



AALBORG UNIVERSITY
DENMARK

The Faculty of Engineering and Science
The Study Board of Civil Engineering

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

Aalborg University

September 2018

Campus: Aalborg

Godkendt d. 10/1 - 2018

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dekan



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Preface:

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum is established. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for The Faculty of Engineering and Science, The Faculty of Medicine and The Technical Faculty of IT and Design.

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Chapter 1: Legal Basis of the Curriculum, etc.

1.1 Basis in ministerial orders

The Master's programme is organised in accordance with the Ministry of Higher Education and Science's Order no. 1328 of November 15, 2016 on Bachelor's and Master's Programmes at Universities (the Ministerial Order of the Study Programmes) with subsequent changes and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 111 of January 30, 2017 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (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.

1.4 External Exiners Corps

The programme falls under the external evaluator corps: ingeniøruddannelernes censorkorps - bygning

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

2.1 Admission

Applicants with a legal right of admission (retskrav):

Applicants with the following bachelor's degree are entitled to admission:

- Aalborg University offers no bachelor's programmes with a legal right of admission to this Master's program

Applicants without legal right of admission:

Bachelor's programmes qualifying students for admission:

- Bachelor of Science in Civil Engineering; Structural and Civil Engineering, Aalborg University
- Bachelor of Science in Engineering (Civil Engineering with specialisation in Structural and Civil Engineering)
- Bachelor of Science in Civil Engineering; Indoor Environmental and Energy Engineering, Aalborg University
- Bachelor of Science in Engineering (Civil Engineering with specialisation in Indoor Environmental Engineering)
- Bachelor of Science in Civil Engineering; Water and Environment, Aalborg University
- Bachelor of Science (BSc) in Engineering (Civil Engineering with specialisation in Water and Environment)
- Bachelor of Science in Civil Engineering; Transportation Engineering, Aalborg University
- Bachelor of Science (BSc) in Engineering (Civil Engineering with specialisation in Traffic and Highway Engineering)
- Bachelor of Science (BSc) in Engineering (Structural and Civil Engineering), Aalborg University, Campus Esbjerg

- Bachelor of Engineering in Civil Engineering, Structural and Civil Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering; Indoor Environmental and Energy Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering; Water and Environment, Aalborg University
- Bachelor of Engineering in Civil Engineering; Transportation Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering; Traffic and Highway Engineering, Aalborg University
- Bachelor of Engineering in Civil Engineering, Aalborg University, Campus Esbjerg
- Bachelor of Engineering in Civil Engineering, VIA University College, Horsens
- Bachelor of Science (BSc) in Engineering (Architecture and Design with specialisation in Architecture and Urban Design)
- Bachelor of Science in Civil Engineering (Construction Engineering), Technical University of Denmark
- Bachelor of Engineering in Civil Engineering (Construction Engineering), Technical University of Denmark
- Bachelor of Engineering in Civil and Structural Engineering, Aarhus University – School of Engineering
- Bachelor of Engineering in Civil Engineering, University of Southern Denmark
- Bachelor of Engineering in Civil Engineering, VIA University College

Applicants who hold one of the above mentioned bachelor's degrees that do not include knowledge within the field of project management and economics are recommended to acquire knowledge within this field before or during their study at Management in the Building Industry. Inspiration for the knowledge building can be found in the course "Projektledelse og økonomi" in the curriculum for Bachelor of Science in Engineering.

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

- Has knowledge within management in the building industry

that, in selected areas, is 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 the 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.

Competencies

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

Chapter 3: Content and Organization of the Program

The program is structured in modules and organised 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 organised 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.

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 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 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 3rd semester, the student can choose between 4 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 3rd semester.

Semester	P= Project module C= Course modules	Module	ECTS	Assessment	Exam
1st	P	Project Management and Production in Construction	15	7-point scale	Internal
	C	Management of the Construction Process	5	7-point scale	Internal
	C	Framework Conditions of Construction	5	7-point scale	Internal

		C	Knowledge Management in the AEC Industry	5	7-point scale	Internal	
2nd*	A	P	Management of Construction Industry Companies	15	7-point scale	External	
	B	P	ICT Supported Collaboration and User Involvement in the Building Process	15	7-point scale	External	
			C	Introduction to Building Information Management	5	7-point scale	Internal
				Development of Project, Risk and Quality Management Systems in Construction	5	7-point scale	Internal
			C	Strategy and Performance Measurements	5	7-point scale	Internal
3rd**	A	P	Innovation in Construction	5-30	7-point scale	Internal	
	B	P	Scientific Paper Writing ¹	30	7-point scale	Internal ²	
	C	P	Academic Internship ²	30	7-point scale	Internal	
	D		Study at another University	5-30	- ³		
4th		P	Master's Thesis	30	7-point scale	External	
Total				120			

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

**) At the 3rd semester, students must choose between option A, B, C, or D. Should a student choose option D and wish to conduct a study abroad stay (of less than 30 ECTS), the student must earn the remaining credits by following the module listed under option A.

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

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 1st semester

3.2.2 Project Management and Production in Construction (P) *Projektleidelse og produktion i byggeriet*

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

³ Assessment and exam according to the curriculum at the other university. The study board must approve on the contents before the study is commenced.

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 modelling processes.

Skills

The student must be able to:

- Analyse 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.
- Analyse 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.

Type of instruction: 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 stated in the Joint Programme Regulations.

3.2.3 Management of the Construction Process (C) *Byggeprocessens styringsområder*

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 an 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 optimisation in the management of building and construction projects.
- Must be able to explain the quality and environmental management systems.
- Must be able to analyse 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.

Type of instruction: 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 Joint Programme Regulations.

3.2.4 Framework Conditions of Construction (C) ***Byggeriets rammebetingelser***

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 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 general conditions and tender law 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 general international conditions and EU tender law 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 analyse 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 labour 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.

Type of instruction: 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 Joint Programme Regulations.

3.2.5 Knowledge Management in the Architecture, Engineering and Construction Industry (C) ***Byggeriets videnshåndtering***

Objective: The student should acquire knowledge about basic concepts, technologies and methods to analyse and develop models that describe a building's functional systems, components, processes in construction and knowledge management models.

Knowledge - The students should have knowledge within the following areas:

- Knowledge representation in theory and practice including conceptual models and data models.
- Basic concepts, technologies and methods for knowledge management.
- Principles, methods and techniques for the design and evaluation of user environments for computer-aided interaction and collaboration, and knowledge exchange.
- The construction process' fundamental ontologies.

Skills – The student should be able to:

- Use various knowledge representation properties and evaluate their practical suitability for modelling of different systems.
- Document knowledge for digital delivery of building models.
- Demonstrate basic knowledge of methods and systems for ICT-supported information and knowledge sharing in the construction process including Semantic Web technologies
- Identify support systems for knowledge management
- Demonstrate how simulation and analysis systems can be integrated with building models
- Perform conceptual modelling in e.g. IDEF0, E-R and UML
- Describe how a system can be implemented in cooperation with end-users, including methods to identify user requirements and evaluation of systems under development

Competencies - The course provides the students with a capability to:

- Specify building processes and building functional systems and how these can be modelled on a conceptual and data level.

Type of instruction: Lectures and exercises in groups supplemented with workshops, presentation seminars and other forms of active learning.

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

Evaluation criteria: As stated in the Joint Programme Regulations.

3.3. Management in the Building Industry 2nd semester

3.3.1 Management of Construction Industry Companies (P)

Ledelsessystemer i byggeriets virksomheder

Recommended
academic
prerequisites

Builds upon the knowledge acquired in the modules on the 1st semester or the like.

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 organisational.
- Must have knowledge of the theoretical and practical basis for the company's long-term development.
- Must have knowledge of coherent business systems and development plans at different management levels.

Skills

The student:

- Must be able to understand the structure of different management of construction for businesses.
- Must be able to analyse 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.

Type of instruction: 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 Joint Programme Regulations.

3.3.2 ICT Supported Collaboration and User Involvement in the Building Process (P) *IKT-støttet samarbejde og brugerinddragelse i byggeprocessen*

Recommended
academic

prerequisites: Builds upon the knowledge acquired in the modules on the 1st semester or the like.

Objectives: The project should provide the theoretical and practical background for the student to participate actively in the specification, development and testing of ICT-supported user environments for collaboration and communication.

Knowledge - The students should have knowledge within the following areas:

- Methods for user involvement in creative and innovative design of buildings within and between enterprises
- Methods for user involvement in system development
- Evaluation paradigms in system development
- Augmented, Virtual and Mixed Reality environments

Skills - The student should be able to:

- Perform specification, development and testing of ICT-supported user environments for collaboration and communication
- Identify user needs and perform system evaluation
- Use the conceptual modelling methods and system development procedures as e.g. Contextual Design
- Facilitate user-driven innovation in the construction process
- Demonstrate knowledge of the structure and properties of augmented, virtual and mixed reality systems
- Apply theories and methods for specifying user needs and system requirements
- Apply theories and methods for system evaluating
- Explain how end-users can be involved in system development

Competencies - The course provides the students with a capability to:

- Participate actively in the planning and implementation of processes, which include specification, development and testing of ICT-supported user environments and workflows for cooperation and communication between different actors.

Type of instruction: Project work with supervision supplemented with workshops, presentation seminars and other forms of active learning.

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

Evaluation criteria: As described in the Joint Programme Regulations.

3.3.3 Introduction to Building Information Management (C) ***Introduktion til byggeriets informationshåndtering***

Objective: 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 analyse 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 models and data representation.

Skills

The student must be able to:

- Explain the fundamental differences between various types of building models and process models.
- Explain central aspects of model supported collaboration between actors of the construction process.
- Demonstrate knowledge of information 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 the properties of different information representations and their suitability for modelling 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.

Type of instruction: Lectures and exercises in groups 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 stated in the Joint Programme Regulations.

3.3.4 Development of Project, Risk and Quality Management Systems in Construction (C) ***Udvikling af kvalitets-, risiko- og projektstyringssystemer i byggeri***

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 company and project quality and project management systems. Emphasis is placed on elements targeting the company's development as a whole via tight project management.

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

- Quality management - business processes and supply chain.
- Project planning and management in multi-project environments.
- Models, methods and tools for the development of advanced quality and environmental and project management systems.
- Financial management and Risk management of activities in companies with production orders and long production time.
- Project Risk management and 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 organisation overall. Also how quality, project management and financial management systems can be integrated with the organisation's other systems. Finally, the focus is on project 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:

- Understand quality management in relation to business and project processes and analyse the organisation'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 and risk 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.
- Identify and analyse risk factors for the company's project portfolio and understand risk management systems and the use of risk management for strategic purposes.
- Apply advanced methods and models to develop proposals to improve the organisation's existing quality and project management systems.

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 acquired 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 acquired knowledge on techniques and management systems for contract manufacturing companies.
- Must be able to apply acquired knowledge gained on how to specify projects and the challenges that may arise in project-driven businesses.
- Must be able to apply acquired knowledge gained about how companies develop quality management systems.
- Must be able to analyse risk factors for the company's project portfolio and understand risk management systems and the use of risk management in connection with the organisation's strategy development process.

Type of instruction: 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 stated in the Joint Programme Regulations.

3.3.5 Strategy and Performance Measurements (C) ***Strategi og performance measurement***

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 organisation.

Skills

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

- Apply the learned theories and methods to understand and analyse the company's choice of strategy and performance measurements.
- Assess theoretical and practical problems by developing and implementing changing strategies in established organisations.
- 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 organisation hereof.

Type of instruction: 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 Joint Programme Regulations.

3.4 Management in the Building Industry 3rd semester

3.4.1 Innovation in Construction (P)

Innovation i byggeriet

Recommended
academic

prerequisites: The activity is based upon knowledge obtained at the 1st and 2nd 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:

- 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 organisational 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:

- Analyse technical, economic, social or organisational systems and processes in a company or in a network of companies
- Account for the development of technical, economic, social or organisational 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.

Type of instruction: 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 Joint Programme Regulations.

3.4.2 Scientific Paper Writing (P) *Akademisk artikel*

Recommended
academic

prerequisites: The activity is based upon knowledge obtained at the 1st and 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 summarising relevant literature, and making and proving hypothesis', arguing and documenting his/her work in a scientifically recognised 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, summarise, 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.

Type of instruction: 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.

Evaluation criteria: As described in the Joint Programme Regulations.

3.4.3 Academic Internship (P) ***Projektorienteret forløb i en virksomhed***

Recommended academic prerequisites: The activity is based upon knowledge obtained at the 1st and 2nd semester.

Objective: The student should gain knowledge about how theory is used in practice and how theory can be used for rationalising real-life work and making it more useful. 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
- Problem-solving through knowledge gained at earlier semesters
- Management and organisational 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 specialisation
- 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.

Type of instruction: 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 Joint Programme Regulations.

The Academic Internship must have a scope that corresponds the ECTS load

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

Recommended
academic

prerequisites: The activity is based upon knowledge obtained at the 1st and 2nd semester.

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 Joint Programme Regulations for further information.

3.5. Management in the Building Industry 4th semester

3.5.1 Master's Thesis

Kandidatspeciale

Recommended
academic
prerequisites:

The activity is based upon knowledge obtained at the 1st, 2nd and 3rd semester.

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 Joint Programme Regulations.

Chapter 4: Entry into Force, Interim Provisions and Revision

The curriculum is approved by the dean and enters into force as of 1 September 2018.

Students who wish to complete their studies under the previous curriculum from 2015 must conclude their education by the summer examination period 2019 at the latest, since examinations under the previous curriculum are not offered after this time.

Chapter 5: Other Provisions

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

In the assessment of all written work, regardless of the language it is written in, weight is also given to the student's spelling and formulation ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination can be assessed as 'Pass' on the basis of good language performance alone; similarly, an examination normally cannot be assessed as 'Fail' on the basis of poor language performance alone.

The Board of Studies can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Master's thesis must include an English summary. If the project is written in English, the summary must be in Danish. 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

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

5.3 Rules for examinations

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

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

5.4 Exemption

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

5.5 Rules and requirements for the reading of texts

It is assumed that the student can read academic texts in his or her native language as well as in English and use reference works etc. in other European languages.

5.6 Additional information

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