



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

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**Preface:**

Pursuant to Act 367 of May 22, 2013 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 Framework Provisions and the Examination Policies and Procedures for the Faculties of Engineering, Science and Medicine.

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## **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 Science, Innovation and Higher Education's Order no. 814 of June 29, 2010 on Bachelor's and Master's Programs at Universities (the Ministerial Order of the Study Programs) and Ministerial Order no. 666 of June 24, 2012 on University Examinations (the Examination Order) with subsequent changes. Further reference is made to Ministerial Order no. 241 of March 15, 2013 (the Admission Order) and Ministerial Order no. 250 of March 15, 2007 (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.

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

### **2.1 Admission**

Admission to the Master's program in Risk and Safety Management requires a Bachelor's degree in Civil Engineering, Mechanical Engineering, Chemical Engineering, Public Health Science, Economics and Business Administration.

Students with another Bachelor's degree, upon application to the Board of Studies, will be admitted after a specific academic assessment if the applicant is deemed to have comparable educational prerequisites. The University can stipulate requirements concerning conducting additional exams prior to the start of study.

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. Bekendtgørelse nr. 213 af 21/02/2012 om adgang m.v. ved bachelor- og kandidatuddannelser ved universiteterne (adgangsbekendtgørelsen).

### **2.2 Degree designation in Danish and English**

The Master's program entitles the graduate to the designation cand.scient.techn. 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:**

### The graduate of the Master's program:

#### 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 board 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 <sup>1)</sup>	5	7-point scale	Internal
	Maintenance Management <sup>1)</sup>	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 <sup>1)</sup>	5	Pass/Fail	Internal
	Health and Safety Management <sup>1)</sup>	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.

### 3.2 Module descriptions

Module descriptions can be found in the appendix, ordered alphabetically according to their English title.

## 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 2014.

In accordance with the Framework Provisions for the Faculties of Engineering, Science and Medicine at Aalborg University, the curriculum must be revised no later than 5 years after its entry into force.

## 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.<sup>1</sup> If the project is written in English, the summary must be in Danish.<sup>2</sup> 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 Framework Provisions 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 Faculties of Engineering, Science and Medicine on their 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.

### **5.5 Completion of the Master's program**

The Master's program must be completed no later than four years after it was begun.

### **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.

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<sup>1</sup> Or another foreign language (upon approval from the Board of Studies).

<sup>2</sup> The Board of Studies can grant exemption from this.



## **Appendix: Module Descriptions**

### **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 Framework Provisions.

#### **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 Framework Provisions.

## **Risk Analysis** ***Risikoanalyse***

Prerequisites: Course modules 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 Framework Provisions.

## **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: Individual oral exam based on presentation seminar and project report.

Evaluation criteria: Are stated in the Framework Provisions.

## **2. Semester**

### **Risk Management** ***Risikostyring***

Prerequisites: Course module 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 Framework Provisions.

### **Decision Making** ***Beslutningstagning***

Prerequisites: Course modules 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 Framework Provisions.

## **Risk Communication** **Risiko kommunikation**

Prerequisites: Course module: 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: Individual oral or written exam. Exam format is decided on by start of semester.

Evaluation criteria: Are stated in the Framework Provisions.

## **Maintenance Management** **Vedligeholdelsesplanlægning**

Prerequisites: Course module 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 individual oral exam based upon the written assignment.

Evaluation criteria: Are stated in the Framework Provisions.

### **Risk Analysis and Management** ***Risikoanalyse og -styring***

Prerequisites: Corresponding to having passed the 1<sup>st</sup> 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: Individual oral exam based on presentation seminar and project report.

Evaluation criteria: Are stated in the Framework Provisions.

### 3. Semester

#### **Simulation of Emergencies** ***Simulering af nødsituationer***

Prerequisites: Course modules 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 Framework Provisions.

#### **Emergency Management** ***Håndtering af nødsituationer***

Prerequisites: Course modules 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: Individual oral exam.

Evaluation criteria: Are stated in the Framework Provisions.

## **Risk and Reliability in Engineering** ***Risiko og sikkerhed af konstruktioner***

Prerequisites: Course module 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: Individual oral or written exam. Exam format is decided on by start of semester.

Evaluation criteria: Are stated in the Framework Provisions.

### **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 obstacles are 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: Individual oral or written exam. Exam format is decided on by start of semester.

Evaluation criteria: Are stated in the Framework Provisions.

### **Operational Risk Management in Projects** ***Operativ risikohåndtering i projekter***

Prerequisites: Corresponding to having passed the 1<sup>st</sup> and 2<sup>nd</sup> 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: Individual oral exam based on presentation seminar and project report.

Evaluation criteria: Are stated in the Framework Provisions.

## **4. Semester**

### **Master's Thesis *Kandidatspeciale***

Prerequisites: Successful completion of 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: Individual oral exam based on presentation seminar and the thesis.

Evaluation criteria: Are stated in the Framework Provisions.