

Curriculum for the Master of Science in Management in the Building Industry

Curriculum for the Master's Programme in Management in the Building Industry

Aalborg University 2012

Curriculum for the Master of Science in Management in the Building Industry

Preface

Pursuant to Act 367 of May 22, 2013 on Universities (the University Act) with subsequent changes, the following curriculum for the Master of Science programme in Management in the Building Industry is stipulated. The programme also follows the Framework Provisions and the Examination Policies and Procedures for the Faculty of Engineering and Science and the Faculty of Medicine.

This is an English translation of Studieordning for cand.scient.techn. i byggeledelse. In the event of a discrepancy between the translation and the Danish version, the Danish text published at the School of Engineering and Science webpage is valid.

Curriculum for the Master of Science in Management in the Building Industry

Table of Contents

Preface	2
Chapter 1: Legal Basis of the Curriculum etc.....	4
1.1 Basis in Ministerial Orders	4
1.2 Faculty affiliation	4
1.3 Board of Studies affiliation	4
Chapter 2: Admission, Degree Designation, Program Duration and Competence Profile.....	4
2.1 Admission	4
2.2 Degree designation in Danish and English.....	4
2.3 The program's specification in ECTS credits.....	4
2.4 Competence profile on the diploma.....	4
2.5 Competence profile of the programme	5
Chapter 3: Content and Organisation of the Programme	6
3.1 Overview of the programme	7
3.2 Module descriptions	8
Chapter 4: Entry into Force, Interim Provisions and Revision	8
Chapter 5: Other Provisions.....	8
5.1 Rules concerning written work, including the Master's thesis	8
Appendix: Module descriptions	10
Problem Based Learning and Introduction to Statics.....	10
Design and Construction of Buildings.....	11
Project management and Production in Construction.....	12
Project Management and Economics.....	13
Strategy and Performance Measurements.....	15
Development of Advanced Project and Quality Management Systems	15
Development of Project and Quality Management Systems.....	17
Management of the Construction Process	18
Framework conditions of Construction	19
Geotechnics and Foundation	20
Information Technology and Building Modelling	21
Master's Thesis.....	22
Management of Construction Industry Companies.....	23
Management of Construction Industry Facilities Management Companies	24

Curriculum for the Master of Science in Management in the Building Industry

Chapter 1: Legal Basis of the Curriculum etc.

1.1 Basis in Ministerial Orders

The Master's programme (cand.scient.techn.) in Management in the Building Industry 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 programme falls under the Faculties of Engineering and Science, Aalborg University.

1.3 Board of Studies affiliation

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

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

2.1 Admission

Admission to the Master's programme in Management in the Building Industry requires a Bachelor's degree in Architectural Technology and Construction Management, a Bachelor's degree in civil engineering, or a Bachelor of engineering degree in civil engineering, or the like.

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.

2.2 Degree designation in Danish and English

The Master's programme entitles the graduate to the designation cand.scient.techn. (candidatus/candidata scientiarum technologiae) i Byggeledelse. The English designation is: Master of Science (MSc) and Technology in Management in the Building Industry.

2.3 The program's specification in ECTS credits

The Master's programme 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 Candidatus graduate has the following competency profile:

Curriculum for the Master of Science in Management in the Building Industry

A Candidatus graduate has competencies that have been acquired via a course of study that has taken place in a research environment.

A Candidatus graduate is qualified for employment on the labour market on the basis of his or her academic discipline as well as for further research (PhD programmes). A Candidatus graduate has, compared to a Bachelor, developed his or her academic knowledge and independence so as to be able to apply scientific theory and method on an independent basis within both an academic and a professional context.

2.5 Competence profile of the programme

The graduate of the Master's programme:

Knowledge:

- Has knowledge in management in the building industry that, in selected areas, are based on the highest international research in a subject area.
- can understand and, on a scientific basis, reflect over the knowledge of management in the building industry and identify scientific problems.
- has knowledge about organisation and management of order-based production in the building activity, including management systems, both technical, economic, social and organisational.
- can understand and, on a scientific basis, reflect over the builders and construction contractors frames and conditions for production, and be able to identify innovation and development potentials.

Skills:

- excels in the scientific methods and tools and general skills related to employment within Management in the Building Industry.
- can evaluate and select among the scientific theories, methods, tools and general skills within Management in the Building Industry and, on a scientific basis, advance new analyses and solutions.
- can communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists.

Competences:

- can manage work and development situations that are complex, unpredictable and require new solutions.
- can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility.
- can independently take responsibility for own professional development and specialisation.
- can structure and communicate problems and solutions and

Curriculum for the Master of Science in Management in the Building Industry

consequences targeted at different recipients and consider both professional, technical ethics as a possible conflict of interests.

- has knowledge of the connection between project engineering and execution, running and maintenance of building, including basic knowledge of design of models and building up models that describe the building's products and processes.

Chapter 3: Content and Organisation of the Programme

The programme is structured in modules and organized as a problem-based study. A module is a programme element or a group of programme elements, which aims to give students a set of professional skills within a fixed time frame specified in ECTS credits, and concluding with one or more examinations within specific exam periods.

The programme is based on a combination of academic, problem-oriented and interdisciplinary approaches and organized based on the following work and evaluation methods that combine skills and reflection:

- project work
- lectures
- classroom instruction
- study circles
- workshops
- exercises (individually and in groups)
- laboratory experiments
- field measurements and registration
- portfolio work
- independent study

Where the modules are specific aspects of teaching methods, this will be indicated by the module description, see below.

Project modules are generally evaluated in a group based oral exam based upon a submitted report and an oral group presentation according to the Framework provisions (examination policies).

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

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

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

Curriculum for the Master of Science in Management in the Building Industry

- 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 practical and economic reasons. In the first case decision must be notified before the start of the teaching activity in the latter case the students must be notified when the examination date is decided.

3.1 Overview of the programme

All modules are assessed through individual grading according to the 7-point scale or Pass/Fail. All modules are assessed by external examination (external grading) or internal examination (internal grading or by assessment by the supervisor only).

Of a total of 120 ECTS, 105 ECTS are assessed by the 7-point scale and 45 ECTS are assessed by external examination.

Semester	Module	ECTS	Assessment	Exam
1	Design and construction of buildings	15	7-point scale	Internal
	Project management and economics	5	7-point scale	Internal
	Geotechnics and foundation	5	7-point scale	Internal
	Problem based learning and Introduction to statics	5	Pass/no-pass	Internal
2	Project management and production in construction	15	7-point scale	External
	Management of the construction process	5	7-point scale	Internal
	Framework of construction	5	7-point scale	Internal
	Development of project and quality management systems	5	Pass/no-pass	Internal
3*	A: Management of construction industry companies	15	7-point scale	Internal
	B: Management of construction industry facilities management companies	15	7-point scale	Internal
	Information technology and building modelling	5	Pass/no-pass	Internal
	Development of advanced project and quality management systems	5	7-point scale	Internal
	Strategy and performance measurements	5	7-point scale	Internal
4	Master's thesis	30	7-point scale	External
Total		120		

On the 3rd semester the students must select between module A or B.

Curriculum for the Master of Science in Management in the Building Industry

The students are given options in the project modules as they can select among different projects within the same general theme. Moreover, the Master Thesis on the 4th semester can be selected freely within the field of Management in the Building Industry.

The Study Board of Civil Engineering can decide, that the contents of a course module on a semester is taught in the project module in the same semester, by increasing the ECTS extend as well as the learning goals. The decision is taken regarding to capacity and/or economy of the semester.

3.2 Module descriptions

Descriptions of the modules of the education are inserted in the Appendix, ordered alphabetically after their Danish 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 1 February 2012.

Students who wish to complete their studies under the previous curriculum from 2009 must conclude their education by the summer examination period 2013 at the latest, since examinations under the previous curriculum are not offered after this time.

In accordance with the Framework Provisions and the Handbook on Quality Management for the Faculty of Engineering and Science 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.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.

¹ Or another foreign language (upon approval from the Board of Studies).

² The Board of Studies can grant exemption from this.

Curriculum for the Master of Science in Management in the Building Industry

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 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.

Completion of the Master's program

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

Rules and requirements concerning the reading of texts in foreign languages and a statement of the foreign language knowledge this assumes

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 languages

Curriculum for the Master of Science in Management in the Building Industry

Appendix: Module descriptions

Problem Based Learning and Introduction to Statics **Problemløst læring og introduktion til statik**

Prerequisites: Admission to the programme

Goal: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge

- Must have knowledge about basic design elements and construction types
- Must have knowledge about the modeling of loads and supports
- Must have knowledge about forces and moments
- Must be able to understand equilibrium equations
- Must be able to understand the concepts of static determinacy and in-determinacy
- Must have knowledge of common building materials: steel, wood and concrete.
- Must be able to explain the learning theories that underlie problem based learning
- Must be able to explain the Aalborg model approach to problem based learning.
- Must be able to explain the various techniques for planning and management of the group-based project work.

Skills

- Must be able to set static models for planar truss, beam and frame structures
- Must be able to perform calculations of reactions in statically determinate truss, beam and frame structures
- Must be able to perform calculations of section forces and stresses in statically determinate truss, beam and frame structures
- Must be able to use the notation and terminology in the field area.
- Must be able to plan and manage a problem-based and project-organized study project carried out by a project group.
- Must be able to communicate project results and processes in a coherent, structured and understandable manner, both in writing, verbally and graphically.
- Must be able to analyze the project group's organization of the group cooperation with a view to identifying strengths and weaknesses, and based on the analysis make suggestions for how cooperation in future groups can be improved.
- Must be able to reflect on the causes and propose possible solutions to any group conflicts.
- Must be able to analyze and evaluate own study efforts and learning in relation to a problem-based group work with a view to continued professional development.
- Must be able to analyze and evaluate collective learning processes for joint knowledge development and exchange of experience.

Competencies

Curriculum for the Master of Science in Management in the Building Industry

- Must be able to engage in a dialogue on technical issues in which a basic knowledge of statics is assumed.
- Must be able to engage in, reflect on and optimize own participation in a group-based project.
- Must be able to consciously reflect on and develop own learning.
- Must be able to engage in, reflect on and optimize collective learning processes in relation to specific technological projects.

Teaching methods: Lectures supplemented with workshops, presentation seminars, laboratory visits and more.

Exam format: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Design and Construction of Buildings **Projektering og udførelse af bygningskonstruktioner**

Prerequisites: In accordance with the admission requirements

Goal: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The student must have knowledge of the theories that describe the following subject areas:

- Must have knowledge of the interaction between design and construction of buildings.
- Must have knowledge of civil engineering including the timing and financial impact of different construction methods.
- Must have knowledge of basic foundation and concrete structures.

Skills – The student must be able to:

- Describe the alternative shapes of selective structural elements, including foundation design.
- Explain alternative material types and construction methods and specify criteria for choosing between alternatives.
- Analyze the time required for a construction project and set schedules, for example as bar charts, network diagrams and cyclograms.
- Analyze the cost of construction of a building project and plan tender calculations in regards to the chosen construction methods.
- Analyze the client and contractor payments and deposits and create similar financial statement for the project.
- Analyze requirements and design a site that is appropriate for the building project.

Curriculum for the Master of Science in Management in the Building Industry

- Develop a project organization that specifies the legal relations between the parties in the construction project and an organization deemed appropriate for management of the construction project.
- Explain the process that semester the group has gone through.
- Document project work and its results in a well-structured report.
- Plan and carry out a presentation of the project.

Competencies

- Should in the future be able to manage a construction based on an understanding of the technical and organizational relationships between design and execution.
- Should be able to compare technical disciplines with the practical execution of construction.
- Must be able to communicate results obtained from project work in project reports.
- Must be able to work around the problem field project and make a joint presentation of the project results.

Teaching methods: Project work with teacher feedback supplemented with lectures, workshops, presentation seminars and more.

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

Evaluation criteria: As described in the Framework Provisions.

Project management and Production in Construction **Projektledelse og produktion i byggeriet**

Prerequisites: Project Management and Economics

Goal: Students complete the module must have acquired the following knowledge, skills and competencies:

Knowledge – The student must have knowledge of the theories that describe the following areas:

- Must have knowledge of the collection and analysis of empirical data.
- Must have knowledge of analytical methods for contracting order process.
- Must have knowledge of project management theories and methods.
- Must have knowledge of modeling processes.

Skills – The student must be able to:

- Analyze a construction order process with emphasis on design and manufacturing issues.
- Process empirical project data.

Curriculum for the Master of Science in Management in the Building Industry

- Explain the production, quality and cost issues in the order process.
- Interpret the relationship between activities in production through the construction of whole models and detailed models that describe these conditions.
- Analyze process flows and value creation.
- Reasoning between the project and the organization's structural, technical and resource building.
- Interpret the interaction between the parties involved in a project or contract manufacturing company's various organizational units.
- Argue by using precise production-related terminology.

Competencies

- Must be able to assess the proposed systems and their sensitivity to changes in e.g. customer demands, regulatory, quality, etc.
- Must be able to establish operational production models. The models can be based on a deterministic, stochastic or heuristic basis.
- Skal kunne vurdere betydningen for virksomheden eller projektet af at ændre de nuværende forhold og indføre de foreslåede ændringer skal eksempelvis vurderes ud fra økonomiske, organisatoriske, sociale og tekniske konsekvenser.
- Must be able to assess the importance for the company or the project of changing the current situation and introduce the proposed amendment, which must be assessed from e.g. economic, organizational, social and technical consequences.
- Must be able to prepare and reflect on concrete implementation plans
- Must be able to communicate the results obtained from the project work in a project report.
- Must be able to work around the problem field project and make a joint presentation of the project results.

Teaching methods: Project work with teacher feedback supplemented with lectures, workshops, presentation seminars and more.

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

Evaluation criteria: As described in the Framework Provisions.

Project Management and Economics **Projektledeelse og økonomi**

Prerequisites: No specific prerequisites necessary

Goal: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge – The student must have knowledge of the theories that describe the following areas:

Curriculum for the Master of Science in Management in the Building Industry

- Must have knowledge of economic conditions for the construction industry
- Must have knowledge of operating, investing and financing calculations.
- Must have knowledge of budgeting and financial reporting.
- Must have knowledge of general project management models.
- Must have knowledge of basic project planning tools such as time and resource plans.
- Must have knowledge of general organizational and motivational and communication theories.
- Must have knowledge of working environment and safety and health on construction projects.

Skills

- Must be able to use the usual methods for calculation of costs in manufacturing companies.
- Must be able to use the usual methods for the assessment of investment attractiveness.
- Must be able to use the usual methods of budgeting of business operations.
- Must be able to identify and evaluate the usual sources for financing the investments and operations of a manufacturing company.
- Must be able to prepare and analyze accounts and accordingly assess the economic situation.
- Must be able to argue for usual models of motivation, communication and management and use of models in less complex cases.
- Must be able to explain the traditional models of organization of construction projects as well as classical and modern forms of cooperation in such projects.
- Must be able to design appropriate time and resource plans based on among other things the principles of "lean construction".
- Must be able to assess specific cases for the purposes of health and safety tools.

Competencies

Must be able to explain the impact of project activities on the financial circumstances of the company as well as the managerial tasks in project management, including assignments related to organizational health and safety.

Teaching methods: Lectures supplemented with workshops, presentation seminars and more.

Exam format: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Curriculum for the Master of Science in Management in the Building Industry

Strategy and Performance Measurements
Strategi og performance measurements

Prerequisites: No specific prerequisites necessary

Goal: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge

- Must have knowledge of concepts, theories and methods for analysis, development and implementation of the strategy; including the ability to performance measure this by a combination of both economic and non-economic performance of the organization.

Skills – The student, should with the proper use of management concepts, be able to:

- Apply the learned theories and methods to understand and analyze the company's choice of strategy and performance measurements.
- Assess theoretical and practical problems by developing and implementing changing strategies in established organizations.
- Communicate such issues to other participants of occurring development projects.

Competencies:

- Must be able to apply the learned knowledge elements and skills as a staff employee in strategy development projects.
- Must be able to independently contribute constructively and professionally in strategy investigation and development with other professionals.
- Must on the basis of the acquired identify their own needs for further learning and to implement the appropriate organization hereof.

Teaching methods: Lectures supplemented with workshops, presentation seminars and more.

Exam format: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Development of Advanced Project and Quality Management Systems
Udvikling af avancerede kvalitets- og projektstyringsystemer

Prerequisites: Development of Advanced Project and Quality Management Systems or similar and business economics.

Curriculum for the Master of Science in Management in the Building Industry

Goal: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The course presents the student for selected models and methods used in connection with corporate quality and project management systems. Emphasis is placed on the elements targeting the company's development as a whole.

The student must have knowledge of the theories that describe the following areas:

- Planning and management in multi-project environments
- Models, methods and tools for the development of advanced quality and environmental and project management systems.
- Risk management and performance measurement.

The course supports the students in gaining knowledge of how quality, project management and financial management systems can be included as a strategic element in the organization overall. Also how quality, project management and financial management systems can be integrated with the organization's other systems. Finally, the focus is on enterprise risk identification and management of order-based production, including how risk management can be used as a strategic business advantage.

Skills – The student must be able to:

- Analyze the organization's need for quality and project management overall both internally and in relation to its customers and suppliers.
- Analyze a group of projects for simultaneous execution and complete an evaluation of an existing portfolio of projects.
- Apply advanced methods and models to develop proposals to improve the organization's existing quality and project management systems.
- Identify and analyze risk factors for the company's project portfolio and understand risk management systems and the use of risk management for strategic purposes.
- Assess the effect of implementing the proposed methods and models.

Competencies

- Must be able to apply the acquired knowledge of models and methods for the organization's development of quality and project management systems. Furthermore, to define and understand systems for project management with multiple conflicting success criteria when projects share limited resources and a limited budget. The emphasis is on seeing the quality and project management systems as a strategic parameter - integrated into the organization's overall profile.

Curriculum for the Master of Science in Management in the Building Industry

- Must be able to analyze risk factors for the company's project portfolio and understand risk management systems and the use of risk management in connection with the organization's strategy development process.

Teaching methods: Lectures supplemented with workshops, presentation seminars and more.

Exam format: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Development of Project and Quality Management Systems **Udvikling af kvalitets- og projektstyringsystemer**

Prerequisites: Business Economics

Goal: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The students must have knowledge of the theories that describe the following areas:

- Quality management - business processes and supply chain.
- Project planning and control methods and techniques.
- Financial management of activities in companies with production orders and long production time.

Skills – The student must be able to:

- Understand quality management in relation to business processes and analyze the organization's need for quality management with a focus on supply chain, and suggest changes and improvements to all or parts of the system.
- Understand the financial management of activities in companies with production orders. Including cash management, financial capacity management and calculations for planning and follow-up on the company's order-based production.
- Understand resource-limited project management problems and plan the execution of projects with regards to this.

Competencies

- Must be able to understand the relation between quality management, project management, and financial management and the company's other management systems and relation with suppliers and customers in the value chain.
- Must be able to apply his/hers knowledge to build quality and project management systems in companies with order-based production. This is

Curriculum for the Master of Science in Management in the Building Industry

carried out in terms of how such systems interact with the company's core business and the company's other systems, particularly the company's financial management.

- Must be able to apply his/hers acquired knowledge on techniques and management systems for contract manufacturing companies.
- Must be able to apply his/hers knowledge gained on how to specify projects and the challenges that may arise in project-driven businesses.
- Must be able to apply his/hers knowledge gained about how companies develop quality management systems.

Teaching methods: Lectures supplemented with workshops, presentation seminars and more.

Exam form: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Management of the Construction Process **Byggeprocessens styringsområder**

Prerequisites: Project Management and Business Economics

Objectives: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge The course introduces the students to the various management roles in building projects and for the communication and collaboration needs which is the prerequisite for achieving effective construction process. The students must have knowledge of the theories that describe the following areas:

- Must have knowledge of management roles and management areas, including the authorities.
- Must have knowledge of proactive and reactive conflict
- Must have knowledge of basic logistics for the construction of building projects.
- Must have knowledge of quality and environmental management works carried out at construction sites.
- Must have knowledge of advanced project financial management.
- Must have knowledge of facilities management

Skills

- Must be able to compare different management roles in a construction project and relate these to the phases of the building process.
- Must be able to account for the authorities, in connection with the construction of building and construction projects
- Must be able to use various conflict resolution models.

Curriculum for the Master of Science in Management in the Building Industry

- Must be able to integrate logistical optimization in the management of building and construction projects.
- Must be able to explain the quality and environmental management systems.
- Must be able to analyze various economic problems in building and construction projects.
- Must be able to integrate facilities management theories in the construction process.

Competencies:

- Must be able to understand the different analysis models and have a solid knowledge of the management tasks that occur during the building process.
- Must master a wide range of management areas for both large and small projects. Knowledge gained in this module must be used as skills in project management areas of logistics, economics, risk management, quality and environmental management and facilities management.

Teaching methods: Lectures supplemented with workshops, presentation seminars and more.

Exam form: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Framework conditions of Construction **Byggeriets rammebetingelser**

Prerequisites: No specific prerequisites necessary

Objectives: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The students must have knowledge of the theories that describe the following areas:

- Must have knowledge of national and international legislation and contractual relations in connection with the execution of building and construction works.
- Must have knowledge of work environment, including health and safety in the building and construction industry.

Skills

- Must be able to demonstrate knowledge of the use of AB92, ABT93, ABR89 and AB Consumer as basic national agreement between the construction parties

Curriculum for the Master of Science in Management in the Building Industry

- Must be able to demonstrate understanding of different performance descriptions and explain their use.
- Must be able to explain the current national regulation and associated guidelines for quality assurance
- Must be able to demonstrate knowledge of FIDIC, NL92 and NLM94 as basic international agreement between construction parties.
- Must be able to describe national and international (EU) legislation on inviting tenders and award of contract in connection with the construction.
- Must be able to describe the building's historic development and ongoing development initiatives including OPP, partnering and use of indicators.
- Must be able to analyze the construction context in connection with general societal trends
- Must be able to use the guidelines and rules about working in construction.
- Must be able to explain labor law.

Competencies:

- Must be able to explain the framework of construction.
- Must be able to relate a given project to the framework of construction including the work environment.

Teaching methods: Lectures supplemented with workshops, presentation seminars and more.

Exam form: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Geotechnics and Foundation **Grundlæggende geoteknik og fundering**

Prerequisites: Admission to the program.

Objectives:

The course will provide an understanding of typical Danish soil types and their geotechnical properties, including characteristic material, strength and setting parameters. Geotechnics must be applied. Insight into the foundation methods, field and laboratory investigation methods must be achieved and understanding of geotechnical reports.

Knowledge

- Must have knowledge of Danish soil types and their geotechnical properties.
- Must have knowledge of field survey methods.
- Must have knowledge of laboratory testing methods.
- Must be able to understand and explain geostatic.
- Must be able to manage and account for the foundation principles of simple structures.

Curriculum for the Master of Science in Management in the Building Industry

- Must be able to understand and explain a geotechnical report.

Skills

- Must be able to apply methods for engineering geological description of the Danish landscape and soil types.
- Must be able to use geostatic of geotechnical structures.
- Must be able to determine sentences and the critical load for simple direct-based constructions
- Must be able to assess sentences timing and assess measures against the sentences.
- Must be able to perform and assess geotechnical classification tests.
- Must be able to use geotechnical drilling profiles and geotechnical reports.

Competencies

- Must be able to use the correct terminology in geotechnics and foundation.
- Must be able to assess foundation methods in relation to Danish soil conditions.
- Must be able to assess Danish soil types and apply geotechnical reporting.

Teaching methods: Lectures supplemented with workshops, presentation seminars, laboratory visits and more.

Exam form: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Information Technology and Building Modelling **Informationsteknologi og bygningsmodellering**

Prerequisites: No specific prerequisites necessary

Objectives: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The students must have knowledge of the theories that describe the following areas:

- Concepts, technologies and methods to analyze and develop models that describe a building's functional systems and components as well as processes in construction.
- Concepts, techniques and methods to develop product and process models in construction
- Methods for management of knowledge and information in construction, including different types of model and data representation.

Skills – The student must be able to:

Curriculum for the Master of Science in Management in the Building Industry

- Explain the fundamental differences between various types of building models and process models, including 3D and 4D models
- Demonstrate knowledge of essential standards in the field, including classification systems
- Demonstrate knowledge of significant national and international initiatives regarding the use of information technology in the construction industry.
- Explain central issues related to model supported collaboration between actors of the construction process.
- Explain the properties of different knowledge representations and their suitability for modeling of different systems.

Competencies

- The course provides students with a number of basic skills to participate in the implementation of ICT-based systems in construction business.

Teaching methods: Lectures and exercises in groups supplemented with workshops, presentation seminars and more.

Exam form: Individual oral or written examination. The exam form is determined at the beginning of the semester.

Evaluation criteria: As described in the Framework Provisions.

Master's Thesis **Kandidatspeciale**

Prerequisites: Must have completed 1st – 3rd semester on the Master's programme

Objectives: The module will give the student the opportunity to demonstrate knowledge, skills and competence at a master level.
The student him/herself formulates the problem addressed, but the problem formulation must be approved by the supervisor and study director before the project begins.

Students who complete the module must have acquired the following knowledge, skills and competencies:

Skills

- Must have knowledge and be able to understand the specialization subjects at the highest international level.
- Must be able to critically assess knowledge and identify emerging scientific issues within the specialization area.
- Must be able to understand the terms of specialization of the research area including research ethics.

Curriculum for the Master of Science in Management in the Building Industry

Knowledge

- Must be able to independently explain the choice of scientific theoretical and / or experimental methods.
- Must via the project and at the end of it be able to provide an independent and critical assessment of the chosen theories and methods as well as of the analyzes, results and conclusions.
- Must be able to use a broad spectrum of engineering methods for research and development in the specialization area.
- Must be able to communicate relevant scientific and engineering professional aspects of the project work in a clear and systematic way to both peers and to the public.

Competencies

- Must independently be able to problem formulate, implement, document, reflect on and communicate results of a project that deals with a complex work and development situation in the central topics of the Master's programme.
- Must be able to evaluate, select and translate academic knowledge, skills and scientific theories, methods and tools on a scientific basis to develop relevant new analytical approaches and justify its choice.
- Must be able to provide solid time and work plans for their own project, independently and critically assess progress, and to select and incorporate relevant literature, experiments or relevant data in order to maintain the scientific basis.
- Must be able to handle complex and unpredictable work situations and be able to develop new solutions.
- Must independently and with professional and scientific approach engage in dialogue with peers and professional stakeholders in relation to the Master's programme.
- Must be able to communicate the results obtained from the project work in a project report.
- Must be able to work around the project of the problem field and make a joint presentation of the project results.

Teaching methods: Project work with teacher feedback and more.

Exam form: Oral examination based on the presentation seminar and project report.

Evaluation criteria: As described in the Framework Provisions.

Management of Construction Industry Companies **Ledelsessystemer i byggeriets virksomheder**

Prerequisites: Must have completed 2nd semester

Curriculum for the Master of Science in Management in the Building Industry

Objectives: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The students must have knowledge of the theories that describe the following areas:

- Must have knowledge of management of construction, both technical, economic, social and organizational.
- Must have knowledge of the theoretical and practical basis for the company's longer-term development.
- Must have knowledge of coherent business systems and development plans at different management levels.

Skills

- Must be able to understand the structure of different management of construction for businesses.
- Must be able to analyze business management of constructions for the improvement of companies' operating systems.
- Must be able to understand the structure of support systems for the decision makers of the company.
- Must be able to identify business needs for strategic change and develop strategic plans for this transformation.
- Must be able to identify and assess a company's need for information for budgeting and dissemination of results.

Competencies

- Must be able to be part of the management team in a construction project and in a company in the building and construction sector.
- Must be able to argue for specific strategic development initiatives and how they are implemented in practice.
- Must be able to communicate the results obtained from the project work in a project report
- Must be able to work around the project of the problem field and make a joint presentation of the project results.

Teaching methods: Project work with teacher feedback supplemented with lectures, workshops presentation seminars and more.

Exam form: Oral examination based on the presentation seminar and project report.

Evaluation criteria: As described in the Framework Provisions.

Management of Construction Industry Facilities Management Companies **Ledelsessystemer i byggeriets Facilities Management virksomheder**

Prerequisites: Must have completed 2nd semester

Curriculum for the Master of Science in Management in the Building Industry

Objectives: Students who complete the module must have acquired the following knowledge, skills and competencies:

Knowledge - The students must have knowledge of the theories that describe the following areas:

- Must have knowledge of management of constructions, both technical, economic, social, organizational, and thus be able to see through the strategic development and processing of building facilities management suppliers.
- Must have knowledge of the theoretical and practical basis for the company's longer-term development in order to create competitive advantages.
- Must have knowledge of coherent business systems and development plans at different management levels and thus be able to argue for
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- and develop solutions for the implementation of actions both at the strategic, tactical and operational level.

Skills

- Must be able to argue for specific strategic development initiatives and how they are implemented in practice, as set out scenarios, metrics, etc. for business development.
- Must be able to collect existing knowledge of Facilities Management in relation to future major construction projects.
- Must be able to understand the structure of support systems for the decision makers of the company.
- Must be able to identify business needs for strategic change and develop strategic plans for this transformation.
- Must be able to identify and assess a company's need for information for budgeting and dissemination of results.

Competencies

- Must be able to be part of in the management of a construction company in the building and construction sector, with a particular focus on Facilities Management deliveries.
- Must be able to argue for specific strategic development initiatives and how they are implemented in practice.
- Must be able to communicate the results obtained from the project work in a project report
- Must be able to work around the project of the problem field and make a joint presentation of the project results.

Teaching methods: Project work with teacher feedback supplemented with lectures, workshops presentation seminars and more.

Curriculum for the Master of Science in Management in the Building Industry

Exam form: Oral examination based on the presentation seminar and project report.

Evaluation criteria: As described in the Framework Provisions.