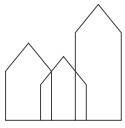


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# SEMESTER SYLLABUS 3RD SEMESTER INDUSTRIALIZED BUILDING DESIGN AND ELECTIVE PROGRAMME ELE- MENT

Bachelor of Architectural Technology and Construction Management  
AP Degree programme in Construction Technology

VIA University College Horsens

Spring 2016

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# SEMESTER SYLLABUS

## Welcome to the 3<sup>rd</sup> semester!

You have now reached the first semester in the study environment we call 'professionalization'. The academic level increases and what we expect from you will be more in line with what a future employer will expect from you.

We now expect that you are familiar with your own learning style and that you reached an understanding of the Problem Based Learning approach (PBL).

The theme of the semester project is 'Industrialized Building Design'.

So far you have worked on designing houses. During this semester, you will learn about the link between designing an industrialized building, organize the production of the building components and planning the construction. Furthermore, the focus will be on pointing out which tasks the consultant, manufacturer and building contractor attend to.

We emphasize that you get an understanding of how important good and timely communication is in relation to a building process.

In this semester, you will also have an elective programme element with the theme "Innovation and Entrepreneurship".

The main aim is that you gain knowledge about creativity, innovation and entrepreneurship. By the end you should be able to take part in innovative processes in an interprofessional context.

In your future work with projects, we expect that you use what you have learned.

By the end of this semester, you have to decide whether you wish to become an AP Graduate in Construction Technology after the 4<sup>th</sup> semester or to become a Bachelor of Architectural Technology and Construction Management after the 7<sup>th</sup> semester.

Consider what you want to work with, your economic situation and academic circumstances. If you have any doubts concerning your academic competencies or your decision regarding your education path we encourage you to talk to one of the student supervisors of this programme or one of your teachers.

## Quality assurance and development

VIA the following link, you can find the latest action plan, developed by the programme management based on your assessments:

- [Final teaching evaluation 3<sup>rd</sup> semester](#)

Find other action plans in relation to the work with quality assurance and development of the study programme on [Studynet \(Horsens\)](#).

Join [VIA Bygningskonstruktør / Architectural Technology and Construction Management](#) on LinkedIn and become a part of a professional network with other students, graduates, teachers and employers.

## Reading guide

To guide you about the different semesters in this programme, a semester syllabus has been developed for each semester. The semester syllabus contains three main sections:

**1. The programme.** This section describes the basic approach to the pedagogy and teaching-forms, including our expectations of you in terms of achieving the learning aims. This section also describes our work with quality assurance and development of the programme and the role you play in this context.

**2. The semester.** This section starts with a brief description of the overall planning of the semester, followed by a brief specification of requirements and prerequisites for admission on the semester as well as the overall learning objectives for the semester. Subsequently, you will find a detailed description of semester content, i.e. the cross-disciplinary project, including single subjects and other elements. Finally, the main section describes how to assess the fulfillment of your learning aims, through tests and evaluations, and what criteria form the basis for the evaluation.

**3. The teaching.** This section contains a description prepared by the semester team (teachers) detailing the specific project/case and includes a teaching plan and a list of references. The project work in the specific semester is planned by the teacher team and is tailored to meet the class and to the students' background. Consequently, there will be differences in the planning and organizing of teaching in Danish versus international classes. Likewise, differences may occur in the way teaching is planned and organized at the different campuses. Such differences level out as the programme progresses.

# 1 THE PROGRAMME

The Architectural Technology and Construction Management programme is organized as a full-time education with 7 semesters, equivalent to 210 ECTS-points. The Construction Technologist Programme consists of 4 full-time semesters corresponding to 120 ECTS-points. Each ECTS-point corresponds to a workload of 27.5 hours and each semester is organized over 20 weeks, including the exam. Hence, you are expected to spend approximately 41 hours per week on your education<sup>1</sup>.

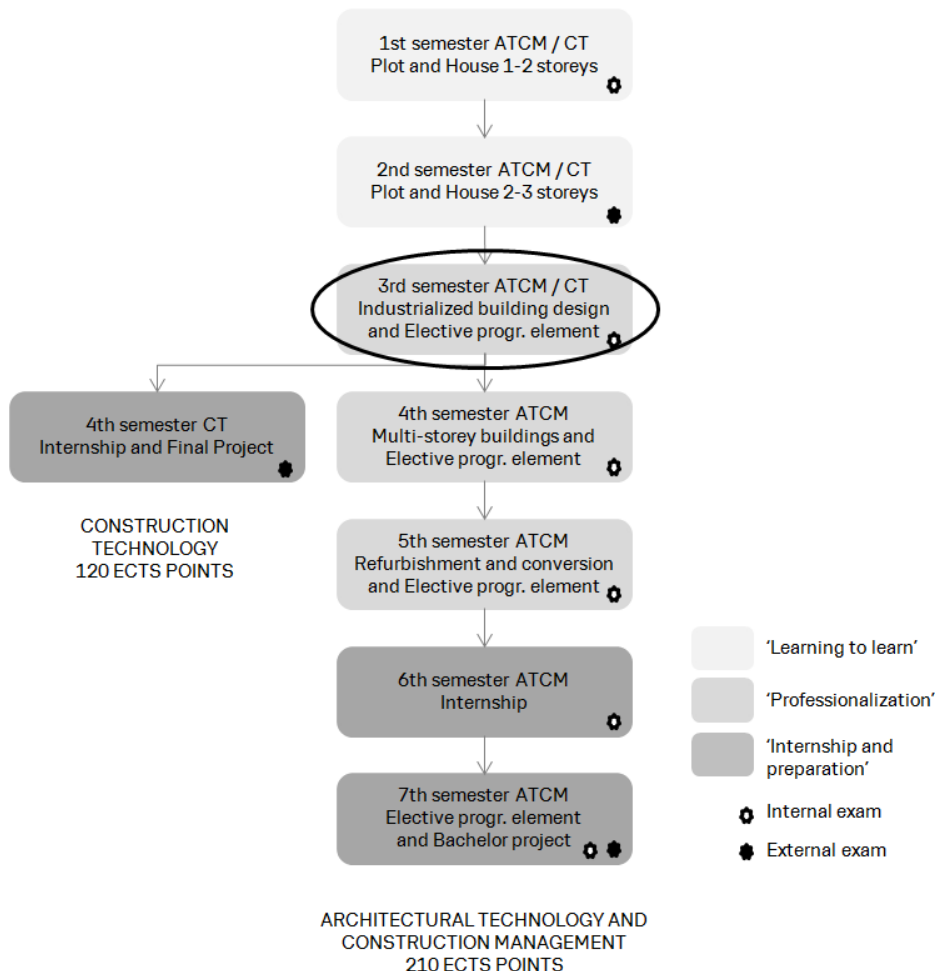
As a student, you have your own 'workplace' at the college, which we encourage you to use. The 'workplace' will change from semester to semester, depending on the size of the classes and your choice of specialization.

You also have access to resources and equipment made available to you by the campus. The type of resources and equipment may vary slightly from campus to campus.

## 1.1 The study environments

The programme is based on three different study environments, ensuring a natural progression in the learning during the course of the programme, see Figure 1:

Figure 1: The three study environments at VIA Built Environment



Source: Created at VIA Built Environment

<sup>1</sup> During the internship, a workload of approximately 37 hours/week is accepted.

### **"Learning to learn"**

This environment emphasizes the learning of how to be a successful student – finding your own learning style and gaining good study- and work-habits in a PBL (Project Based Learning) environment. It is also an introduction to the professional world of the Bachelor of Architectural Technology and Construction Management, and you acquire basic knowledge and skills concerning working methods and tools used within the profession.

### **"Professionalization"**

This environment increases focus on the professional content of the projects and you learn more about advanced methods for carrying out analyses.

### **"Internship and job preparation"**

Through the internship in a company of your own choice, and through your elective dissertation and bachelor project (defined within delimited areas), you are required to immerse yourself further and independently into theory and practice.

## **1.2 Teaching- and workforms**

The programme has a varied teaching and learning environment – ranging from traditional teaching- and workforms with lectures to new teaching- and workforms with innovative projects carried out in cooperation with real companies.

As a student, you are responsible for your own learning, and we put much emphasis on that. The Study Activity Model accentuates which study activities the teachers will initiate, and which activities you should initiate. It also accentuates which activities both teachers and students participate in, as well as activities where only students participate (four categories). The model illustrates the distribution of time for each type of study activity in percent. It also illustrates the development in the pedagogical environment and consequently how you are expected to become gradually more and more responsible for your own learning as the programme progresses.

The programme is primarily based on Problem Based Learning (PBL), which means that the single subject inputs and assignments all relate to, and support the project work.

Lectures in theory, group guidance and independent project work are organized in relation to the specific class and most activities take place in the same classroom.

You are expected to keep yourself updated on relevant academic presentations regarding your career, labour union etc., which may be on offer during the semester.

During the programme, you are introduced to a tool called Portfolio. The use of this tool will help you in getting a better understanding of your strong and weak points, and consequently help you in finding out in which areas you need to increase your study efforts and in which areas you could possibly reduce your efforts.

### **1.2.1 Individual learning offers**

In addition to the scheduled and teacher-organized learning, you have many options of seeking new knowledge on your own. You can make use of the various offers of online teaching made available to you on 'Studynet' at this address: [www.Openvia.dk](http://www.Openvia.dk). In this database, you can find numerous instructional videos and tutorials, which may support your individual learning. You may also find material that can support you in the use of certain it-tools or material that offers repetition of specific academic topics.

You are expected to make use of these offers as a supplement to your own learning-process, and you are also expected to seek knowledge through other relevant services (such as the library).

In case you have additional need for special assistance during the programme, there are a number of individual possibilities at the different campuses, e.g. assistance in math, it, language or the like. The assistance may be offered in the form of short, specially organized courses or it could be assistance from a student in one of the higher semesters.

In case you have special needs in relation to your learning, it is your responsibility to make your teachers or the student counselors aware of such needs. In each case, the programme management assesses the possibilities of offering special assistance.

In order to be able to offer you optimal conditions for your studies, it is important that you inform the college about special study or learning needs that you may have.

### 1.3 Study activity / Attendance

As described in the Study Activity Model, you are expected to participate actively in classes, project work and guidance meetings. In other words, we expect that you:

- attend to class well prepared
- take part in discussions and exercises in class
- contribute positively to the group work
- procure literature recommended by your teachers and/or counsellors
- hand in compulsory assignments (these assignments must be approved for you to continue to the next semester)
- attend to meetings related to your education (status meetings, guidance meetings, evaluations, etc.) well prepared and motivated, and that you are able to document and demonstrate that you have reached the set goals

### 1.4 Quality-assurance and -development of the programme

We work systematically and goal-oriented with quality assurance and development of the study programmes at VIA Built Environment with regards to ensuring your learning and the content of the study programmes. This includes ensuring an updated knowledge base, the right academic level and the study programmes' relevance for the employers.

#### 1.4.1 Your involvement

You and your fellow students play an important part in assuring and developing the quality of the study programme. It is important for the programme management and the teachers to get your feedback, partly to ensure that you and your fellow students gain a high learning outcome, partly to ensure a satisfactory study- and teaching environment.

From the table below, you can get an overview of how you as students are involved in evaluating the courses at and outside of VIA, who primarily uses your feedback and when the evaluations are carried out.

**Table 1: The students involvement in evaluation of the courses at and outside of VIA**

	<b>Method</b>	<b>Primary users</b>	<b>Time</b>
<b>Semester introduction</b>	You and the teachers align your expectations to the semester with a starting point in the semester syllabus.	Students and teachers	At the start of each semester.
<b>Portfolio</b>	You reflect upon your own effort and what you have to do in order to reach your learning aims.	Students	Continually through the course of the study programme.
<b>Midterm teaching Evaluation</b>	The teachers select a method, typically it is orally.	The teachers	Approximately in the middle of the semester – it will be stated in the guiding time schedule.
<b>Final Teaching Evaluation</b>	You receive a mail with a link to the online survey from the study programme. In semesters where you can be gath-	Teachers  The programme management	Each semester is evaluated every 3rd time it is carried out. It will be stated in the guiding time schedule if the semester is to be

	ered in class, the teachers will discuss the results with you.		evaluated.
<b>Final Evaluation of the Internship</b>	You receive a mail with a link to the online survey from the study programme.	The programme management	
<b>Final Evaluation of Study abroad</b>	You receive a mail with a link to the online survey from the International Office.	The programme management The International Office	By the end of each semester.
<b>Student Satisfaction Survey</b>	You receive a mail with a link to the online survey from VIA Quality. The programme management invites the class representatives to a follow-up meeting.	The programme management  VIA's management	Every 2nd year. It will be stated in the guiding time schedule if there is a Student Satisfaction survey in the given semester.

Source: Development at VIA Built Environment

You can find results, Key Performance Indicators and action plans on [Studynet \(Horsens\)](#). Results from the latest evaluations are presented at the Semester introduction. Furthermore, your class representatives play an important part in passing on the main points from the DSR-meetings.

## 1.4.2 The local DSR (Student Council)

At VIA there is one [DSR](#) at each campus with class representatives from all the study programmes, but there is also local DSR's at the study programmes.

The programme management at VIA Built Environment in Horsens, Aarhus and Holstebro respectively continuously involve the local DSR in a discussion of the work with quality assurance and development of the programme, including:

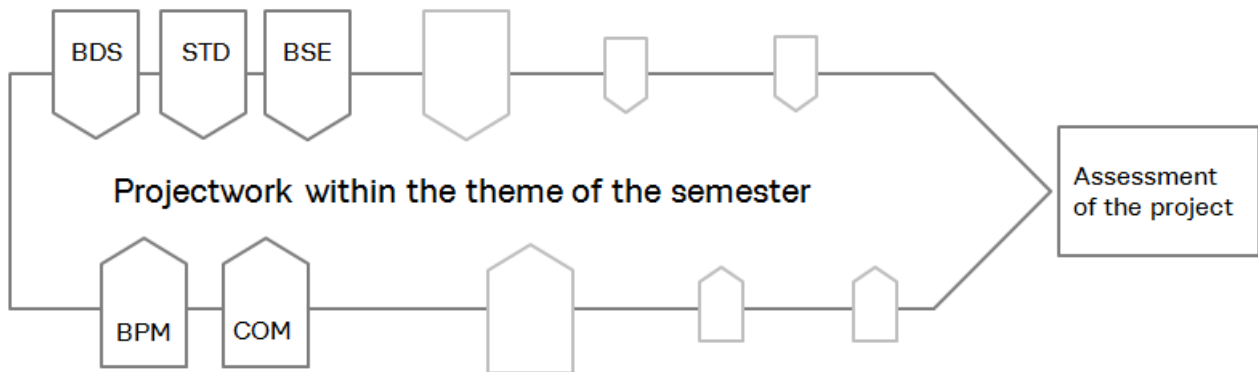
- Employer involvement
- Graduate involvement
- Final Teaching Evaluation
- Final Evaluation of the Internship in Denmark and abroad
- Final Evaluation of Study Abroad
- The Student Satisfaction Survey
- Drop-out analysis
- The Quality Report



## 2 THE SEMESTER

During this semester, your studies will evolve around one continuous project in agreement with the overall semester theme. Figure 2 illustrates how single subject inputs support the project work. Theoretical inputs are often concentrated at the beginning of the semester, whereas guidance and consultancies in relation to the project are offered later in the semester. It is by solving problems related to the given project that you demonstrate your development of competencies in order to become an AP Graduate in Construction Technology or a Bachelor of Architectural Technology and Construction Management.

Figure 2: Cross- disciplinary semester



Source: Created at VIA Built Environment

The 3<sup>rd</sup> semester is the first semester in the pedagogical learning environment “professionalization” (see Figure 1). Hence, for the first time there is an elective programme element of 5 ECTS-points in the semester (corresponding to three weeks). This elective programme element is an opportunity for you to explore your skills in relation to collaborating with students from other professions on relevant topics. You can gain important knowledge about your competencies which ought to inspire you, give you direction and professionalize you in your future studies. The elective programme element is an independently planned course.

### 2.1 Entrance requirements

In order to be admitted to the 3<sup>rd</sup> semester, you must have been registered for the exam in the 2<sup>nd</sup> semester, or be able to document that you in other ways have equivalent competencies.

### 2.2 Learning aims for the 3rd semester (transcribed from the curriculum)

In this section the learning aims for the compulsory part of the semester (25 ECTS-points) are described. The learning aims are transcribed from [the curriculum](#).

#### Knowledge

At the end of the 3<sup>rd</sup> semester, you should have learned:

- about and have the ability to reflect on constructions, planning- and management tools, technical installations, structural principles and documentation related to the theme of the semester
- about and have an understanding of the production and construction methods in the building process and be able to reflect upon these
- about commonly used communication methods, tools and standards related to the theme of the semester

## Skills

At the end of the 3rd semester, you should:

- have the ability to use methods and tools for gathering and analysis of information regarding the theme of the semester
- have the ability to use professional design methods for Industrialized Building Design as well as the ability to organize the production and building process
- have the ability to assess theoretical and practical problems concerning industrialized building designs and to justify actions and solutions chosen
- have the ability to communicate practical and professional problems and solutions to collaborators and users

## Competencies

At the end of the 3rd semester you should:

- have the ability to use the acquired knowledge and the skills related to the theme of the semester, and to carry out documented analysis of problems relevant to professional building
- have the ability to create new solutions within construction in order to optimize the production

## 2.3 The project work

The project work is partly carried out as individual assignments and partly as assignments that need to be solved in groups of 2-4 students.

The work is carried out in groups, partly because this work form is commonly used within the building industry, and partly because you learn a lot when you are forced to collaborate on a project with other students with different experiences.

Irrespective of the group work, it is important that you as an individual are able to acquire and put into use the knowledge you have obtained during single-subject teaching

Part of the project work includes analysis of aspects related to financial issues, architectural technology and management and the preparation of documentation necessary for the implementation of Industrialized Building Design.

The cross-disciplinary project, which comprises an industrial building, possibly with a joint administration building, is divided into three phases, namely **consultation**, **production** and **construction**.

**Consultation** focuses on the advisor role, and the starting point is an Outline Proposal for a multi-purpose sports building which will be further elaborated into digital tendering at Detail Design 1 level, i.e. including detailed specifications. However, in this semester the tender only includes works related to manufactory, delivery and erection of external walls, but building design will be continued to such a level as agreed between you and your consultants/teachers. Another group, preferably at a different college, will be invited to carry out the continued design work – thus allowing you to get experience in communicating with other professionals who have not been involved in the initial design work.

**The production** focuses on such issues as production calculation, production planning and the delivery of external wall elements.

**Construction** focuses on preparation of element erection. The elements to be erected are those offered in tender by the group mentioned above (under 'Calculation'). Submission of tenders is included in this part.

During Intermediate and final evaluations of your project work you must document your ability to put into practice - analytically, competently and professionally - the theory, the knowledge and the skills you have acquired through the single-subject teaching in such a way that you can:

- solve explicit tasks across subjects, education and organization
- assess and design such building structures and construction details as related to element construction with focus on minimizing energy consumption as well, focusing on overall economy including such issues as environmental impact and cycle

- handle the design work and optimize the building process and also ensure that the basic architectural expressions as well as technological solutions are maintained throughout the design, the production and the construction phases
- communicate - in writing and verbally - issues related to administrative project management with regard to solving the cross-disciplinary assignment
- handle the planning and the management of team-based project work as well as the planning of the design, the production and the erection of external wall elements
- assess and handle such financial aspects as may be related to a business dealing with consultancy/design, production and element erection
- use the analogue and digital tools specified in the single-subject learning-aims and in the case-description

Your success in meeting the above mentioned objectives, demonstrates the level of your professional competencies upon completion of the 3rd semester.

## 2.3.1 Single-subject teaching

The single-subject teaching concerns rules, theories, methods and techniques within each specific academic field. The timely placement of each topic can be seen from the semester team own teaching plans, which will be available on Study net.

**Fejl! Henvisningskilde ikke fundet.** show which single subject each main subject consists of. The topics are described separately in the following subsections.

**Table 2: Subjects and topics**

Main subject	Single subject	Duration
Building Design (BDS)	Architecture and Building Design (ABDS)	-
	Building Design (BDS)	8 ECTS-points
	Material Science (MSC)	2 ECTS-points
Structural Design (STD)	Structural Design (STD)	2.5 ECTS-points
Building Services (BSE)	Building Services and Building Physics (BSE/BPHY)	2.5 ECTS-points
Building Planning and Management (BPM)	Building Planning and Management (BPM)	7 ECTS-points
Communication (COM)	Communication and Study Techniques (COM)	3 ECTS-points
The Elective programme element	The Innovation weeks	5 ECTS-points
<b>Total duration of the semester:</b>		30 ECTS-points

Source: Created at VIA Built Environment

### 2.3.1.1 Building Design (BDS)

The learning aims and content of the subject is shown in the following subject boxes.

**Subject box 1: Architecture and Building Design (ABDS)**

<b>Duration</b>	Integrated part of the other teaching
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the subject in general, its methods and practice</li> <li>- constructions and important areas of the architect's work with Industrialized Building Design as well as large-span construction</li> <li>- the history of modular building and architectural effects in relation to the theme of the semester</li> <li>- the interrelationship between functional requirements, material choice, aesthetics as well</li> </ul>

	as sustainability within industrialized building design
<b>Learning aims - Skills</b>	You must be able to: <ul style="list-style-type: none"> <li>- analyze functions, constructions and selection of materials and to make independent and qualified general choices that are related to architecture</li> <li>- work with sketching as a tool to design and disposition</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- The history of modular building and architectural effects in relation to the theme of the semester</li> <li>- Sketching and communication of construction through analogue and digital tools</li> </ul>

Source: Created at VIA Built Environment

**Subject box 2: Building Design (BDS)**

<b>Duration</b>	8 ECTS-points
<b>Learning aims - Knowledge</b>	You must gain knowledge about: <ul style="list-style-type: none"> <li>- basic principles in addition to the practical use of methods and techniques used in the planning of buildings using industrialized building processes and prefabricated elements</li> <li>- the basic principles in building component design in relation to Scheme Design, Detail Design 1 and Detail Design 2/Production design and Construction</li> <li>- contemporary construction principles and construction types with regard to industrialized production, energy and sustainability</li> <li>- legislation for construction of prefabricated elements for 1-2 storey buildings</li> <li>- analogue and digital tools in sketching and communication of construction (See "BIM - Building Information Modeling" under References)</li> </ul>
<b>Learning aims - Skills</b>	You must be able to: <ul style="list-style-type: none"> <li>- analyze and select prefabricated elements used in industrialized building systems</li> <li>- plan and develop a prefabricated building from Scheme Design through parts of authority approval to the final construction</li> <li>- prepare the necessary specifications and communicate information concerning pre-fabricated construction throughout the design phases as well as the construction phase, using digital design tools in 2D and 3D, respectively - and you should have the ability to use oral and written communication</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Work with Scheme Design, Detail Design 1 and Detail Design 2 on the basis of a given Outline Proposal</li> <li>- Work with Outline proposal</li> <li>- Production drawings of the facade elements</li> </ul>

Source: Created at VIA Built Environment

**Subject box 3: Material Science (MSC)**

<b>Duration</b>	2 ECTS-points
<b>Learning aims - Knowledge</b>	You must gain knowledge about: <ul style="list-style-type: none"> <li>- the subject in general, its methods and practice, with an emphasis on energy, sustainability and industrialization</li> <li>- the building materials listed below: <ul style="list-style-type: none"> <li>o Wood</li> <li>o Concrete</li> <li>o Roofs (roofing materials)</li> <li>o Elastic joint (sealing compounds)</li> <li>o Sheet material (panels)</li> <li>o Heat insulation materials</li> </ul> </li> <li>- building materials and their application in prefabricated construction, including the compilation of the materials, their features, preparation, standard requirements, environmental effects, protection, trade forms maintenance and life cycle and removal</li> <li>- production tolerances, building-in tolerances and quality control</li> </ul>

<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- analyze, select and incorporate the above mentioned materials into the chosen constructions</li> <li>- justify and document your selection of materials</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Wood in relation to element production (e.g. as single-subject teaching)</li> <li>- Concrete in relation to element production (e.g. as single-subject teaching)</li> <li>- Roofs (roof material), joints (sealing materials), panels, heat insulation materials</li> <li>- Work with material analyses and specification in building component log/building component analysis in drawings and in tender description</li> <li>- Analogue and digital tools in sketching and communication of construction (See "BIM – Building Information Modeling" under References)</li> </ul>

Source: Created at VIA Built Environment

### 2.3.1.2 Structural Design (STD)

The learning aims and content of the subject is shown in the following subject box.

#### Subject box 4: Structural Design and Mathematics (STD/MATH)

<b>Duration</b>	2.5 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- different types of prefabricated load bearing and non-load bearing constructions used in 'heavy' and 'light' building types respectively</li> <li>- the structural system for 'heavy' or 'light' building types</li> <li>- load transferring joints</li> <li>- the structural function of the 'light' as well as the 'heavy' part of the building</li> <li>- dimensioning and construction of different types of prefabricated elements with particular focus on facade elements</li> <li>- basic principles applied in the use of communication tools used in Digital Design</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- identify and account for the two different structural systems pertaining to 'light' and 'heavy' buildings respectively</li> <li>- make extractions of drawing plans for illustration of the structural system</li> <li>- communicate the structural ways of the loads through the buildings, orally and by using sketching techniques</li> <li>- communicate - in writing and on drawings - such structural demands and loads that are required when documents are exchanged with other professionals and when documents are used for tender</li> <li>- identify and account for load transferring joints</li> <li>- carry out an estimated structural calculation and prepare work drawings for element production</li> <li>- apply appropriate characteristics in relation to statics demands in a BIM model</li> <li>- undertake collision and consistense control on drawing extracts</li> <li>- analyze and identify optimal ways of breaking up prefabricated elements with respect to structural demands and loads and at the same time consider sustainability in relation to production, transport and element erection</li> <li>- describe the correct physical handling of prefabricated elements, i.e. correct lifting/transportation procedures - from production to building site</li> <li>- account for the different types of lifting devices used for the handling of prefabricated elements</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Structural analysis of a 'heavy' and a 'light' single-storey building (Production area and office)</li> <li>- Loads and Safety in accordance with Eurocode 0 and 1 – DS-EN 1990 and 1991</li> <li>- Structural documentation in accordance with BR10 and guidelines in SBI 223 – A1 + parts of A2-A4</li> <li>- Load transferring joints and load transfer</li> </ul>

	<ul style="list-style-type: none"> <li>- Estimate structural calculations and detail drawing of prefabricated elements</li> <li>- Estimate dimensioning of lifting devices - lifting methods</li> <li>- Bracing and anchoring</li> </ul>
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Source: Created at VIA Built Environment

### 2.3.1.3 Building Services (BSE)

The learning aims and content of the subject is shown in the following subject box.

#### Subject box 5: Building Services and Building Physics (BSE/BPHY)

<b>Duration</b>	2.5 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- different heating systems used in larger buildings and offices</li> <li>- ventilation systems used for mechanical/balanced ventilation</li> <li>- energy consumption and in-depth insight into the calculation of the energy frame in BR10</li> <li>- alternative energy sources which may affect the indoor climate and energy consumption of the project in question, including proposed solutions for optimizing the indoor climate</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- prepare drawing material concerning selected technical installations for the application of building permit (sewer, water, ventilation, etc.)</li> <li>- include sufficient data for a realistic calculation of the energy frame for the production hall and/or the office building, focusing on the body of the building</li> <li>- estimate and, in collaboration with ventilation experts, to select a suitable ventilation system for the definite project</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Principles for heating systems used in larger buildings</li> <li>- Principles used in balanced mechanical ventilation systems</li> <li>- Sound analysis in production and office areas</li> <li>- Plans and principles for the running of sewer, water, heating and ventilation pipes</li> <li>- Ventilation plan for prefabricated elements of concrete and wood respectively</li> <li>- Introduction of Revit MEP (Mechanical - Electrical and Plumbing)</li> <li>- The study course 'Moisture' (in buildings - diffusion by calculation and graphic analysis)</li> </ul>

Source: Created at VIA Built Environment

### 2.3.1.4 Building Planning and Management (BPM)

The learning aims and content of the subject is shown in the following subject box.

#### Subject box 6: Building Planning and Management (BPM)

<b>Duration</b>	7 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- team collaboration and resource management enabling you (and your group) to work efficiently towards specific goals solving complex problems</li> <li>- organizational structure, the role of the leader in an organization and different forms of organization set-up</li> <li>- organization, administration and financial management of building enterprises – emphasis on design and project management</li> <li>- the duties and responsibilities of an enterprise acting as the manufacturer and supplier</li> <li>- types of tender, contract types, and contract delimitation</li> <li>- the Tender Act and AB92 and understand the importance of legally binding of documents</li> <li>- relevant directions from DANSKE ARK and FRI –including tools used for scrutinizing and output specifications including BIPS specification tools</li> <li>- calculation of building costs including considerations with respect to total economic value in relation to manufacture and maintenance</li> <li>- hierarchy of legislation – the starting point is 'The Working Environment Act' continuing with Work Safety in production enterprises and Plans for Health and Safety (PHS)</li> <li>- relevant production technology and acts on environment and safety</li> </ul>

	<ul style="list-style-type: none"> <li>- quality assurance procedures – performing quality control in relation to production and erection/fitting of building components – including tolerances accepted</li> <li>- BIM and Digital Design including the use of ‘Project Hotel’</li> <li>- transportation and building site logistics in relation to erection of elements</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- collaborate and to work individually on the planning and implementation of teamwork, as well as the follow-up on guidance meetings</li> <li>- plan project work efficiently, i.e. group work as well as individual work</li> <li>- introduce and use a suitable document structure on group work, including the numbering of drawings</li> <li>- use current methods for the planning and controlling of project work, i.e. as a planner / designer (architect’s office), as a producer (element manufacturer) and as a contractor (erecting elements)</li> <li>- scrutinize an Outline Proposal and a Scheme Design and use the results of this analysis in the continued design process (follow up)</li> <li>- scrutinize tender documents and prepare delivery control plans</li> <li>- make calculations with increased detailing throughout the project phases, including a tender price of the element contract, based on supplied tender documents</li> <li>- use currently acknowledged methods in the elaboration of documents required for tendering of the element contract which include legal as well as technical aspects</li> <li>- communicate practical and technical problems related to the starting up and operation of a company, including budgeting, organizational issues, production planning, submission of tenders, and reflecting upon and communicating such aspects</li> <li>- specify the manager’s role and responsibility in a production company, including the responsibility to act as ‘communication catalyst’</li> <li>- plan and organize factory production of elements</li> <li>- use a relevant project hotel for the exchange of project materials</li> <li>- plan the erection of elements including health and safety (H&amp;S) risk assessment for own work and an assessment of the Plan for Health and Safety (PHS)</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Transportation logistics</li> <li>- Study planning, teamwork and resource management</li> <li>- Industry and Technology</li> <li>- Types of enterprise and types of tender</li> <li>- Construction planning</li> <li>- Calculation, taking off and tender documents</li> <li>- Total Economic Value</li> <li>- Building Component Log</li> <li>- Quality Assurance</li> <li>- Building site arrangement</li> <li>- Plan for Health and Safety (PHS)</li> <li>- Refuse handling</li> <li>- Production planning techniques</li> <li>- Organizational chart for manufacturing companies</li> <li>- Production flow and division of labour</li> <li>- Collaboration between parties involved at the building site with the objective of reducing errors and shortcomings</li> <li>- Financial control models used in small consultancy companies (building), manufacturing companies and construction contractors</li> <li>- Construction documents and specifications</li> <li>- Transport logistics</li> <li>- Manufacturing and fitting tolerances</li> </ul>

Source: Created at VIA Built Environment

### 2.3.1.5 Communication (COM)

The learning aims and content of the subject is shown in the following subject box.

#### Subject box 7: Communication and Study Techniques (COM)

<b>Duration</b>	3 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- problem-oriented/Project-based Learning (PBL) on a basic theoretical level</li> <li>- limitations and characteristics of different learning styles</li> <li>- consequences of role distribution and responsibility in teams</li> <li>- and understanding of the limitations of verbal communication within the profession</li> <li>- the different types of communication, and acquire skills in the use of active listening and 'the good dialogue'</li> <li>- common English expressions relevant to Health and Safety at the building site</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- set up goals in your portfolio , related to the new study environment: <i>professionalization</i></li> <li>- collaborate with your group, and independently be able to plan, implement and follow-up on guidance meetings</li> <li>- become more cognitive in the use of the basic principles of PBL while studying</li> <li>- incorporate your own as well as other team members' learning styles and preferred group roles in the teamwork</li> <li>- describe models and systems that affect the group work, such as motivation, group organization, roles, conflicts, etc.</li> <li>- communicate in writing, both to partners and users, concerning problems and solutions relating to real-life situations</li> <li>- do a short presentation in English on Health and Safety at the building site</li> </ul>
<b>Content</b>	<p>Collaboration and learning:</p> <ul style="list-style-type: none"> <li>- Problem Oriented/Project Based Learning (PBL)</li> <li>- Advanced learning style test</li> <li>- Team roles</li> <li>- Guidance meetings</li> </ul> <p>Portfolio:</p> <ul style="list-style-type: none"> <li>- Creating goals with consideration to the new study environment: <i>professionalization</i></li> </ul> <p>Presentation:</p> <ul style="list-style-type: none"> <li>- Health and Safety presentation</li> </ul>

Source: Created at VIA Built Environment

## 2.3.2 Other study elements

### 2.3.2.1 Concrete in relation to prefabrication of building elements

The learning aims and content of the study element is shown in the following subject box.

#### Subject box 8: Concrete

<b>Duration</b>	Integrated part of the other teaching
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the basic technical characteristics of concrete</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- make a justified decision regarding materials and production methods in relation to design and construction</li> </ul>
<b>Content</b>	Tuition can alternate between lectures and assignments – to be carried out individually and in groups. Course outcome will be integrated into the semester project to be evaluated during the



	<p>semester as well as at the end of the semester:</p> <ul style="list-style-type: none"> <li>- Composition of concrete, characteristics and adaptability</li> <li>- Standards and quality demands</li> <li>- Construction principles, including protective methods</li> <li>- Environmental aspects (environmentally friendly materials / minimizing waste / handling of waste and trade forms)</li> </ul>
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Source: Created at VIA Built Environment

### 2.3.2.2 Wood in relation to prefabrication of building elements

The learning aims and content of the study element is shown in the following subject box.

#### Subject box 9: Wood

<b>Duration</b>	Integrated part of the other teaching
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the basic technical characteristics of wood</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- make a justified decision regarding materials and production methods in relation to design and construction</li> </ul>
<b>Content</b>	<p>Tuition can alternate between lectures and assignments – to be carried out individually and in groups. Course outcome will be integrated into the semester project to be evaluated during the semester as well as at the end of the semester:</p> <ul style="list-style-type: none"> <li>- Characteristics of wood and wood based products</li> <li>- Standards and quality demands</li> <li>- Construction principles, including protective methods</li> <li>- Environmental aspects such as chemical surface treatment, including selection of materials, minimizing waste, refuse handling and trade forms</li> </ul>

Source: Created at VIA Built Environment

### 2.3.2.3 Moisture

The learning aims and content of the study element is shown in the following subject box.

#### Subject box 10: Moisture

<b>Duration</b>	Integrated part of the other teaching
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the basic theory of moisture, moisture transport mechanisms and an understanding of the water-vapour diagram</li> <li>- and an understanding of the water-vapour- diagram/vapour pressure in relation to surface condensation</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- make a qualified analysis of the moisture in a construction by the use of a steady-state diffusion model, partly by a graphic analysis, and partly by the application of a calculation programme</li> <li>- carry out a graphic determination of whether internal condensation will appear in a given building part (Glaser's method)</li> <li>- make an in-depth calculation of a critical building component (Moisture Analysis)</li> </ul>
<b>Content</b>	<p>Tuition can alternate between lectures and assignments – to be carried out individually and in groups. Course outcome will be integrated into the semester project to be evaluated during the semester as well as at the end of the semester:</p> <ul style="list-style-type: none"> <li>- Water-vapour diagram/moisture pressure diagram</li> <li>- Surface condensation</li> <li>- Glaser's method: Graphic determination of whether internal condensation will appear in a given building component</li> </ul>

	<ul style="list-style-type: none"> <li>- Moisture analysis: Using calculation programme for in-depth analysis of a critical building component</li> </ul>
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Source: Created at VIA Built Environment

### 2.3.3 The Elective programme element - "Innovation and entrepreneurship"

The learning aims and content of the study element is shown in the following subject box.

Subject box 11: The Elective programme element

<b>Duration</b>	5 ECTS-point
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- specific areas of your own undertakings as well as the undertakings of other professions, yours/their competences and responsibility</li> <li>- core areas in cross-disciplinary professionalism</li> <li>- essential concepts related to creativity, innovation and entrepreneurship</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- identify particular challenges and ways of acting in cross-disciplinary collaboration</li> <li>- enter into innovative processes used in cross-disciplinary contexts</li> <li>- bring your professional knowledge into play in new and innovative ways</li> </ul>
<b>Content</b>	<p>You will be informed of this activity by the start of the semester and immediately before execution. The elective programme element is organized and implemented differently at each campus.</p> <p>You are obligated to participate in the elective programme element.</p> <p>In the elective programme element 'Inter-professional Innovation / Entrepreneurship' you will work partly at your own programme, partly in a team with students from other programmes.</p> <p>Through participation in creative, innovative and entrepreneurial processes you should come up with a solution to a specific welfare challenge presented by external collaboration partners.</p>

Source: Created at VIA Built Environment

## 2.4 Tests and evaluations

At the end of the semester, a final test is carried out. You and your group present the interprofessional project. Following, you will receive an individual assessment, partly for the group work and partly for the independent part of the project.

Only in case of lacking study activity or too large shortcomings in the prerequisites you will be guided to start the semester again, or in the worst case scenario, drop out of the programme.

Table 3 is an overview of the different study elements and their evaluation before or in relation to the final test.

**Table 3: Study elements and their assessment**

Study element	Evaluated before the final test	Evaluated in the final test
Project work in relation to 'Industrialized Building Design'		X
Wood, Concrete, Moisture		X
The Elective programme element (Innovation and entrepreneurship)	X	
Portfolio	X	X

Source: Created at VIA Built Environment

Find general information about the exam on [Study net](#).

## 2.4.1 Evaluation of the project

The assessment criteria are defined as:

- Method and process (knowledge, skills, competency)
- Technical solutions and documentation (knowledge, skills, competency)
- Oral presentation and defense (knowledge, skills, competency)

Essential parts of the project must be presented digitally / orally followed by oral examination by the teachers.

In the 3<sup>rd</sup> semester emphasis is put on you professionally and independently is able to understand and act in the different roles in relation to design, industrialized component production and construction planning respectively of bigger buildings like industrialized buildings or gyms etc..

Your professional approach will especially be assessed by your skills to figure out, implement and communicate the relevant and necessary descriptions and drawings related to each of the different phases and roles you get in this semesters interprofessional project from consultant to production management to project manager, including your ability to present and defend this to your fellow students and your teachers.

When digital presentation is used at the ATCM-programme in relation to evaluation / the final test, we refer to the [current guide](#).

### 3 THE TEACHING

The project in the 3<sup>rd</sup> semester is planned by the team of teachers with reference to the guiding time schedule figure 3 below.

In 3<sup>rd</sup> semester, you have three different roles.

Outline/Scheme Design phase your role is as **Designer**.

Production phase your role is as **Manufacturer** of façade elements.

Execution phase your role is as **Contractor** mounting elements – wooden or concrete.

In the role as **Designer**, you will be given an Outline proposal that you have to finish into Detail 2 standard. The drawings and specifications will have to be finished for the tendering procedure/procurement. But only concerning façade elements – wooden and concrete elements.

In the role as **Manufacturer**, you will receive the tendering material from another group. You will have to organize and plan the production activities.

In the role as **Contractor**, your job is to calculate the mounting costs, organize and plan the activities in connection with mounting the concrete / wooden elements. Especially focusing on issues connected to health and safety.

The different cases will be more specific explained in the different phases.

#### 3.1 Guiding time schedule

To the extent possible, the semester will proceed in accordance with the guiding time schedule presented in Figure 3.

Figure 3: Guiding time schedule

The Spring of 2016																														
3rd SEMESTER																														
Period: the 08.02-24.06																														
Month	February						March						April						May						June					
Calendar week	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Teaching week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25					
Semester start / Introduction																														
Midterm Teaching Evaluation																														
<b>Outline/Scheme design</b>																														
Guidance meetings																														
Innovation weeks																														
<b>Detail 1/Tendering</b>																														
<b>Production</b>																														
<b>Execution phase</b>																														
Evaluation																														
Exam																														
Excursion trip																														
Wood in pre-fab construction																														
Concrete in pre-fab construction																														
Moisture - special course																														

Source: The semester team's creation

## 3.2 References and knowledge base

### 3.2.1 Cross-disciplinary references

- [ICT and BIM](#)
- Building regulation 2010
- SBI 230 guidelines on Building regulations
- Broch OB, Mosegaard J 2008, Design Methodology, Ny Teknisk Forlag, Copenhagen
- The Constructing Architects Manual

### 3.2.2 Single-subject references

#### BDS

- Protection against fire in buildings
- Fire technical examples - Published by Danish institute of Fire and Security Technology
- B & B 200 Wet rooms

#### ABDS

- Danish architecture since 1754, The Danish Architecture Press
- Guide to Danish Architecture 1, 1000 – 1960
- Danmarks arkitektur, Byens huse, Byens plan, Gyldendal
- Analyzing Architecture, Simon Unwin, ROUTELEDGE
- Danish Architecture, Tobias Faber, Det Danske Selskab

#### BDS/ IT

- [www.students.autodesk.com](http://www.students.autodesk.com)
- [www.detdigitalebyggeri.dk](http://www.detdigitalebyggeri.dk)
- [www.bips.dk](http://www.bips.dk)
- [www.traecad.dk](http://www.traecad.dk)

#### STD

- Eurocodes 0 (DS/EN 1990) + national annex
- Eurocodes 1 (DS/EN 1990) + national annex
- Eurocodes 2 (DS/EN 1990) + national annex
- Eurocodes 5 (DS/EN 1990) + national annex

#### BSE

- Compendium – Ventilation & Indoor climate
- Compendium – Drain and Sewer systems
- The Space required to accommodate services - Guidelines for plumbers and architects
- DS 418 - Calculation of heat loss from buildings
- Calculation program Be10 - Energy requirements for buildings
- SBI – Guidelines 213 – Energy requirements for buildings / calculation guide

#### BPM

- DOS – Description of Services
- General conditions for consulting services ABR 89
- General conditions 92 (GC 92)
- Handbook for project and construction management
- The Constructing architects manual
- Manual – Working environment for building and construction

#### BPM / IT

BIPS file and document structure