



Curriculum for Master in Environmental Engineering

Aalborg University
September 2016

Preface

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) the following study regulations are stipulated.

The Study Regulations are approved by the Study Board of Biotechnology, Chemical and Environmental Engineering at Aalborg University. The study regulations cover the Master's Programme in Environmental Engineering in Aalborg.

Aalborg University, 2015

Niels T. Eriksen
Chairman of Study Board

Approved by the Dean 2015

Table of contents

PREFACE	2
TABLE OF CONTENTS	3
CHAPTER 1. LEGAL BASIS OF THE STUDY REGULATIONS	4
1.1 THE MINISTERIAL ORDER BASIS	4
1.2 THE FACULTY OF SCIENCE AND ENGINEERING AFFILIATION	4
1.3 THE STUDY BOARD AFFILIATION	4
1.4 BOARD OF EXTERNAL EXAMINERS	4
CHAPTER 2. ADMISSION, TITLE, PROGRAMME DURATION AND COMPETENCE PROFILE ..	5
2.1 ADMISSION	5
2.2 DEGREE/TITLE IN DANISH, LATIN AND ENGLISH	5
2.3 THE PROGRAMME'S SPECIFICATION IN ECTS	5
2.4 THE PROGRAMME'S COMPETENCE PROFILE	5
CHAPTER 3. CONTENT OF THE STUDY PROGRAMME	7
3.1 1 ST SEMESTER – SOIL SCIENCE AND GROUNDWATER	8
3.1.1 <i>Soil and Groundwater Pollution</i>	8
3.1.2 <i>Experimental Hydrology</i>	8
3.1.3 <i>Environmental Soil Science and Geostatistics</i>	9
3.1.4 <i>Hydrogeology and Groundwater Modeling</i>	11
3.2 2 ND SEMESTER – AQUATIC POLLUTION OR WASTEWATER TREATMENT	12
3.2.1 <i>Marine and Freshwater Pollution</i>	12
3.2.2 <i>Wastewater Treatment Systems</i>	12
3.2.3 <i>Hydrodynamics and time series analysis of environmental flows</i>	13
3.2.4 <i>Fundamental wastewater treatment</i>	14
3.2.5 <i>Marine pollution</i>	15
3.2.6 <i>Limnology</i>	16
3.3 3 RD & 4 TH SEMESTER.....	17
3.3.1 <i>Master's Thesis</i>	17
3.4 PROBLEM-BASED LEARNING (PBL) AND STUDENT RESPONSIBILITY AT AALBORG UNIVERSITY	18
3.4.1 <i>Problem-based Learning (PBL) and Student Responsibility at Aalborg University</i>	18
CHAPTER 4. ENTRY INTO FORCE, INTERIM PROVISIONS AND REVISION	20
CHAPTER 5. OTHER RULES	21
5.1 3 RD SEMESTER	21
5.2 RULES FOR WRITTEN ASSIGNMENTS INCLUDING THE MASTER'S THESIS AND ITS SCOPE	21
5.3 CREDIT TRANSFER.....	21
5.4 RULES FOR THE MAXIMUM PERIOD OF ENROLMENT	21
5.5 RULES FOR EXAMINATIONS	21
5.6 EXEMPTION.....	21

Chapter 1. Legal basis of the Study Regulations

1.1 The Ministerial Order Basis

The Master's programme in Environmental Engineering is organized in accordance with the Ministry of Science, Technology and Innovation's Ministerial Order no. 1520 of December 16, 2013 on Bachelor's and Master's Programs at Universities (the Ministerial Order of the Study Programs) and Ministerial Order no. 670 of June 19, 2014 on University Examinations (the Examination Order) with subsequent changes. Further reference is made to Ministerial Order no. 257 of March 18, 2015 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order) with subsequent changes.

1.2 The Faculty of Science and Engineering affiliation

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

1.3 The Study Board affiliation

The 1st to 4th semesters of the Master's programme fall under the Study Board for Biotechnology, Chemical and Environmental Engineering.

1.4 Board of External Examiners

The programme falls under the external evaluator corps: ingeniøruddannelernes censorkorps – Chemistry

Chapter 2. Admission, title, 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 in Environmental Engineering, Aalborg University

Applicants without legal claim to admission:

Students with another Bachelor degree may, upon application to the Board of Studies, be admitted following a specific academic assessment if the applicant is considered as having comparable educational prerequisites. The University can stipulate requirements concerning conducting additional exams prior to the start of study.

2.2 Degree/title in Danish, Latin and English

Successful completion of the Master's programme entitles the student to use the title cand.polyt. i miljøteknologi. The corresponding English title is: Master of Science (MSc) in Engineering (Environmental Engineering).

2.3 The programme's specification in ECTS

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

2.4 The programme's competence profile

The competence profile below will appear on the diploma:

A graduate of the Master's programme has competences acquired through a course of study that has taken place in a research environment.

A graduate of the Master's programme can handle highly qualified functions in the labour market. In addition, the graduate of the Master's programme has the requirements to undertake research training (a Ph.D. programme). A graduate of the Master's programme has; compared to a Bachelor's degree, developed their professional knowledge and independence, so that they can independently use scientific theory and method within academic as well as business/professional contexts.

Description of qualifications:

Individuals who attain the MSc degree in Environmental Engineering

Knowledge

- Have knowledge within environmental engineering that in selected areas such as urban water and wastewater managements, soil science, and pollution and remediation of receiving fresh and marine waters, is based on the highest international research.
- Are able, on a scientific basis, to understand and reflect over the knowledge in the above-mentioned areas and be able to identify scientific problems.

Skills

- Master the scientific methods and tools of the above-mentioned areas and master the general skills that are tied to work within environmental engineering.
- Are able to evaluate and select among the scientific theories, methods, tools and general skills of

environmental engineering, and set up, on a scientific basis, new analysis and solution models

- Are able to communicate research based knowledge and discuss professional and scientific problems with both peers and non-specialists.

Competences

- Are able to develop, design and operate industrial plants to protect the environment, and evaluate and solve assignments concerning environmental issues in private and public enterprises
- Are able to independently initiate and carry out discipline specific and cross-disciplinary cooperation and to assume professional responsibility within the area of environmental engineering.
- Are able to independently take responsibility for their own professional development and specialization.

Chapter 3. Content of the Study Programme

Outline of the Master's programme in Environmental Engineering

Semester	Module	ECTS	Grading	Assessment
1.	Soil and Groundwater Pollution	15	7-point scale	Internal
	a. Experimental Hydrology	5	7-point scale	Internal
	Environmental Soil Science and Geostatistics	5	Pass/fail	Internal
	Hydrogeology and Groundwater Modelling	5	Pass/fail	Internal
2.	Electives	15		Internal
	a. Marine and Freshwater Pollution		7-point scale	Internal
	b. Wastewater Treatment Systems (for international students)	7-point scale		
	Hydrodynamics and Time Series Analysis of Environmental Flows	5	Pass/fail	Internal
	Electives	5		Internal
a. Limnology	Pass/fail			
b. Fundamental Wastewater Treatment (for international students)	Pass/fail			
	Marine Pollution	5	7-point scale	Internal
3.-4.	Master's Thesis	60	7-point scale	External
	a. On 3. semester students have the option of an individual semester			
Total		120		

The study board can cancel modules if the number of enrolled students is low.

On the third semester of the programme, students have the option of a project oriented activity in collaboration with a company, a study period at another Danish or foreign university, or a semester composed of transversal programme elements, after approval by the study board.

International students following Wastewater Treatment Systems should also follow the course in Fundamental Wastewater Treatment.

A compulsory course in Problem based learning (PBL) and student responsibility is offered as an integrated part of all project modules to students not acquainted with PBL at Aalborg University.

3.1 1st semester – Soil Science and Groundwater

3.1.1 Soil and Groundwater Pollution

<i>English title</i>	<i>Soil and Groundwater Pollution</i>
<i>Danish title</i>	<i>Jord og grundvandsforurening</i>

Placement	Fall, 1st semester
Aim	The main aim of the project is to qualify the student to understand, measure and model transport and degradation of fluids, compounds and contaminants in the water-unsaturated (vadose) soil zone and the water-saturated groundwater zone at and around an urban contaminated soil site, and to apply this in evaluation and design of risk assessment and remediation regarding area use, soil and water resources.
Learning outcomes	After completion of the course the student should be able to Knowledge <ul style="list-style-type: none">• account for the technology and applicability of in-situ physical and biological methods for remediation of contaminated soil and groundwater zones at polluted soil sites. Skills <ul style="list-style-type: none">• analyse, synthesize and evaluate contaminant spill situation in regard to risk for area use and soil and groundwater resources at and around a polluted soil site• apply selected methods to measure water transport parameters, solute transport parameters, gas transport parameters, and/or biodegradation coefficients in soil and groundwater• model transport of fluids (water and/or air) and transport and degradation of contaminants in soil and groundwater, using own models for one dimensional problems and ready-available software for two or three dimensional problems Competences <ul style="list-style-type: none">• handle soil and groundwater pollution in relation to the groundwater resource, indoor climate, areal use.• structure and produce technical documentation of complex problems, methods and results.• communicate problems, findings and solutions graphical as well as oral to the relevant target audience.• communicate the results of the project work in a project report• contribute successfully to teamwork within the problem area and make a common presentation of the result of the project work
Type of instruction	Project
Duration	15 ECTS
Language	English
Assessment	Oral examination based on a written report
Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.1.2 Experimental Hydrology

<i>English title</i>	<i>Experimental Hydrology</i>
----------------------	-------------------------------

<i>Danish title</i>	<i>Ekspierientel hydrologi</i>
Placement	Fall, 1st semester
Aim	To qualify the student to understand and estimate hydro-geological parameters by in-situ and laboratory experiments in relation to a specific site and/or transport phenomenon. This includes the planning of a measuring programme based on suitable measuring methods and positions, setting up a time schedule and a data processing procedure. To give especially students without experiences in problem and project based learning hands-on experiences with this leaning method.
Learning outcomes	<p>After completion of the course the student should be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> • account for the groundwater system and its essential properties and parameters • account for experimental methods for property and parameter estimation of the ground water zone • account for uncertainties and limitations of the applied methods <p>Skills</p> <ul style="list-style-type: none"> • select, design and conduct suitable in-situ test for estimating saturated hydraulic properties. • select, design and conduct suitable laboratory test for estimating hydraulic saturated hydraulic properties. • analyze and evaluate test results and methods regarding suitability and reliability. • organize documentation and presentation of measured data. <p>Competences</p> <ul style="list-style-type: none"> • describe, analyze, and evaluate a specific part of the groundwater system, regarding its composition and its properties through a planned investigation of the system • structure and plan the project and the work in a group • produce technical documentation of complex problems, methods and results in group cooperation. • communicate findings and solutions graphically as well as orally to a relevant target audience.
Content	Project
Duration	5 ECTS
Language	English
Assessment	Oral examination based on a written report
Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.1.3 Environmental Soil Science and Geostatistics

<i>English title</i>	<i>Environmental Soil Science and Geostatistics</i>
<i>Danish title</i>	<i>Jordmiljø og geostatistik</i>
Placement	Fall, 1st semester
Aim	To give the students fundamental knowledge of water and contaminant transport, sorption and degradation in soil, and the use of geostatistical methods in contaminated soil studies. The student should understand the links between

the physical, chemical and biological processes in soil. The student should know the principles behind and how to apply relevant laboratory and field methods for measurement of water and solute transport in soil, know the principles behind and the applicability of relevant physical- and biological-based remediation methods for contaminated soil sites, and be able to calculate one-dimensional water and solute transport in the soil vadose zone (from soil surface to capillary water table).

Learning outcomes

After completion of the course the student should be able to

Knowledge

- account for fundamental soil physics
- describe soil texture and structure, physical and chemical phase distribution (solids, water, air), pore-size distribution, water retention, hydraulic conductivity, soil-water sorptivity, unsaturated zone water transport, gas diffusion and chemical transport, sorption and biodegradation
- On the basic principle of 1D analytical and numerical water and contaminant transport modeling
- On evaluating the uncertainty of measured data and model results

Skills

- to measure soil hydraulic properties in the laboratory
 - apply parameter models for water retention, hydraulic conductivity,
 - gas diffusion, and chemical dispersion to measured data or as predictive tools
 - to program and apply analytical and simple numerical water and solute transport models to measured data or in risk assessment.
- to apply relevant geostatistical methods to measured data in the soil and groundwater zones

Competences

- perform preliminary risk assessment and evaluate the conditions for on-site or in-situ clean-up methods for contaminated soil sites.
- so 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

Duration

5 ECTS

Language

English

Assessment

Written report

Grading

Passed/failed

Assessment criteria

As stated in the joint programme regulations

3.1.4 Hydrogeology and Groundwater Modeling

<i>English title</i>	<i>Hydrogeology and Groundwater Modelling</i>
<i>Danish title</i>	<i>Hydrogeologi og grundvandsmodellering</i>

Placement	Fall, 1st semester
Aim	To give the students fundamental knowledge of water and contaminant transport in the groundwater zone. Based on hydrological and hydrogeological data the student shall be able to set-up, calibrate and validate a groundwater model for an area of suitable size. Furthermore the student should obtain knowledge of model parameter and uncertainty estimation
Learning outcomes	After completion of the course the student should be able to Knowledge <ul style="list-style-type: none">• account for fundamental hydrogeology• describe the basic principle of numerical groundwater modeling• describe chemical transport, dispersion, sorption/retardation and degradation in the groundwater zone Skills <ul style="list-style-type: none">• Collect, analyze and visualize the various data that forms the basis for the conceptual model• construct, calibrate and validate of groundwater models• simulate water and contaminant transport• evaluate and quantify modeling uncertainty Competences <ul style="list-style-type: none">• evaluate and handle hydrological data that forms the basis for groundwater modeling• structure and produce technical documentation of complex problems, methods and results• communicate problems, findings and solutions to relevant target audiences
Duration	5 ECTS
Language	English
Assessment	Written or oral exam
Grading	Passed/failed
Assessment criteria	As stated in the joint programme regulations

3.2 2nd semester – Aquatic Pollution or Wastewater Treatment

3.2.1 Marine and Freshwater Pollution

English title	<i>Marine and Freshwater Pollution</i>
Danish title	<i>Forurening af akvatiske systemer</i>

Placement	Spring, 2nd semester
Aim	To enable the students to examine, model and evaluate processes in the aquatic environment, and to suggest engineering solutions to various pollution problems.
Learning outcomes	After completion of the course the student should be able to Knowledge <ul style="list-style-type: none">• explain the physics of freshwater and marine environments including currents, waves, and sediment transport.• explain the basic ecology of freshwater and marine environments including organization and key processes• explain the environmental impact of different types of pollution on aquatic environments Skills <ul style="list-style-type: none">• identify the physical, chemical and biological processes that are central for the analysis and evaluation of pollution in the aquatic environment• evaluate toxicological effects on aquatic ecosystems• use impact assessment methods• build and analyze numerical water quality models• evaluate methods and models for the analysis of changing impacts on aquatic environments Competences <ul style="list-style-type: none">• perform water quality assessment studies for different types of pollution in marine and freshwater environments• cooperate and teamwork within the problem area• communicate the results of the project work in a project report, and make a common oral presentation of the main results
Type of instruction	Project
Content	In this project, the students work in coastal marine areas or freshwater lakes or streams. The given localities are analyzed using both published data and self-generated data. The collected data can be incorporated into numerical models.
Duration	15 ECTS
Language	English
Assessment	Oral examination based on a written report
Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.2.2 Wastewater Treatment Systems

English title	<i>Wastewater Treatment Systems</i>
Danish title	<i>Spildevandsbehandlingssystemer</i>

Placement	Spring, 2nd semester
Aim	To teach the student to design and operate urban wastewater treatment systems and to gain knowledge on the microbiological and chemical transformations processes that takes place in a wastewater treatment plant.
Learning outcomes	After completion of the course the student should be able to Knowledge <ul style="list-style-type: none"> • account for physical, microbial and chemical methods for separation and treatment of wastewater by activated sludge processes • describe the different microbiological and chemical processes that participate in wastewater treatment Skills <ul style="list-style-type: none"> • apply methods for design and analysis of wastewater treatment plants • dimension and run a treatment plant
Type of instruction	Project
Content	The procect focuses on <ul style="list-style-type: none"> • design of wastewater treatment systems • operation of wastewater treatment systems • microbiology of activated sludge • modeling of activated sludge treatment processes
Duration	15 ECTS
Language	English
Assessment	Oral examination based on a written report
Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.2.3 Hydrodynamics and time series analysis of environmental flows

<i>English title</i>	<i>Hydrodynamics and Time Series Analysis of Environmental Flows</i>
<i>Danish title</i>	<i>Hydrodynamik og tidsserieanalyse for miljøhydrauliske forhold</i>
Placement	Spring, 2nd semester
Aim	The aim of the course is to give the student a fundamental knowledge of water flow in marine environments. Based on the gained knowledge the student shall be able to analyse time series of environmental data and set up numerical models for a given aquatic environment.
Learning outcomes	After completion of the course the student should be able to Knowledge <ul style="list-style-type: none"> • explain advanced hydrodynamics • explain numerical modelling of turbulent flows • explain modelling of transport and mixing • account for environmental flow in coastal zone and estuaries • explain basic time series analysis Skills <ul style="list-style-type: none"> • perform a systematic analysis of the physics in the coastal zone and estuaries • perform non-stationary time simulations using advanced hydrodynamic models • analyse time series for persistence and harmonic elements

	<ul style="list-style-type: none"> analyse geophysical flows in the ocean and coastal zone
Competences	<ul style="list-style-type: none"> evaluate and handle data that forms the basis of hydrodynamic and water quality modelling structure and produce technical documentation of complex problems, methods and results communicate problems, findings and results graphically as well as orally to the relevant target audience
Type of instruction	Lectures, etc. supplemented with project work, workshops, presentation seminars, lab tests
Duration	5 ECTS
Language	English
Assessment	Written or oral examination
Grading	Pass/failed
Assessment criteria	As stated in the joint programme regulations

3.2.4 Fundamental wastewater treatment

<i>English title</i>	<i>Fundamental Wastewater Treatment</i>
<i>Danish title</i>	<i>Grundlæggende spildevandsbehandling</i>

Placement	Spring, 2nd semester
Prerequisites	The module builds on knowledge gained in Basic microbiology, basic chemistry and hydraulics
Aim	To gain knowledge on the composition and characterization of wastewater and to the processes used to treat urban wastewater.
Learning outcomes	<p>After completion of the course the student should be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> account for advanced waste water treatment account for physical, chemical and microbial treatment and separation processes explain the treatment for nutrients (nitrogen and phosphorus) describe the anaerobic processes in activated sludge account for the physical separation processes account for the biological mineralization of carbon, nitrogen and phosphorus <p>Skills</p> <ul style="list-style-type: none"> quantify the important biological, chemical and physical processes which is used for a process based wastewater treatment plant design characterise of wastewater operate and optimise wastewater treatment systems design of plants for mechanical and chemical treatment of wastewater design of activated sludge and biofilm treatment plant for removal of carbon, nitrogen and phosphorus model biological mineralization of carbon, nitrogen and phosphorus in suspension and biofilms <p>Competences</p>

	<ul style="list-style-type: none"> • plan and design new treatment plants • analyze the function of existing treatment plants • structure and produce technical documentation of complex problems, methods and results. • communicate problems, findings and results graphically as well as orally to the relevant target audience
Type of instruction	Lectures, etc. supplemented with project work, workshops, presentation seminars, lab tests
Duration	5 ECTS
Language	English
Assessment	Written or oral examination
Grading	Pass/fail
Assessment criteria	As stated in the joint programme regulations

3.2.5 Marine pollution

<i>English title</i>	<i>Marine Pollution</i>
<i>Danish title</i>	<i>Forurening i marine områder</i>

Placement	Spring, 2nd semester
Aim	To provide fundamental insight into coastal marine waters including effects and prevention of natural and anthropogenic pollution.
Learning outcomes	<p>After completion of the course the student should be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> • explain physical, chemical and microbial processes in marine systems • account for the most common types of marine pollution • account for the exchange of matter between aquatic and terrestrial environments • account for the processes: primary production, respiration and re-oxidation • describe important organic and inorganic pollutants and pollution effects in coastal marine waters <p>Skills</p> <ul style="list-style-type: none"> • analyze microbial loops, food webs, and turnover of C, N, and S in aquatic environments and in sediments • distinguish between pollution impacts on individuals, populations, and communities • assess recreational and bathing water quality, and tools for fecal pollution source tracking <p>Competences</p> <ul style="list-style-type: none"> • evaluate the occurrence of inorganic nutrients, man-made pollutants, disease-causing microorganisms, and metal pollution in marine waters • evaluate methods to prevent and alleviate antropogenic pollution in coastal marine waters
Type of instruction	Lectures, supplemented with theoretical exercises, workshops, presentation seminars
Duration	5 ECTS
Language	English

Assessment	Written or oral examination
Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.2.6 Limnology

<i>English title</i>	<i>Limnology</i>
<i>Danish title</i>	<i>Limnologi</i>
Placement	Spring
Prerequisites	The module builds on knowledge gained in General chemistry, General biology
Aim	To provide fundamental insight into freshwater ecology and freshwater ecosystems and introduce the physical, chemical and biological dynamics of natural freshwater ecosystems, and the effects of natural and anthropogenic perturbations on structure and function
Learning outcomes	<p>After completion of the course the student should be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> • describe key components of freshwater ecosystems • describe relevant theory for physical, chemical and biological processes in freshwater ecosystems • describe the dominant anthropogenic types of pollution affecting freshwater ecosystems • differentiate between major types of streams, rivers and lakes • explain the exchange of matter between aquatic and terrestrial environments • explain lake and river ecosystem dependence on light, temperature, nutrients and organic matter • describe primary production, respiration and re-oxidation in freshwater ecosystems • account for current river and lake restoration methods • describe important organic and inorganic pollutants and pollution effects in freshwater ecosystems. • <p>Skills</p> <ul style="list-style-type: none"> • determine the significance of hydraulic conditions on chemical and biological dynamics in lakes and rivers • analyze oxygen dynamics in freshwater environments • analyze impacts of pollution on biotic communities • use existing pollution indicators for running waters and lakes to assess the pollution of a given location <p>Competences</p> <ul style="list-style-type: none"> • work with and analyze biological communities in relation to nutrient dynamics and organic matter cycling in lake and river ecosystems • evaluate methods to prevent and alleviate anthropogenic perturbations in freshwater ecosystems using existing technologies
Type of instruction	Lectures
Duration	5 ECTS
Language	English
Assessment	Written or oral examination

Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.3 3rd & 4th semester

3.3.1 Master's Thesis

<i>English title</i>	<i>Master's Thesis</i>
<i>Danish title</i>	<i>Kandidatspeciale</i>
Placement	3. and 4. semester (long Master's thesis), 4. semester (short Master's thesis)
Prerequisites	The module builds on knowledge gained in Completed 1.-2. semester or 1.-3. semester
Aim	To allow the student to conduct an independent in-depth scientific work including planning and completion of a research project
Learning outcomes	After completion of the course the student should be able to Skills <ul style="list-style-type: none"> • plan, complete and report a comprehensive independent research project within a set time period • carry out research and technological development and solve complicated technological problems by use of scientific methods • critically compare and evaluate the results of a research project in relation to existing knowledge and established theories in the field Competences <ul style="list-style-type: none"> • include relevant social, economical, safety, environmental, and working environment issues in the completion of a research project • perform a balanced and effective written and oral communication of results, conclusions and perspectives of the research project
Content	<p>The thesis work may consist of a natural continuation of projects themes from the previous semesters. However, the thesis work may also consist of entirely new subjects with less association to previous studies, and may include project work in collaboration with an external partner.</p> <p>The thesis work is characterised by independent development or research including experimental work, numerical modelling, field experiments and/or comparative calculations.</p>
Duration	30-60 ECTS
Language	English or Danish
Assessment	Oral examination based on a written report
Grading	7-point scale
Assessment criteria	As stated in the joint programme regulations

3.4 Problem-based Learning (PBL) and Student Responsibility at Aalborg University

3.4.1 Problem-based Learning (PBL) and Student Responsibility at Aalborg University

English title	<i>Problem-based Learning (PBL) and Student Responsibility at Aalborg University</i>
Danish title	<i>Problembaseret læring og studerendes ansvar for læring på Aalborg University</i>
Placement	Spring, 2nd semester
Prerequisites	None, but the course is compulsory for students not acquainted with the Aalborg PBL model
Aim	To introduce the students majoring in chemistry or engineering a broad knowledge of polymer chemistry, such as principles of polymerization, polymer morphologies, polymer properties and so on. Meanwhile, some basic experimental techniques will be included in the lab course.
Learning outcomes	<p>After completion of the course the student should</p> <p>Knowledge</p> <ul style="list-style-type: none">• know about the organization at Aalborg University and where to ask for help in different matters• know about how to communicate both in the project groups and during courses• know how a semester is structured and for the different examination forms used at Aalborg University• know how project work and laboratory work are carried out at Aalborg University including safety issues in the laboratories• know about issues concerning plagiarism and its consequences• know about the software which is used during the study• know about the IT systems used and how to get started• know about the specialist student counselors and how they may provide assistance <p>Skills</p> <ul style="list-style-type: none">• be able to use problem-based learning and group work in project and courses at Aalborg University• be able to use Moodle to find lecture plans, timetables, and other relevant information <p>Competences</p> <ul style="list-style-type: none">• be able to apply the concepts, theories and methods for problem-based learning and group work• be able to account for the considerations involved in the process of formulating project reports in practice.
Content	Lectures, discussions and group work. The course will take place during two Wednesday afternoons.
Duration	
Language	English
Assessment	Internal assessment during the course/class participation according to the rules in the Examination Policies and Procedures, Addendum to the joint programme regulations of the Faculty of Engineering and Science, Aalborg University. In this case the assessment is primarily based on the oral performance during the course. This means that the student has to be active during the course time and participate in discussions. The course is an integrated part of the

project and a precondition for participation in the project examination for those who are not acquainted with the Aalborg PBL model. Consequently, no diploma will be issued for the course nor will it appear on the academic transcripts.

Grading

Passed/failed

Assessment
criteria

As stated in the joint programme regulations

Chapter 4. Entry into force, interim provisions and revision

The study regulations are adopted by the Study Board of Biotechnology, Chemical and Environmental Engineering, approved by the Dean of the Faculty of Engineering and Science and take effect from 1st September, 2016.

Students who wish to complete their studies under the former study regulations from 2014 must conclude their education by the summer examination 2017, since examinations under the former study regulation are not offered after this time.

The current, valid version of the study regulations is published at www.ses.aau.dk.

Chapter 5. Other rules

5.1 3rd semester

On the 3rd semester in accordance with the joint programme regulations provisions section 5.3 the students have on their own initiative the following options instead of an ordinary project.

- Documentation of the semester project through a scientific article
- Individual project preparing a scientific report or article
- Transversal studies
- Relevant internship
- Long dissertation (Master thesis) on 3rd and 4th semester on programmes experimental in nature.

The particular wishes of the students must be approved by the study board prior to semester start.

5.2 Rules for written assignments including the Master's thesis and its scope

An evaluation of the student's spelling and writing ability enters into the assessment of all written work, regardless of what language it is written in. Orthographic and grammatical correctness and stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always enter in as an independent dimension of the total evaluation. However, no examination can be assessed as 'Pass' on the basis of language performance alone; similarly, an examination normally cannot be assessed as 'Fail' on the basis of poor language performance alone. The above applies unless other rules are stated in connection with the individual examination.

The Master's thesis must include a summary in a foreign language (English, French, Spanish or German subject to the study board's approval). If the project is written in a foreign language (English, French, Spanish or German) the summary can be written in Danish subject to the study board's approval. The summary must be at least 1 page and may be at most 2 pages (the summary is not counted in any fixed minimum and maximum page count per student). The summary enters into the evaluation of the project as a whole.

5.3 Credit transfer

Students with other programme elements from other Master's programmes can obtain credit/admission subject to the study board's evaluation of the individual application (meritering).

5.4 Rules for the maximum period of enrolment

The Master's programme must be completed within 4 years at the latest following enrolment, excluding leaves of absence.

5.5 Rules for examinations

The rules for examinations appear in "Examination Policies and Procedures" published on the Faculty of Engineering and Science website www.teknat.aau.dk.

5.6 Exemption

In the case of unusual circumstances, the study board can grant exemptions from those parts of the study regulations that are not fixed by law or ministerial order. Exemption regarding an examination applies to the immediate examination.