

# **Curriculum for the Master's Program in Management in the Building Industry**

The Faculties of Engineering, Science and Medicine  
Aalborg University  
2015

**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 Management in the Building Industry is stipulated. The program also follows the Framework Provisions and the Examination Policies and Procedures for the Faculties of Engineering, Science and Medicine.

This is an English translation of Studieordning for kandidatuddannelsen 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.

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## ***Chapter 1: Legal Basis of the Curriculum, etc.***

### **1.1 Basis in ministerial orders**

The Master's program in Management in the Building Industry is organised in accordance with the Ministry of Science, Innovation and Higher Education's Order no. 1520 of December 16, 2013 on Bachelor's and Master's Programs at Universities (the Ministerial Order of the Study Programs) and Ministerial Order no. 1518 of December 16, 2013 on University Examinations (the Examination Order) with subsequent changes. Further reference is made to Ministerial Order no. 1488 of December 16, 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 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.

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

### **2.1 Admission**

Admission to the Master's program in Management in the Building Industry requires a

- Bachelor of Science (BSc) in Engineering (Civil Engineering; Structural and Civil Engineering), Aalborg University

Other bachelor of Science (BSc) in Engineering programmes at Aalborg University also meet the criteria for enrolment with a specific choice of course at the bachelor.

The following study programme are qualifying

- Bachelor of Civil Engineering, VIA University College, Horsens

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 program entitles the graduate to the designation *civilingeniør, cand.polyt.* (candidatus/candidata polytechnices) i byggeledelse. The English designation is: Master of Science (MSc) in Engineering (management in the building industry).

### **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 Candidatus graduate has the following competency profile:**

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

A Candidatus graduate is qualified for employment on the labour market 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 program:

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

Knowledge	<ul style="list-style-type: none"><li>• Has knowledge within management in the building industry that, in selected areas, is based on the highest international research in a subject area.</li><li>• can understand and, on a scientific basis, reflect over the knowledge of management in the building industry and identify scientific problems.</li><li>• has knowledge about the organisation and management of order-based production in the building activity, including management systems, both technical, economic, social and organisational.</li><li>• 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.</li></ul>
Skills	<ul style="list-style-type: none"><li>• excels in the scientific methods and tools and general skills related to employment within management in the building Industry.</li><li>• 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.</li><li>• can communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists.</li></ul>
Competencies	<ul style="list-style-type: none"><li>• can manage work and development situations that are complex, unpredictable and require new solutions.</li><li>• can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility.</li><li>• can independently take responsibility for own professional development and specialisation.</li><li>• can structure and communicate problems and solutions and consequences targeted at different recipients and consider both professional, technical ethics as a possible conflict of interests.</li></ul>

## **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:

- 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:

- 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 economical 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 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).

At 3<sup>rd</sup> semester, the student can choose between 5 options. Every option except from option A must be approved by the study board prior to commencement.

Of a total of 120 ECTS, 80-110 ECTS are assessed by the 7-point scale and 45-75 ECTS are assessed by external examination. The variation is caused by the options at 3<sup>rd</sup> semester.

Semester	Module	ECTS	Assessment	Exam
1st	Project Management and Production in Construction	15	7-point scale	Internal
	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/Fail	Internal
2nd	A: Management of Construction Industry Companies*	15	7-point scale	External
	B: Management of Construction Industry Facilities Management Companies*	15	7-point scale	External
	Information Technology and Building Modelling	5	Pass/Fail	Internal
	Development of Advanced Project and Quality Management Systems	5	7-point scale	Internal
	Strategy and Performance Measurements	5	7-point scale	Internal
3rd	Innovation in Construction	30	7-point scale	Internal
	Scientific Paper Writing <sup>1</sup>	30	7-point scale <sup>2</sup>	Internal <sup>2</sup>
	Academic Internship <sup>3</sup>	30	7-point scale	Internal
	Study at another University	30	- <sup>4</sup>	- <sup>4</sup>
	Individual Designed Semester <sup>5</sup>	30	- <sup>6</sup>	- <sup>6</sup>
4th	Master's Thesis	30	7-point scale	External
3rd-4th	Master's Thesis	45-50-55-60 <sup>7</sup>		
Total		120		

\*) At 2nd semester, students must choose between module A and B.

Students who have not received instruction in problembased learning at Aalborg University must participate in the course "Problem-based Learning (PBL) and Student Responsibility" as an integrated part of the project module at his/hers first semester at Aalborg University.

At the study programme there is a freedom of choice of 60 ECTS of which 30 ECTS concern 3<sup>rd</sup> semester and 30 ECTS concern choice of topic in the master's thesis.

<sup>1</sup> The article must be at least 15 ECTS, additional courses approved by the study board must add up to 30 ECTS

<sup>2</sup> Applies on the article. Courses are evaluated in accordance with the relevant curriculum

<sup>3</sup> The study board must approve on the content of the internship before it is commenced.

<sup>4</sup> Assessment and exam according to the curriculum at the other university. The study board must approve on the contents before the study is commenced.

<sup>5</sup> The student makes an individual semester that consists of interdisciplinary study activities.

<sup>6</sup> Assessment and examination must be approved by the study board. In case the student chooses existing courses, these will be evaluated according to the relevant curriculum.

<sup>7</sup> See description of master's thesis. By long master's thesis, the thesis is conducted at 3<sup>rd</sup> and 4<sup>th</sup> semester and has a value of 45-60 ECTS.

Study board of Civil Engineering can decide that the content of a course module can be taught in the project module at a specific semester. The number of ECTS in the project module will be raised correspondingly. This decision can be made due to lack of human or economic capacity at the semester.

## Descriptions of modules

### 3.2. Management in the Building Industry 1<sup>st</sup> semester

#### 3.2.1 Problem Based Learning and Student Responsibilities at Aalborg University *Problembaseret læring og studerendes ansvar for læring på Aalborg Universitet*

Prerequisites:

None, but the course is compulsory for students not acquainted to the Aalborg PBL model

Objective:

Students who complete the module should:

Knowledge:

- Have knowledge about the organization at Aalborg university and where to get help in different matters
- Have knowledge about how to communicate both in your project groups but also when attending courses
- Have comprehension for how a semester is structured and about the different examination forms we use at Aalborg University
- Have comprehension for how project work and laboratory work is carried out at Aalborg University including safety issues in the laboratory
- Have comprehension for issues concerning plagiarism and the consequence when doing plagiarism
- Have knowledge about the software which are used in the study
- Have knowledge about the IT systems used and how to get started
- Have knowledge about the students counselor and what they can do

Skills:

- Be able to use problem based learning and perform group work when doing projects and courses at Aalborg University
- Be able to use Moodle i. e. for finding lecture plans, time schedules etc.

Competences:

- Be able to apply the concepts, theories and methods for problem based learning and group work
- Be able to account for the considerations involved in the process of formulating project reports in practice.

Type of instruction:

Lectures, discussions and group work. The course will take place on Wednesday afternoons.

Form of examination:

Internal assessment during the course/class participation according to the rules in the Examination Policies and Procedures, Addendum to the Framework Provision of Faculty of Engineering and Science, Aalborg University. In this case the assessment is primarily based on the oral performance during the course, this means that the student has to be active during the course time and participate in discussions. The course is an integrated part of the project for those not acquainted to the Aalborg PBL model, and is a precondition for participation in the project examination. In this way there will be no diploma for the course and it will not be visible on the academic transcripts.

Campus: Aalborg

Evaluation criteria:

**Passed/not passed as stated in the Framework Provisions.**

### **3.2.2 Project Management and Production in Construction** ***Projektledeelse og produktion i byggeriet***

Prerequisites: Project Management and Economics

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

#### Knowledge

- 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.
- 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.
- Must be able to assess the impact on the company or the project if the current conditions are changed and the supposed changes are implemented. The changes should be evaluated by for example economical, organizational, social and technical consequences.
- 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.

### **3.2.3 Management of the Construction Process** ***Byggeprocessens styringsområder***

Prerequisites:

Objective: 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 output descriptions in construction projects.
- 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 demonstrate insight in different types of output descriptions and explain their use.
- 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.
- 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 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.

### **3.2.4 Framework of Construction** ***Byggeriets rammebetingelser***

Prerequisites: No specific prerequisites necessary

Objective: 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:

- Must have knowledge about politics and political initiatives within the field of construction
- Must have knowledge about both historical and recent development within the field of construction
- Must have knowledge about the state of the market and the social meaning of construction
- Must have knowledge about national and international legislation and contractual relations in connection with the execution of building and construction works.
- Must have knowledge about 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
- 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 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.

### **3.2.5 Development of Project and Quality Management Systems** ***Udvikling af kvalitets- og projektstyringssystemer***

Prerequisites: Business Economics

Objective: 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:

- Quality management - business processes and supply chain.
- Project planning and control methods and techniques.
- IT systems for project management
- 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.
- Understand how IT systems can support the workflow in project driven companies.

#### 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 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 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.

### **3.3. Management in the Building Industry 2<sup>nd</sup> semester**

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

Prerequisites: Must have completed 1st semester

Objective: 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:

- 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

The student must be able to:

- 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: 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.

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

Prerequisites: Must have completed 1st semester

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 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.

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

Evaluation criteria: As described in the Framework Provisions.

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

Prerequisites: No specific prerequisites necessary

Objective: 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:

- 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.
- Principle, methods and techniques for design and assessment of user settings for computer aided interaction, cooperation, and knowledge sharing.

#### Skills

The student must be able to:

- 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.

- Conceptual modelling in IDEF0, E-R and UML
- Structuring and modelling of relation databases
- Hypertext based representation and modelling of information containers in Semantic Web
- Describe how system development can be accomplished together with end users, including methods to identify user demands for systems and evaluation of systems under development.

#### 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 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.

### **3.3.4 Development of Advanced Project and Quality Management Systems** ***Udvikling af avancerede kvalitets- og projektstyringssystemer***

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

Objective: 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.
- 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.

### **3.3.5 Strategy and Performance Measurements** ***Strategi og performance measurement***

Prerequisites: No specific prerequisites necessary

Objective: 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.

## **3.4 Management in the Building Industry 3<sup>rd</sup> semester**

### **3.4.1 Innovation in Construction**

#### ***Innovation i byggeriet***

Prerequisites: Passed 2<sup>nd</sup> semester at Master of Science (MSc) in Engineering (management in the building industry)

Objective: 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:

- Knowledge about innovation theories
- Knowledge about innovative initiatives in the building industry
- Knowledge about strategical, tactical and operational management systems
- Knowledge about technical, economic, social or organizational systems and processes in a company or in a network of companies.

#### Skills

The student should use the management terms correctly and with these terms be able to:

- Analyze technical, economic, social or organizational systems and processes in a company or in a network of companies
- Account for the development of technical, economic, social or organizational systems and processes in a company or in a network of companies
- Demonstrate further understanding of the long term development and planning for building industry companies, such as development of new forms of cooperation between the building industry company and other parties in the building industry.
- Demonstrate further understanding of the integration of technical, economical and organisational systems, including correlations

between a company's products, markets, production, organisation and management.

- Demonstrate knowledge of drawing up a coherent development plan for a network of companies, for a company as a whole or for selected parts of a company.

#### Competencies

- Collect and analyse empiric data from one or more companies.
- Assess the coherence between theories, models and knowledge from empiric data.
- Communicate messages clearly to the parties in the building industry
- Reflect and put the results from the project report into perspective and point out strengths, weaknesses and possible improvements.
- Communicate results from the project work in a project report
- Work together with fellow students about the problem area in question and make a common presentation of the results.

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

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

Evaluation criteria: As described in the Framework Provisions.

### **3.4.2 Scientific Paper Writing**

#### ***Akademisk artikel***

Prerequisites: Must have completed 2nd semester

Objective: To give students the opportunity to work academically/scientifically with a topic of own choice within the academic scope of the master programme. Through the writing the student should gain competences within searching for, assessing and summarizing relevant literature, and making and proving hypothesis', arguing and documenting his/her work in a scientifically recognized way.

The topic of the paper must be approved by the study board of Civil Engineering, and the knowledge, skills and competencies gained should correspond with the approved description.

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

#### Knowledge

- Basic knowledge of scientific methods used in essay writing.

#### Skills

The student must:

- Know methods used in the work with academic/scientific documentation and argumentation.
- Demonstrate familiarity with the design of an academic document.
- Be able to present the work both in an essay, at posters, and by an oral presentation.

#### Competencies

- Should be able to search for, assess, choose, analyse, argue, summarize, put the work into perspective, and communicate information and knowledge that is relevant in the actual context.

- Should be able to structure and write an academic essay corresponding to the academic standards and traditions within management in the building industry.

Teaching methods: The student describes the topic of the academic paper noting possible course modules that the student wish to follow in the same semester. The course modules must not exceed 15 ECTS.

Note: The study board of Civil Engineering has to approve the semester and its objective.

Exam format: Oral examination based on the scientific paper. If the student has attended course modules, these are examined according to the relevant curriculum.

Evaluation criteria: As described in the Framework Provisions.

### 3.4.3 Academic Internship

#### *Projektorienteret forløb i en virksomhed*

Prerequisites: Passed 2<sup>nd</sup> semester at Master of Science (MSc) in Engineering (management in the building industry)

Objective: The student should gain knowledge about how theory is used in practice and how theory can be used for rationalizing real-life work and making it more usefull. The student should gain insight in the framework and conditions of an engineer's employment.

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:

- Planning and controlling of time, economic, quality, safety, and environment
- Problemsolving through knowledge gained at earlier semesters
- Management and organizational development
- Different forms of cooperation

#### Skills

The student should have practical knowledge about the chosen workplace i.e.:

- Public technical institution
- Technical utility company
- Consulting company
- Contracting company
- Construction company

The student must:

- Understand the economical, technical, social, environmental or work environmental situation of a work place
- Get insight into a company's social and administrative settings, including communication, cooperation, formal rules, and administrative routines.
- Account for the company's products and work methods.

### Competencies

- Should relate to engineering work competencies in a company
- Should have a practical approach to tasks within economical, technical, social, environmental or work environmental conditions
- Should be able to present work results in a technical report
- Should be able to make an oral presentation of work results
- Should have established contact with companies within the sector of the chosen specialization
- Should be involved in a project for a longer period.

Note: The study board of Civil Engineering must approve the semester before the study is commenced.

Teaching methods: The student should be considered as a regular employee and solve the engineering tasks that fits into the work of the group that the students is a part of. I.e. the student meets at the same time and for the same number of hours as is normal for the rest of the company.

Half way through the traineeship, the student meets with his/her supervisor in the company for an evaluation (oral or written). In that way possible insufficiencies can be corrected in the last part of the traineeship.

During/right after the traineeship the student must work on a semester report consisting of two parts:

- 1) A traineeship report describing the company/institution as well as the project that the student has worked on during the stay. Should also include a description of the engineering knowledge gained during the stay.
- 2) A special report about a topic in relation to the subject of the project and the objectives of the normal semester project.

Exam format: Oral examination based on the two project reports

Evaluation criteria: As described in the Framework Provisions.

#### **3.4.4 Study at another University** ***Studieophold på andet universitet***

Prerequisites: Passed 2<sup>nd</sup> semester at Master of Science (MSc) in Engineering (management in the building industry)

Objective: The student can complete a relevant semester at another university either in Denmark or abroad.

Note: The study board of Civil Engineering must approve the semester before the study is commenced.

See the Framework Provisions for further information.

#### **3.4.5 Individual Designed Semester** ***Forløb med tværgående uddannelseselementer***

Prerequisites: Passed 2<sup>nd</sup> semester at Master of Science (MSc) in Engineering (management in the building industry)

Note: The student can compose a semester consisting of interdisciplinary activities. The semester can be composed in two ways:  
a) 30 ECTS course modules chosen at other study programmes  
b) A combination of minimum 15 ECTS project module and maximum 15 ECTS course modules. The project module has to be "Innovation in Construction", described in this curriculum. The course modules can freely be chosen among relevant study programmes.

The study board of Civil Engineering must approve the semester before the study is commenced.

Objective: Project module: see description in this curriculum  
Course module: see relevant curriculum

Teaching methods: Project module: project work with teacher feedback  
Course module: see relevant curriculum

Exam format: Project module: Oral examination based on presentation seminar and project report  
Course module: see relevant curriculum

Evaluation criteria: As described in the Framework Provisions.

### **3.5. Management in the Building Industry 4<sup>th</sup> semester**

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

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

Objective: 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:

##### Knowledge

- 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.

##### Skills

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

Evaluation criteria: As described in the Framework Provisions.

### ***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. September 2015 for all new, enrolled students and the students who begin on the third semester MSc on 1 September 2015.

In accordance with the Framework Provisions for the Faculty of Engineering and Science and The Faculty of 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>7</sup> If the project is written in English, the summary must be in Danish.<sup>8</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 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 English and use reference works, etc., in other European languages.

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<sup>7</sup> Or another foreign language (upon approval from the Board of Studies).

<sup>8</sup> The Board of Studies can grant exemption from this.