The Faculty of Engineering and Science
The Board of Studies for Civil Engineering

AALBORG UNIVERSITY
DENMARK

Curriculum for The Master of Science in Technology in Risk and Safety Management

Aalborg University
February 2018
Version 2

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Prodekan
Ola Geil

Campus Esbjerg

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Preface:

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum for the Master's program in Risk and Safety Management is stipulated. The program also follows the Joint Programme Regulations and the Examination Policies and Procedures for the Faculty of Engineering and Science.

Table of Contents

Chapter 1: Legal Basis of the Curriculum, etc.

1.1 Basis in ministerial orders

The Master's program in Risk and Safety Management is organised in accordance with the Ministry of Higher Education and Science's Order no. 1328 of November 15, 2016 on Bachelor's and Master's Programs at Universities (the Ministerial Order of the Study Programs) and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 258 of March 18, 2015 (the Admission Order) and Ministerial Order no. 114 of February 3, 20157 (the Grading Scale Order) with subsequent changes.

1.2 Faculty affiliation

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

1.3 Board of Studies affiliation

The Master's program falls under the Board of Studies for Civil Engineering in the School of Engineering and Science.

1.4 External Examiners Corps

The programme is associated with Ingeniøruddannelsernes landsdækkende censorkorps (bygning).

Chapter 2: Admission, Degree Designation, Program Duration and Competence Profile

2.1 Admission

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 claim to 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 Science in Mechanical Engineering, Technical University of Denmark
- Bachelor of Science in Civil Engineering, Technical University of Denmark
- Bachelor of Science in Chemical Engineering, Aarhus University
- Bachelor of Science in Engineering (Chemistry and Technology), Technical University of Denmark
- Bachelor of Science in Engineering (Biotechnology),Technical University of Denmark
- Bachelor of Engineering in Civil and Structural Engineering, Aarhus University
- Bachelor of Engineering in Civil Engineering, Technical University of Denmark
- Bachelor of Engineering in Civil Engineering, University of Southern Denmark
- Bachelor of Engineering in Mechanical Engineering, University of Southern Denmark
- Bachelor of Engineering in Mechanical Engineering, Aarhus University
- Bachelor of Engineering in Mechanical Engineering, Technical University of Denmark
- Bachelor of Engineering in Chemical Engineering, Aarhus University
- Bachelor of Engineering in Chemical and Bio Engineering, Technical University of Denmark
- Bachelor of Science in Public Health, University of Southern Denmark
- Bachelor of Science in Economics and Business Administration, University of Southern Denmark
- 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

Since the programme is offered in English, in addition to the above, the students must have competencies regarding English documented by Danish B level or internationally recognised tests, cf. Ministerial Order no. 258 of March 18, 2015 (the Admission Order).

2.2 Degree designation in Danish and English

The Master's program entitles the graduate to the designation cand.tech (candidatus/candidata technologiae) i sikkerhed og risikostyring. The English designation is: Master of Science (MSc) in Technology (Risk and Safety Management).

2.3 The program's specification in ECTS credits

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

2.4 Competence profile on the diploma

The following competence profile will appear on the diploma:

> A graduate of the Master's program has competencies acquired through an educational program that has taken place in a research environment.
>
> The graduate of the Master's program can perform highly qualified functions on the labor market on the basis of the educational program. Moreover, the graduate has prerequisites for research (a Ph.D. program). Compared to the Bachelor's degree, the graduate of the Master's program has developed her/his academic knowledge and independence, so that the graduate can independently apply scientific theory and method in both an academic and occupational/professional context.

2.5 Competence profile of the program:

<u>The graduate of the Master's program:</u>

Knowledge

- Has scientifically based knowledge about the risk management in projects and systems
- Understand the nature of probability, uncertainty, stochastic processes and independent and conditional probabilities
- Has knowledge about different decision making tools such as Bayesian networks, decision trees, cost benefit analyses and Monte Carlo simulations
- Understands the importance of ethical considerations in relation to applying cost benefit models and decision making tools when considering actions involving health and safety of people
- Understands the limitations of models/tools within risk/safety, especially in relation to the input data's validity and credibility
- Has knowledge about evacuation strategies, the principles and models behind evacuation simulation software and the influence of human behavior in emergencies
- Has an understanding of the jurisdiction of authorities in the field of risk and safety management and know how the legislation is organised in the context of a given project
- Has knowledge in one or more subject areas that is based on the highest international research within the field of risk and safety management.

Skills

- Can apply the scientific methods and tools as well as general skills related to employment within risk and safety management
- Can communicate research-based knowledge and discuss professional and scientific problems with peers as well as non-specialists, using the correct terminology in risk and safety management
- Can apply appropriate methods of analysis for investigating risk and safety issues in projects and systems
- Can select and apply appropriate tools to support decision making in a risk management framework
- Can identify possible emergency scenarios and are able to apply appropriate methods within each stage of emergency management to a given scenario
- Can apply tools to manage the complexity of a project in a systems engineering framework and use methods that allow early detection of possible failures in systems
- Can select and apply appropriate methods for solving a given problem in the field of risk and safety management and judge the results regarding their accuracy and validity

- Can identify scientific problems within risk and safety management and select and apply proper scientific theories, methods and tools for their solution
- Can develop and advance new analyses and solutions within risk and safety management

Competencies

- Can manage work-related situations that are complex and unpredictable, and which require new solutions
- Can initiate and implement discipline-specific as well as interdisciplinary cooperation and assume professional responsibility
- Can take responsibility for own professional development and specialization.

Chapter 3: Content and Organization of the Program

The program is structured in modules and organized as a problem-based study. A module is a program element or a group of program 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 program 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
- exercises (individually and in groups)
- teacher feedback
- reflection
- portfolio work

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

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

- ordinary written exam based on handed out exercises
- multiple choice
- ongoing evaluation of written assignments

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

- ordinary oral exam with or without preparation
- oral exam based on project report
- oral exam based on presentation seminar
- portfolio based oral exam

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

3.1 Overview of the program

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, 80/85 ECTS are assessed by the 7-point scale and 45 ECTS are assessed by external examination. Furthermore it is possible to obtain 10 ECTS through elective courses on the second and third semesters.

Semester	Module	ECTS	Assessment	Exam
1st	Systems Engineering	5	Pass/Fail	Internal
	Applied Statistics and Probability Theory	5	7-point scale	Internal
	Risk Analysis	5	Pass/Fail	Internal
	Industry Standards and Legislation	15	7-point scale	Internal
2nd	Risk Management	5	Pass/Fail	Internal
	Decision Making	5	Pass/Fail	Internal
	Risk Communication[1)]	5	7-point scale	Internal
	Maintenance Management[1)]	5	Pass/Fail	Internal
	Risk Analysis and Management	15	7-point scale	External
3rd	Simulation of Emergencies	5	Pass/Fail	Internal
	Emergency Management	5	Pass/Fail	Internal
	Risk and Reliability in Engineering[1)]	5	Pass/Fail	Internal
	Health and Safety Management[1)]	5	Pass/Fail	Internal
	Operational Risk Management in Projects	15	7-point scale	Internal
4th	Master's Thesis	30	7-point scale	External
Total		120		

1) The student must choose one out of two course modules. The modules will not be given with a small number of students.

1. Semester

Systems Engineering
Systems engineering

Prerequisites: Admission to the program according to 2.1.

Objective: Students who complete the module:

Knowledge
- know different models and tools for systems engineering
- understand the concept of product lifecycle
- understand the interaction of different engineering disciplines comprising systems engineering

Skills
- can apply tools to manage the complexity of a project in a systems engineering framework
- can account for the theory behind applied models
- are able use methods that allow early detection of possible failures
- can modify system design to mitigate potential risk of failures

Competencies
- are able to use correct professional terminology
- are able to acquire additional knowledge in the field

Type of instruction: Lectures, etc. supplemented with project work, workshops, presentation seminars.

Exam format: Written exam based on a case.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Applied statistics and Probability Theory
Anvendt statistik og sandsynlighedsteori

Prerequisites: Admission to the program according to 2.1.

Objective: Students who complete the module:

Knowledge
- have a basic understanding of probability, uncertainty, stochastic processes and independent and conditional probabilities
- know basic probability and statistical models for uncertainties
- have knowledge of discrete and continuous probability distributions and their application
- know of the basic principles of statistical analysis, including data collection
- have knowledge about statistical inferens and hypothesis testing
- know the principles of Markov chains and Monte Carlo methods to simulate probability distributions
- Understands the limitations of models/tools within risk/safety, especially in relation to the input data's validity and credibility

Skills
- are able to use probability distributions to describe stochastic processes
- can estimate statistical parameters from a dataset
- can compute confidence intervals
- can account for the theory behind applied models
- are able to use relevant statistical software to approximate *a posteriori* probability distributions

Competencies
- can assess the applicability of probability theory in a given situation
- are able to use correct professional terminology
- are able to acquire additional knowledge in the field

Type of instruction: Lectures, etc. supplemented with project work, workshops, presentation seminars.

Exam format: Written exam.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Risk Analysis
Risikoanalyse

Prerequisites: The module adds to the knowledge obtained in Applied statistics and probability theory and Systems engineering

Objective: Students who complete the module:

Knowledge
- understand the process of risk analysis and its relation to risk management
- know qualitative and quantitative methods for risk analysis including cost-benefit analysis, HAZID/HAZOP, FMEA, FTA og SIL.
- have knowledge of influence of organizational factors and human errors

Skills
- are able to perform risk analysis of various types of problems and systems
- are able to interpret and use the results from a risk analysis in a decision making process of risk management

Competencies
- are able to model, calculate and communicate risk

Type of instruction: Lectures, discussion, group-based project work, student presentations

Exam format: Written exam based on a case.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Industry Standards and Legislation
Lovgivning og standarder i industrien

Prerequisites: Admission to the program according to 2.1.

Objective: Students who complete the module:

Knowledge
- know how the legislation is organised in the field of a given project
- have a basic understanding of the jurisdiction of authorities in the field

Skills
- are able to identify and describe problems related to a project
- can identify the relevant legislation and standards for a given project
- can organize project work to comply with legislation and industry standards

Competencies
- must be able to apply project work as a study form
- must be able to contribute successfully to teamwork within the problem area and make a common presentation of the result of the project work
- must be able to communicate the results of the project work in a project report

Type of instruction: Project work with supervision supplemented with instructions, workshops, presentation seminars, lab tests, etc.

Exam format: Oral exam based on presentation seminar and project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

2. Semester

Risk Management
Risikostyring

Prerequisites: The module adds to the knowledge obtained in Risk analysis

Objective: Students who complete the module:

Knowledge
- know the basic principles of risk management
- know the definitions of risk (and uncertainty)
- have knowledge about qualitative and quantitative assessment of risk
- have a basic knowledge of probability theory related to risk
- understand basic concepts such as thresholds and acceptable risk
- have an understanding for risk management plans.
- understand the basic mechanisms behind different risk perceptions and its implications for risk management and risk communication.
- understand the importance of risk assessment and understand the importance of economic considerations regarding risk management.

Skills
- are able to use correct terminology for risk management
- can evaluate existent risk management plans and response strategies

- are able to identify, analyse and prioritize risks

Competencies
- can apply the principles behind risk management to undertake risk analyses and formulate response strategies

Type of instruction: Lectures, discussion, group-based project work, student presentations

Exam format: Written exam.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Decision Making
Beslutningstagning

Prerequisites: The module adds to the knowledge obtained in Risk management and Applied statistics and probability theory.

Objective: Students who complete the module:

Knowledge
- know basic concepts behind the decision making process
- know different decision making tools such as Bayesian networks, decision trees, cost benefit analyses and Monte Carlo simulations
- know different normative, descriptive, prescriptive decision making models
- Understand the importance of ethical considerations in relation to applying cost benefit models and decision making tools when considering actions involving health and safety of people

Skills
- are able to evaluate the applicability of a decision making model for a specific case
- are able to use the different tools present in software packages
- can use the presented tools to support decision making in a risk management framework

Competencies
- can develop and apply an appropriate decision making process in a specific case in a risk management context
- can select and apply an appropriate decision making model in a specific case

Type of instruction: Lectures, etc. supplemented with assignments, workshops, presentation seminars, lab tests.

Exam format: Oral exam.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Risk Communication
Risiko kommunikation

Prerequisites: The module adds to the knowledge obtained in Risk management

Objectives: Students who complete the module should:

Knowledge

- know about and understand the contextual challenges of risk communication
- know about and understand the cognitive and emotional processes of risk perception which should guide the development of risk communication strategies
- know about and understand theoretical approaches towards risk communication
- know about and understand evidence-based strategies and methods of risk communication

Skills

- be able to identify, describe and discuss the different theoretical and strategic approaches to risk communication
- be able to analyze the effectiveness of communication strategies and processes in different risk management contexts
- be able to apply different risk communication strategies and methods to develop effective risk communication messages to facilitate risk management in projects

Competencies

- be able to apply adequate terminology in oral and written communication
- be able to critically reflect and discuss different risk communication strategies in a management framework
- be able to present the communication strategies developed in the project work in an oral presentation/written report

Type of instruction: Lectures, discussion, group-based project work, student presentations

Exam format: Oral or written exam. Exam format is decided on by start of semester.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Maintenance Management
Vedligeholdelsesplanlægning

Prerequisites: The module adds to the knowledge obtained in Applied statistics and probability theory

Objective: Students who complete the module:

Knowledge

- have knowledge about basic maintenance planning and concepts
- understand the principles of maintenance optimization in relation to dependability, quality and safety

Skills

- are able to apply the concepts to a given system to optimize maintenance plans
- can apply modern methods like CMMS to organize maintenance plans

Competencies

- are able to apply adequate terminology in oral and written communication
- are able to critically discuss different methods for maintenance planning

Type of instruction: Lectures, discussion, group-based project work, student presentations

Exam format: Written group assignment and oral exam based upon the written assignment.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Risk Analysis and Management
Risikoanalyse og -styring

Prerequisites: The module adds to the knowledge obtained in the 1st semester.

Objective: Students who complete the module:

Knowledge

- must have knowledge about the main methods to deal with risk in a management framework
- understand the methods for risk analysis and assessment

Skills

- are able to apply the principles behind risk management to independently identify risk and possible response strategies
- are able to perform practical risk analysis for identification, structuring and modelling risk
- are able to apply the analysis methods in the various situations related to risk
- are able to assess model parameters used in project risk management
- can formulate alternative solutions for risk mitigation based on identified risks
- are able to choose between alternatives using an appropriate decision making process

Competencies

- must be able to apply proper terminology in oral, written and graphical communication and documentation of problems and solutions within risk analysis and management
- must be able to communicate the results of risk analyses and risk management decisions performed in the project work in a project report
- must be able to contribute successfully to teamwork within risk analysis and management including the decision making process in the problem area and make a common presentation of the result of the project work

Type of instruction: Project work with supervision supplemented with instructions, workshops, presentation seminars, lab tests, etc.

Exam format: Oral exam based on presentation seminar and project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

3. Semester

Simulation of Emergencies
Simulering af nødsituationer

Prerequisites: The module adds to the knowledge obtained in Applied statistics and probability theory, Risk management, and Risk analysis.

Objective: Students who complete the module:

Knowledge
- must have knowledge about evacuation strategies
- must have knowledge about the principles and models behind evacuation simulation software (like Simulex, Step, Exodus etc.)
- understand the influence of human behavior in emergencies

Skills
- must be able to use software to simulate evacuation routes in case of emergencies
- are able to estimate the evacuation time of a building, area or vessel
- are able to identify possibilities and limitations related to simulations

Competencies
- can critically evaluate and report results from an evacuation simulation

Type of instruction: Lectures, discussion, group-based project work, student presentations

Exam format: Written exam based on a case.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Emergency Management
Håndtering af nødsituationer

Prerequisites: The module adds to the knowledge obtained in Risk management and Decision making

Objective: Students who complete the module:

Knowledge
- have knowledge of the various stages of emergency management, mitigation, preparedness, response and recovery, and their mutual relation
- understand methods for developing and implementing contingency plans

Skills
- are able to identify possible emergency scenarios
- are able to decide between different strategies in a given scenario
- are able to apply appropriate methods within each stage of emergency management to a given scenario

Competencies
- are able to use correct professional terminology
- can critically develop and evaluate contingency plans

Type of instruction: Lectures, etc. supplemented with project work, workshops, presentation seminars.

Exam format: Oral exam.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Risk and Reliability in Engineering
Risiko og sikkerhed af konstruktioner

Prerequisites: The module adds to the knowledge obtained in Applied statistics and probability theory.

Objective: Students who complete the module:

Knowledge

- understand the concepts risk, uncertainty, reliability and safety
- know statistical methods for modeling physical, model, statistical and measurement uncertainties
- know methods for assessment of reliability of structural systems using probabilistic methods
- know methods for systems reliability for non-structural components and its applications in engineering

Skills

- be able to model physical, statistical, model and measurement uncertainties
- be able to use failure rates and hazard functions to model failures in systems reliability for non-structural components
- be able to model uncertainties for loads and strengths
- be able to estimate the reliability by FORM/SORM methods (reliability index method) and by simulation
- be able to model system behavior and estimate the reliability of series and parallel systems
- understand basic concepts of stochastic processes and timevariant reliability methods
- be able to estimate characteristic and design values for strength parameters and load bearing capacities, and for environmental loads and load effects using test data and measurements
- be able to calibrate partial safety factors and load combination factors
- be able to apply Bayesian statistical methods
- be able to apply risk & reliability methods for probabilistic design of engineering structures such as buildings, bridges, offshore structures, costal structures, wind turbines etc.
- use correct professional terminology

Competencies

- be able to participate in a dialog on modeling of uncertainties, risk analysis and assessment of reliability of structural and nonstructural components and systems
- be able to model, calculate and communicate risk analysis, modeling

of uncertainties and assessment of reliabilities for engineering problems.

Type of instruction: Lectures, etc. supplemented with project work, workshops, presentation seminars, lab tests.

Exam format: Oral or written exam. Exam format is decided on by start of semester.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Health and Safety Management
Sundheds- og sikkerhedsstyring

Prerequisites: Admission to the program according to 2.1.

Objective: Students who complete the module:

Knowledge

- know principles and methods for identification and analysis of accident risk
- know methods to reduce occupational risk in complex operations
- understand the mechanisms behind experience feedback and learning

Skills

- are able to identify and manage health and safety hazards in operations
- are able to identify organisational and individual obstacles to an efficient learning from experiences on accidents and identify possible strategies to mitigate the effect of these obstaclesare able to apply tools for HSE performance and monitoring

Competencies

- can systematically apply methods for identifying and managing accidents in operations

Type of instruction: Lectures, discussion, group-based project work, student presentations

Exam format: Oral or written exam. Exam format is decided on by start of semester.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Operational Risk Management in Projects
Operativ risikohåndtering i projekter

Prerequisites: The module adds to the knowledge obtained in the 1st and 2nd semester.

Objective: Students who complete the module:

Knowledge

- have knowledge about methods to identify possible risk and hazards
- understand the factors that influence risk and hazards
- understand the methods for preventing and handling emergencies

Skills

- are able to apply the principles behind emergency management to independently identify emergency scenarios
- are able to plan and perform simulations of emergency scenarios
- are able to formulate plans to handle different hazards and emergency scenarios in a project setting

- can develop alternatives to critical processes in a project using the principles of risk management

Competencies

- must be able to apply proper terminology in oral, written and graphical communication and documentation of problems and solutions within operational risk management
- must be able to communicate the results of the project work in a project report
- must be able to contribute successfully to teamwork within the problem area and make a common presentation of the result of the project work

Type of instruction: Project work with supervision supplemented with instructions, workshops, presentation seminars, lab tests, etc.

Exam format: Oral exam based on presentation seminar and project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

4. Semester

Master's Thesis
Kandidatspeciale

Prerequisites: The module adds to the knowledge obtained in the first three semesters of the master programme.

Objective:
After completion of the project, the student should within the following topics:

Knowledge

- have knowledge and comprehension within the field of risk and safety management at the highest international level
- be able to critically evaluate knowledge and identify new scientific problems within risk and safety management
- have understanding of implications within the related research area including research ethics

Skills

- independently explain choice of scientific theoretical and/or experimental methods to solve a risk and safety management problem
- during the project, and when finalising it, make an independent and critical estimation of the chosen theories and methods as well as the analyses, results and conclusions
- be able to apply a wide range of engineering methods in research and development in the field of risk and safety management
- be able to, if necessary, develop new methods for solving a specific problem in the field of risk and safety management

- be able to communicate relevant scientific and professional aspects of project work in a clear and systematic way both to specialists and the public

Competencies

- be able to work independently with a project on a specific problem within risk and safety management at the highest international level
- Independently be able to define and analyse scientific problems and based on that make and state the reasons for the decisions made
- be competent to solve new and complicated technical problems by the use of advanced mathematics, scientific and technological knowledge
- be able to evaluate the progress of the project independently and select and include additional literature, experiments or data when needed in order to maintain a scientific basis for the project
- be able to control complex and unexpected working situations and be able to develop new solutions
- must be able to communicate the results of the project work in a project report

Type of instruction: Project work with supervision supplemented with instructions, workshops, presentation seminars, lab tests, etc.

Exam format: Oral exam based on presentation seminar and the thesis.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Chapter 4: Entry into Force, Interim Provisions and Revision

The curriculum is approved by the Dean of the Faculty of Engineering and Science and enters into force as of February 2018.

Students who wish to complete their studies under the previous curriculum from 2014 must conclude their education by the winter examination period 2019 at the latest, since examinations under the previous curriculum are not offered after this time.

Chapter 5: Other Provisions

5.1 Rules concerning written work, including the Master's thesis

In the assessment of all written work, regardless of the language it is written in, weight is also given to the student's spelling and formulation ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination can be assessed as 'Pass' on the basis of good language performance alone; similarly, an examination normally cannot be assessed as 'Fail' on the basis of poor language performance alone.
The Board of Studies can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Master's thesis must include an English summary.[1] If the project is written in English, the summary must be in Danish.[2] The summary must be at least 1 page and not more than 2 pages. The summary is included in the evaluation of the project as a whole.

5.2 Rules concerning credit transfer (*merit*), including the possibility for choice of modules that are part of another program at a university in Denmark or abroad

In the individual case, the Board of Studies can approve successfully completed (passed) program elements from other Master's programs in lieu of program elements in this program (credit transfer). The Board of Studies can also approve successfully completed (passed) program elements from another Danish program or a program outside of Denmark at the same level in lieu of program elements within this curriculum. Decisions on credit transfer are made by the Board of Studies based on an academic assessment. See the Joint Programme Regulations for the rules on credit transfer.

5.3 Rules for examinations

The rules for examinations are stated in the Examination Policies and Procedures published by the Faculty of Engineering and Science.

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

5.4 Exemption

In exceptional circumstances, the Board of Studies study can grant exemption from those parts of the curriculum that are not stipulated by law or ministerial order. Exemption regarding an examination applies to the immediate examination.

[1] Or another foreign language (upon approval from the Board of Studies.
[2] The Board of Studies can grant exemption from this.

5.5 Rules and requirements for the reading of texts

At programmes taught in Danish, it is assumed that the student can read academic texts in modern Danish, Norwegian, Swedish and English and use reference works, etc., in other European. At programmes taught in English, it is assumed that the student can read academic text and use reference works, etc., in English.

5.6 Additional information

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