VM-K3-21)	Project	30	7-point grading scale	Internal examination	Oral exam based on a project	English
3-4 SEMESTER Version C						
Master's Thesis (B-VM-K3-20)	Project	60	7-point grading scale	External examination	Master's thesis/final project	English
3-4 SEMESTER Version D						
Master's Thesis (B-VM-K3-19)	Project	50	7-point grading scale	External examination	Master's thesis/final project	English
3. semester elective courses		10				
3-4 SEMESTER Version E						
Master's Thesis (B-VM-K3-18)	Project	45	7-point grading scale	External examination	Master's thesis/final project	English
Advanced Hydrodynamic Modelling (CFD) and Visualisation (B-VM-K3-13)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Measurement Technology and Data Acquisition (B-VM-K3-16)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Urban Hydroinformatics	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English

(B-VM-K3-15)						
3-4 SEMESTER Version F						
Master's Thesis (B-VM-K3-23)	Project	45	7-point grading scale	External examination	Master's thesis/final project	English
3. and 4. semester elective courses - Specialisation in Environmental Processes	Course	15				
3-4 SEMESTER Version G						
Master's Thesis (B-VM-K3-24)	Project	50	7-point grading scale	External examination	Master's thesis/final project	English
3. and 4. semester elective courses - Specialisation in Environmental Processes	Course	10				
4 SEMESTER						
Master's Thesis (B-VM-K4-21)	Project	30	7-point grading scale	External examination	Master's thesis/final project	English

[1] The study board must approve on the content of **the project-oriented study** before it is commenced.

3. semester elective courses						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Advanced Hydrodynamic Modelling (CFD) and Visualisation (B-VM-K3-13)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Measurement Technology and Data Acquisition (B-VM-K3-16)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English
Urban Hydroinformatics (B-VM-K3-15)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	English

3. and 4. semester elective courses - Specialisation in Environmental Processes						
Module name	Course type	ECTS	Applied grading scale	Evaluation Method	Assessment method	Language
Ecosystem modelling (K-BIO-K1-60)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

Danish Biotopes – evaluation and management (K-BIO-K2-7)	Course	5	Passed/Not Passed	Internal examination	Active participation/continuous evaluation	Danish and English
Instrumentation and regulation of processes (K-KEM-B6-49A)	Course	5	Passed/Not Passed	Internal examination	Written or oral exam	Danish and English
Bioressources and Biorefineries (K-BT-K2-22)	Course	5	Passed/Not Passed	Internal examination	Active participation/continuous evaluation	English
Colloidal Chemistry (K-KEM-B6-47)	Course	5	7-point grading scale	Internal examination	Written or oral exam	Danish and English
Global Change Biology (K-BIO-K1-13)	Course	5	7-point grading scale	Internal examination	Written or oral exam	English

§ 19: ADDITIONAL INFORMATION

All students who have not participated in Aalborg University's PBL introductory course during their Bachelor's degree must attend the introductory course "Problem-based Learning and Project Management". The introductory course must be approved before the student can participate in the project exam. For further information, please visit this website.

§ 20: COMMENCEMENT AND TRANSITIONAL RULES

The curriculum is approved by the dean and enters into force as of September 1, 2023.

The Study Board does not offer teaching after the previous curriculum from 2022 after the summer examination 2024.

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 of Education has on February 11, 2025, approved that the prerequisite for enrollment for the exam is erased in the module *Marine and Freshwater Pollution*, valid from Spring 2025.

The Vice dean of Education has on February 17, 2025 approved that the title changes in:

- *Hydrodynamics and Time Series Analysis of Environmental Flows* to *Environmental Hydrodynamics,* and
- *Limnology* changes to *Advanced Limnology*

valid from Spring 2025.