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# SEMESTER SYLLABUS 5TH SEMESTER REFURBISHMENT AND CONVER- SION AND ELECTIVE PROGRAMME ELEMENT ARCHITECTURAL TECHNOLOGY

Bachelor of Architectural Technology and Construction Management

VIA University College Horsens

Spring 2018

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# SEMESTER SYLLABUS

## Welcome to the 5<sup>th</sup> semester - with emphasis on Architectural Technology!

You have now reached the last semester in the study environment we call 'professionalization', thus the last semester which primarily is organized by the teachers.

You ought to consider whether you need to make a special effort to improve on your competencies within certain fields before your practice placement, elective dissertation, bachelor project and in the end before you enter the labor market.

The theme of the semester project is 'Refurbishment and Conversion'.

Working with the project, you and your group will learn about substantial changes of the functions, construction principles and material composition in an existing building, including civil engineering works

Furthermore, there is an elective programme element this semester where you have to work with a topic of your choice. Your work must be based on the methods you were introduced to at the 4<sup>th</sup> semester in philosophy of science.

You have to describe a specific problem within refurbishment and conversion you wish to examine and solve.

The elective programme element constitutes half of the semester, thus it is a great opportunity for you to target your education in relation to what you wish to do afterwards.

During this semester, you have to find a place for your internship at the 6<sup>th</sup> semester.

### Quality assurance and development

In the following links, you can find the latest action plans, developed by the programme management based on your assessments.

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>.

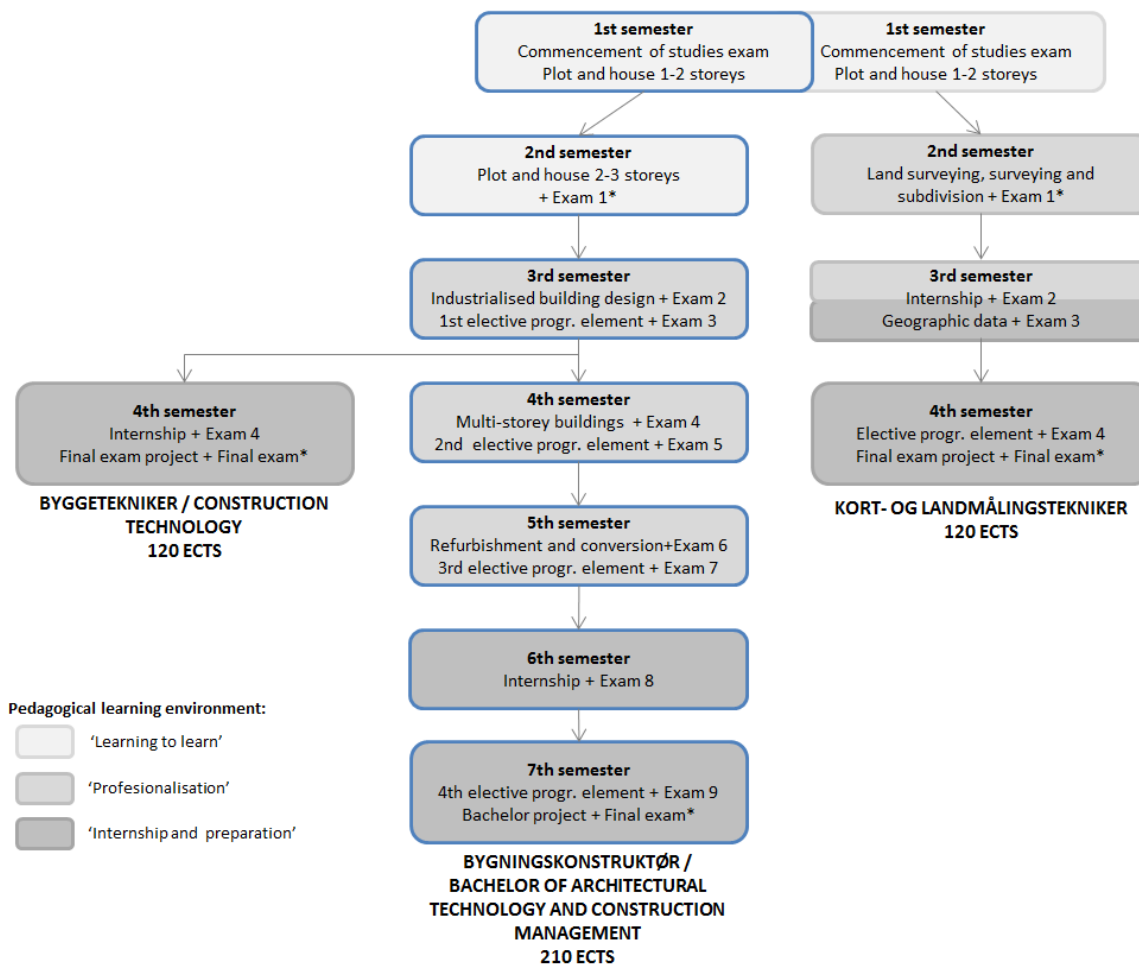
As a student, you have your own 'workplace' at the college, which we encourage you to use. The 'workplace' will change from semester to semester, depending on the size of the classes and your choice of specialization.

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

### "Learning to learn"

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

This environment emphasizes the learning of how to be a successful student – finding your own learning style and gaining good study- and work-habits. Furthermore, special emphasis is put on Portfolio as the controlling element which ensures focus on the process oriented approach.

**“Professionalization”**

This environment increases focus on the professional content of the projects. At the same time, your ability to learn yourself is enhanced. This happens in relation with you learning more about advanced methods for carrying out analyses.

**“Internship and job preparation”**

Through the internship in a company of your own choice, the elective programme element and bachelor project, you are required to immerse yourself further and independently into the relation between theory and practice.

## 1.2 Teaching- and workforms

The Architectural Technology and Construction Management programme is based on Problembased Learning (PBL). That is, the turning point in each of the compulsory programme elements is one cross-disciplinary project. In the work with the project problems, the student develop and demonstrate gained knowledge, skills and competences across the academic areas of the semester.

To prepare the student as much as possible for the profession, the primary work form is group work. Other teaching and workforms are organised in relation to the project work. Theory lessons are primarily placed in the beginning of the compulsory programme element, as it is seen as general contributions within the theme of the semester.

Besides from this, the student has to seek and process anything else that might be relevant for carrying out the project.

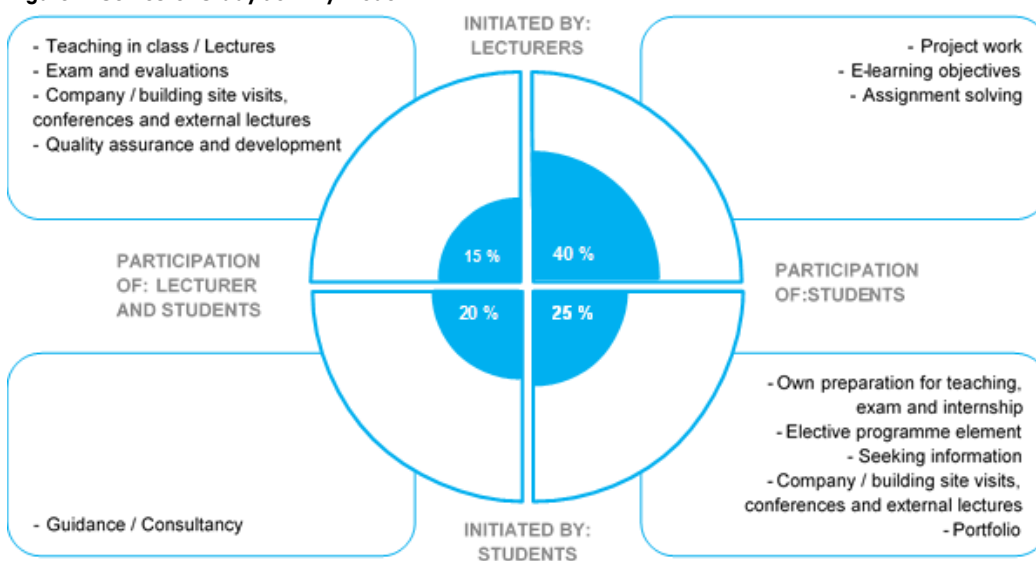
Portfolio is an important tool in the study programme, which you are to use to reflect upon your own learning.

The teaching- and workforms used in this semester are presented in the semester Study activity model.

The Study activity model clarifies partly that we expect you as a student to spent approximately 825 hours in each semester, partly that there are different types of teaching- and workforms which indicate that not all learning is initiated by a teacher and/or with the presence of a teacher. I.e., as a student you also carry a great responsibility for your own learning.

Hence the study activity model is also an illustration of what we expect from you as a student and what you can expect from us in relation to reaching the learning objectives.

**Figure 2: Semester Study activity model**

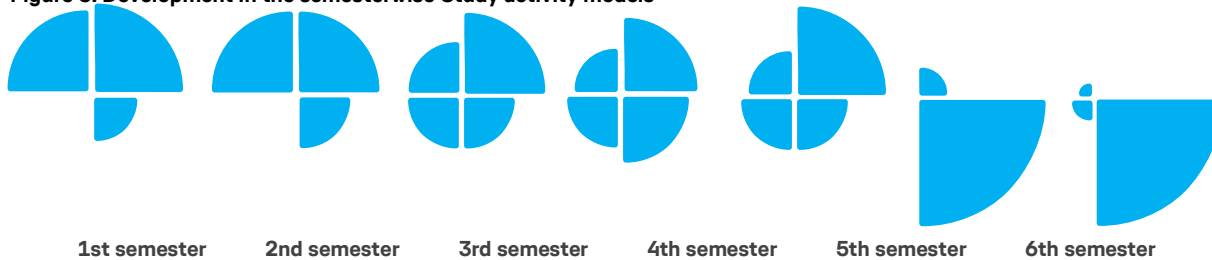


Source: Development at VIA Built Environment

The percentage distribution of hours in the four categories is an expression of the degree of independence we expect of you as a student.

If we look at the development in the semester wise Study activity models it follows the development in the pedagogical learning environment.

Figure 3: Development in the semesterwise Study activity models



Source: Development at VIA Built Environment

All Study activity models can be found on the study programme's [website](#).

### 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 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**

Element	Method	Primary users	Time
Alignment of expectation at the start of a new course at the institution	Dialogue at the Semester introduction with a starting point in the semester syllabus	Teachers and students	At the start of each semester.
Midterm teaching evaluation of a course at the institution	The Teacher team select a method	The teacher team	Approximately half way through the semester – is stated in the guiding time schedule.
Final teaching evaluation of a course at the institution	Online survey	The programme management and The teachers and the teacher team	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 evaluated.
Ongoing dialogue	Dialogue between the teachers, students and programme management, e.g. in the daily life or through the local DSR/KSR	Teachers and students	Continuously.
Quality assurance, incl. final evaluation of internship in Denmark and abroad	Among other things online survey	The programme management, internship coordinators and the international office	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 evaluated.
Quality assurance, incl. final evaluation of studies abroad	Among other things online survey	The programme management and the international office	By the end of each period of studies abroad.
Student satisfaction survey	Online survey	The programme management and VIAs upper 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:

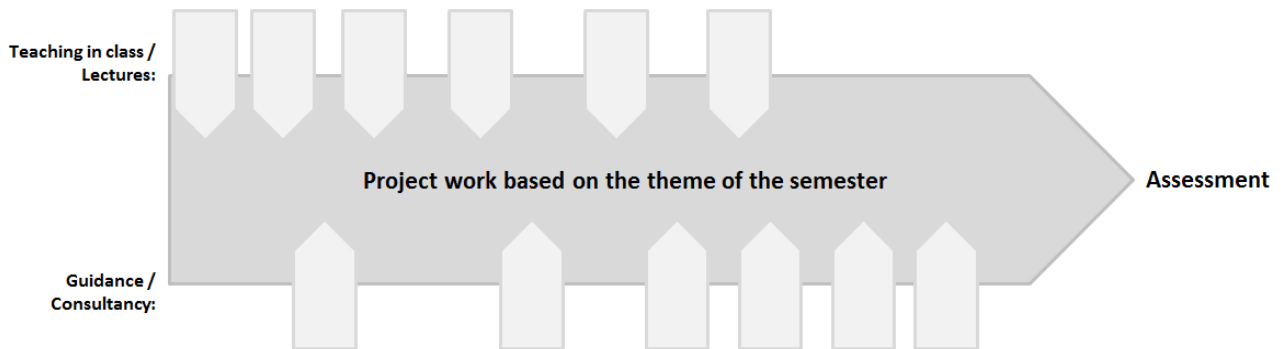
- Employer involvement
- Graduate involvement
- Final Teaching Evaluation
- Final Evaluation of the Internship in Denmark and abroad
- Final Evaluation of Study Abroad
- The Student Satisfaction Survey
- Drop-out analysis
- The Quality Report

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## 2 THE SEMESTER

During this semester, your studies will evolve around one continuous project in agreement with the overall semester theme. Figure 4 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 in the process towards solving problems 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 4: Cross- disciplinary project work



Source: Created at VIA Built Environment

In the elective programme element you get the opportunity to specialize. The elective programme element is an independent course of study during this semester.

### 2.1 Entrance requirements

In order to be admitted to the 5<sup>th</sup> semester, you must have been registered for the exam in the 4<sup>th</sup> semester, or be able to document that you in other ways have equivalent competencies.

### 2.2 Learning aims for 5th semester (transcribed from the curriculum)

In this section the learning aims for the compulsory part of the semester (15 ECTS-points) are described. The learning aims are transcribed from [the curriculum](#).

#### Knowledge

At the end of the 5<sup>th</sup> semester you should have learned:

- about and have the ability to reflect on the design of constructions, planning and management tools, technical installations, structural principles and documentation related to refurbishment and conversion
- about and have the understanding of general design and construction techniques in relation to refurbishment and conversion
- about general communication methods, tools and standards relating to refurbishment and conversion projects

#### Skills

At the end of the 5<sup>th</sup> semester you should:

- have the ability to use methods and tools for collecting and analysing information in relation to refurbishment and conversion projects
- have the ability to assess the theoretical and practical issues regarding the refurbishment and conversion of properties, and be able to make substantiated choices
- have the ability to use professional design methods for refurbishment and conversion of properties and the ability to use methods for planning the actual execution of work

- have the ability to disseminate practical and professional issues and solutions to partners and end-users

### Competencies

At the end of the 5<sup>th</sup> semester you should:

- must be able to apply the acquired knowledge and skills related to the semester's main theme in order to undertake documented analyses of relevant professional issues related to solutions of constructions
- must be able to manage and implement the design and production process of a refurbishment and conversion project, considering social and technological aspects

## 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 have to collaborate problem oriented 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.

Upon completion of the compulsory part you should be able to use relevant professional methods related to building design and/or civil engineering works within building refurbishment. Part of this also includes further development of your skills within drawing technique/visualization and the use of digital tools.

Through the design work, during the proposal phases, you will gradually gain understanding of, and respect for, formerly used building systems, materials, methods, architecture and building styles. Also other aspects related to the implementation of the building project will be touched upon, such as rehousing, building site layout, demolition, shoring, transport planning, choice of equipment and construction method etc.

In this context, the registration part, describing the existing building, the plot and the physical placement, is a very important element in developing complex refurbishment and remodeling projects.

### 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 at Study net.

Table 2 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)	1 ECTS-point
	Building Design (BDS)	6 ECTS-points
	Material Science (BDS/MSC)	1 ECTS-points
Structural Design (STD)	Structural Design and Mathematics (STD/MATH)	2 ECTS-points
Building Services (BSE)	Building Services and Building Physics (BSE/BPHY)	2 ECTS-points
Building Planning and Management (BPM)	Building Planning and Management (BPM)	2 ECTS-points
Law (LAW)	Law (LAW)	1 ECTS-points

The Elective programme element	The Elective programme element	15 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>	1 ECTS-point
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- methods and practice applied within the field of refurbishing/ conversion of multi-storey residential buildings, constructed during the period from approximately 1850-1980</li> <li>- building history and different approaches to refurbishment, both local and international</li> <li>- the impact of sustainable and energy consumption improvements in existing buildings as well as impact of improvements in the altered design of the same building</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- design building improvements in consideration of and with respect for existing architectural design</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Introduction to building refurbishment</li> <li>- Introduction to style history applying to the period 1850-1980</li> <li>- Building refurbishment and energy consumption improvements - in a sustainable and architectural perspective</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

#### Subject Box 2: Building Design (BDS)

<b>Duration</b>	6 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the principles and application of methods and techniques used for the planning, designing and implementation of the design phases involved when refurbishing old buildings, with emphasis on improving the energy conditions through sustainable refurbishment/conversion</li> <li>- the history of old multi-storey buildings and the problems related to building physics, structures and details</li> <li>- the complex of legislation, literature, guidelines, etc., constituting the technical foundation of refurbishment and conversion projects in Denmark</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- master working methodology used in the elaboration of the documentation necessary in the design phases</li> <li>- continue development of your skills in sketching and visualisation techniques as well as your skills in communication, including the use of IT (improving the skills you already have)</li> </ul>
<b>Content</b>	<p><b>Registration</b> of pre-existing old buildings. That is, only partial registration will be possible because the 'school situation' does not allow for the registration on a physical building. Partial registration will be handed out, and the remaining parts will be reconstructed by the students (through an additional assignment).</p> <p><b>Appraisal phase:</b> Based on the 'client's brief' - and on a report describing the present state of the building, supplemented with a sketched floor plan proposal - you elaborate a 'mini-appraisal' based</p>

	<p>on which the building will be designed. Principal aspects to be considered here are building form/architecture, installations, room needs and environment.</p> <p><b>Outline proposal phase:</b> Auto Cad, Revit, free hand sketching, Sketch Up, colouring, proportioning building (extensions, facade alterations) building control provisions, analyses, general understanding and presentation.</p> <p><b>Scheme Design:</b> Design techniques and methods in accordance with generally accepted guidelines, practices and methods. Building control provisions in accordance with the Building Regulations and appurtenant body of laws are important parts of the basis of the design work.</p> <p><b>General:</b></p> <ul style="list-style-type: none"> <li>- Design using AutoCad, Revit, regulatory requirements, project scrutiny, outlining structure and installations, relevant building technique, prefabricated building components, material science</li> <li>- Steel structures as primary basic structural elements in a building extension, etc.</li> <li>- Roofs in refurbishment projects – including dormers</li> <li>- Light weight storey partitions and dry lining walls primarily with the use of steel profile studs</li> <li>- Wet rooms</li> <li>- Corrosion and protection against corrosion</li> <li>- Typical construction principles used in refurbishment projects</li> <li>- Analogue and digital tools in sketching and communication of construction (See “BIM – Building Information Modeling’ under References)</li> </ul>
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Source: Created at VIA Built Environment

**Subject Box 3: Material Science (BDS/MSC)**

<b>Duration</b>	1 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the use of materials in connection with building refurbishment</li> <li>- the following materials’ composition, processing procedures, codes of practice, environmental aspects, protection, commercial availability, aspects related to construction, and chemistry: <ul style="list-style-type: none"> <li>o Wood</li> <li>o Masonry</li> <li>o Concrete</li> <li>o Steel/metal</li> <li>o Roofs (roofing materials)</li> <li>o Sheet materials</li> </ul> </li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- analyze, select and fit the building materials mentioned above</li> <li>- substantiate and document the selection of materials</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Preparation of a building component log</li> <li>- Preparation of material specifications on drawings</li> <li>- Preparation of material analyses for a number of chosen materials</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 ECTS-points
<b>Learning aims – Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- important structural parts acting as overall stabilizing members in the existing building and also in building extensions</li> <li>- sizing and assembling methods used in building extensions and structures, beams, columns and joints</li> <li>- and insight into the most important building systems used in old buildings</li> <li>- shoring methods used in connection with the refurbishment of existing buildings, including possible underpinning</li> </ul>
<b>Learning aims – Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- understand and be able to account for existing building systems</li> <li>- be able to account for structural connections between existing and new building systems (when existing structures are interfered with)</li> <li>- incorporate structural steel fire protection systems in this type of buildings in consideration of the geometry of the steel connections</li> <li>- carry out simple rough calculations of relevant structural elements such as steel columns and beams</li> <li>- account for the practical execution of such interventions (when planning and designing structural interventions in a building)</li> <li>- account for and to list all relevant loads occurring in the building</li> <li>- incorporate industrially produced building components as part of the structural stability of the building</li> <li>- communicate structural analyses orally, in writing and graphically and be able to substantiate your choices</li> <li>- apply appropriate characteristics in relation to statics demands in a BIM model, and undertake drawing extracts from the model to show these characteristics</li> <li>- undertake collision and consistence control on drawing extracts</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Defining relevant types of loads</li> <li>- Building systems</li> <li>- Structural analysis of buildings: Existing, future and during construction</li> <li>- Sizing (dimensioning) – by the use of tables</li> <li>- Estimation of steel column, beams, frames and steel connections by use of geometric equations</li> <li>- Shoring of buildings during construction</li> <li>- Masonry bearing and replacement of masonry</li> <li>- Steel structures as building components</li> <li>- Reinforcing existing foundations (geotechnical bearing capacity)</li> </ul>

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 ECTS-points
<b>Learning aims – Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the technical installations in old buildings, including pathways, materials, and principles used for water, drain and sewer installations</li> <li>- mechanical/balanced ventilation in old buildings</li> <li>- sound conditions in old buildings and knowledge about the improvement of sound conditions in existing structures</li> <li>- different methods used for optimising energy consumption in old multi-storey buildings and in building extensions, including renewable forms of energy</li> </ul>

<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- make proposals for sound improvements in older multi-storey buildings and, if needed, incorporate such measures into the project</li> <li>- select the optimal ventilation system for the refurbishment project</li> <li>- establish pathways for water, heat, ventilation and sewer pipes respecting fire and sound demands</li> <li>- calculate the heat loss frame for an extension in accordance with the current BR</li> <li>- calculate the profitability of an energy improvement in accordance with the current BR</li> <li>- analyse the possible use of renewable energy sources and document the effect such use would have in the Renovation Class for the building in accordance with the current BR</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Sound analysis</li> <li>- Analysis of requirements in the current BR for calculating U- and <math>\Psi</math>-value and energy use in renovation and extension of old buildings</li> <li>- Analysis of the use of renewable energy sources</li> <li>- Ventilation systems using heat recovery</li> <li>- Pathways and service ducts/areas in old buildings</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>	2 ECTS-points
<b>Learning aims - Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- organizational structure and contract forms</li> <li>- overall political, legal, administrative and financial aspects and their interrelation with respect to urban renewal in Denmark</li> <li>- Plan for Health and Safety with respect to the phases at this semester</li> <li>- services rendered in the various design phases in accordance with the Danish PAR and FRI 'Services for Client Consultancies'.</li> <li>- principles and possible applications of the methods listed below used for planning, management and costing</li> <li>- the options in the BIM model for integration with calculation and management tools</li> </ul>
<b>Learning aims - Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- present and communicate the interdisciplinary complexity through the different phases of the building project – in writing and orally - from initial registration to final construction</li> <li>- carry out professional and interprofessional teamwork to be documented through methodology and working process</li> <li>- navigate with respect to the parties involved in the project and (in general) account for the importance and responsibility of each party (e.g. authorities, client, tenants, consultants and contractors)</li> <li>- account for relevant management types and organisation structures</li> <li>- put into practice the requirements in 'Services for Client Consultancies' when planning project design work</li> <li>- design a refurbishment project within the current framework of urban renewal</li> <li>- perform systematic information retrieval with the purpose of preparing documentation with respect to the case</li> <li>- take off quantities in own project and be able to use the quantities in cost calculations</li> <li>- understand and carry out overall network planning for the project</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Planning tool</li> <li>- Budgeting construction costs</li> </ul>

	<ul style="list-style-type: none"> <li>- Taking off – principles and systematics</li> <li>- Pricing building components</li> <li>- Keeping a log of building components and materials</li> <li>- Design/construction phases and services rendered to the client</li> </ul>
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Source: Created at VIA Built Environment

### 2.3.1.5 Law (LAW)

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

Subject Box 7: Law (LAW)

<b>Duration</b>	1 ECTS-points
<b>Learning aims – Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- 'the law of torts' inside as well as outside a contract</li> <li>- company forms, liability and bankruptcy</li> <li>- the 'source of law' and 'law hierarchies'</li> <li>- termination of liability, including complaint regulations and statute of limitations</li> </ul>
<b>Learning aims – Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- account for the chosen contract form</li> <li>- account for the consequences of the chosen contract form in relation to the project</li> <li>- account for basic tender regulations with respect to 'equality of treatment', and transparency</li> <li>- prepare a consultant contract on the basis of ABR 89 with possible deviations and be able to account for consultant liability and authority to act for the principal</li> <li>- prepare 'general conditions' on the basis of AB 92 and account for possible deviations</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Law of tort</li> <li>- Investment trusts – liability</li> <li>- Bankruptcy – in general</li> <li>- Contract forms</li> <li>- The Danish Tender Act and and The Public Procurement Act – supplement to the 4<sup>th</sup> semester</li> <li>- AB 92 – full version</li> <li>- Departmental note on 'cost and time'</li> <li>- ABR 89 – full version</li> </ul>

Source: Created at VIA Built Environment

## 2.3.2 Other study elements

During the semester, the Semester team can plan other study elements, e.g. in corporation with the students. This will appear on the time schedule or the schema for each class.

## 2.4 The Elective programme element

In the elective programme element at the 5<sup>th</sup> semester, you get an opportunity to work with a specific building technology topic or problem within refurbishment of your own choice. It can be related to the project in the compulsory part or it can be another refurbishment project, e.g. from the 60-70'ies.

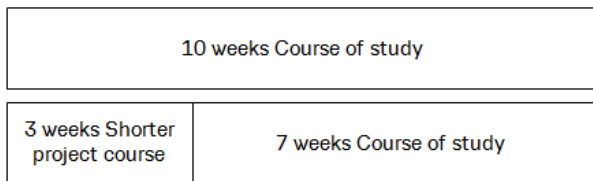
The main aim is that you increase your knowledge and competencies within the given area and that you increase your methodological and analytical skills and building technology competencies.

You decide how you want to organize the 10 weeks in the elective programme element.



According to Figure 5, you can either take one Course of study for 10 weeks, or you can take a Shorter project course for the first 3 weeks and then take a Course of study for the last 7 weeks.<sup>2</sup>

Figure 5: Opportunities in the elective programme element



Source: Created at VIA Built Environment

The **Shorter project course** will typically be a preliminary study or a field study to the following Course of study and could e.g. be:

- IP-Programme (Intensive Programme). Typically a project period of 2 weeks, which is partly financed by EU. Smaller groups of students from a number of universities in Europe participated in a mutual project. Notice that it's typically only 5-7 students from VIA, who can participate in a given IP-Programme.
- *Study trip / University collaboration*. E.g. a workshop in China with focus on energy refurbishment. With regards to organizing, you must have selected this course during the 4<sup>th</sup> semester.
- *Local renovation projects*. Typically the municipality or other stake holders provide a case for which they want suggestions for a solution from the ATCM-programme.
- *Specific research*. E.g. research/ building design analysis or construction management analysis.

To strengthen the collaboration between students and to ensure optimal teaching and guidance during the elective programme element, the school has defined 3 types of **Course of study**:

- Energy Sustainable Refurbishment and Conversion
- Materials used in Buildings
- Special Cross-disciplinary module

The learning aims and content of each Course of study is shown in the following tables.

**NB:** You can choose to work in a group, but in that case it is important that you define which parts of the assignment you are responsible for. At the exam the examiner must have an opportunity to assess your ability to work independently at a professional level.

Table 3: Course of study: "Energy Sustainable Refurbishment and Conversion"

<b>Duration</b>	15 ECTS-points, e.g. incl. a Shorter project course
<b>Aim</b>	<p>The aim of this Course of study is for you to increase your knowledge and competencies within energy efficient and sustainable refurbishment.</p> <p>This Course of study is based on a specific building project, and could be a continuation of the project in the compulsory part. Alternatively, you can choose another refurbishment project, and e.g. design a refurbishment of a building from the 70'ies.</p>
<b>Learning aims – Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- the different types of certification schemes used in relation to sustainable construction</li> <li>- composition of materials, characteristics, working up, standard specifications, environmental aspects, protection, trade forms, structural aspects, chemistry etc.</li> <li>- Life Cycle Analyses, LCA</li> <li>- Life Cycle Costing, LCC</li> <li>- cradle to cradle, C2C</li> <li>- how the indoor climate influences a healthy and sustainable building</li> <li>- the development of architecture in relation to sustainable construction</li> </ul>

<sup>2</sup> Note! There are no requirements to the duration of the Shorter project course. E.g. you could also split the elective programme element 2/8. However, activities abroad must have a duration of minimum 2-3 weeks corresponding to 5 ECTS-points.

	<ul style="list-style-type: none"> <li>- layout and operation of a building site, including such aspects as energy sustainable layout and operation as well as the handling of hazardous waste and recyclable materials</li> </ul>
<b>Learning aims – Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- carry out design work at Detail Design 2 level</li> <li>- work with certification in refurbishment projects</li> <li>- analyse and choose healthy building materials on grounds of and documentation in LCA, LCC and C2C</li> <li>- elaborate</li> <li>- carry out energy calculations on the building or selected building components</li> <li>- arrange the building site, taking sustainable operation into consideration</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Certification systems</li> <li>- Materials</li> <li>- Economy and profitability</li> <li>- Demolition and recycling</li> <li>- Indoor climate</li> <li>- Energy calculations</li> <li>- Architecture</li> <li>- Energy efficient building site</li> </ul>

Source: Created at VIA Built Environment

**Table 4: Course of study: "Materials used in Buildings"**

<b>Duration</b>	15 ECTS-points, e.g. incl. a Shorter project course
<b>Aim</b>	The aim of this Course of study is for you to increase your knowledge and competencies within material science, particularly with respect to materials in older buildings, their composition and use in construction work and the recycling of materials.
<b>Learning aims – Knowledge</b>	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> <li>- material composition, characteristics, working up, standard specifications, environmental aspects, protection, trade forms, structural aspects, chemistry etc.</li> <li>- and knowledge about materials used in older buildings, including recyclable materials and materials containing hazardous substances.</li> <li>- choosing healthy materials – low emission materials</li> <li>- choosing materials and constructions considering cycle costing as well as knowledge about life cycle analyses.</li> <li>- operation and maintenance, OM</li> </ul>
<b>Learning aims – Skills</b>	<p>You must be able to:</p> <ul style="list-style-type: none"> <li>- carry out design work at Detail Design 2 level</li> <li>- analyze materials in older buildings and prepare demolition plans as well as plans for the handling of waste</li> <li>- prepare plan for recyclable materials in a concrete case</li> <li>- analyse and choose healthy materials – justifying and documenting such choices</li> <li>- plan and design such measures to be taken in order to protect the building project against construction moisture and demonstrate knowledge about the moisture content in materials and their moisture sensitivity</li> <li>- perform overall financial calculations</li> </ul>
<b>Content</b>	<ul style="list-style-type: none"> <li>- Material science</li> <li>- Certification and labelling systems</li> <li>- Examination of existing materials in older buildings</li> <li>- PCB, asbestos, lead and other hazardous substances</li> <li>- Reuse of materials, C2C</li> <li>- Overall financial calculations, LCC</li> <li>- Knowledge of Life Cycle Analyses, LCA</li> </ul>

Source: Created at VIA Built Environment

**Subject Box 8: Course of study: "Special Cross-disciplinary module"**

<b>Duration</b>	15 ECTS-points, e.g. incl. a shorter course of study
<b>Aim</b>	The aim of this Shorter course of study is for you to increase your knowledge and competencies within cross-disciplinary work. Either by working with a development project in collaboration with external companies or institutions, or by working with internal research- or development projects in collaboration with a private or public institution.
<b>Learning aims - Knowledge</b>	- Defined individually in relation to a specific project.
<b>Learning aims - Skills</b>	- Defined individually in relation to a specific project.
<b>Content</b>	- Defined individually in relation to a specific project.

Source: Created at VIA Built Environment

## 2.5 Tests and evaluations

At the end of the semester, 2 tests are carried out: one after the compulsory part and one after the elective programme element.

You and your group present the cross-disciplinary project. Following, you will receive an individual assessment, partly for the group work and partly for the independent part of the project.

Table 5 is an overview of the different study elements and their evaluation before or in relation to the final test.

**Table 5: Study elements and their assessment**

<b>Study element</b>	<b>Evaluated before the final test</b>	<b>Evaluated in the final test</b>
Exam 6: Project work in relation to 'Refurbishment and Conversion'		X
Exam 7: The elective programme element		X
Portfolio	X	

Source: Created at VIA Built Environment

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

### 2.5.1 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.

It is the last semester before the internship in companies, why great emphasis is put on independence in problem solving including the ability to work methodologically, analytically and professionally with seeking relevant knowledge.

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

## **2.5.2 Evaluation of the elective programme element**

The supervisors will assess and give you feedback in the form of a grade supplemented.

The overall assessment criteria used are:

- Introduction
- Problem statement
- Project with overall considerations on the subject and thorough investigations
- Conclusion
- Reflection

### 3 TEACHER TEAM SPECIFICS

Case:

The main idea of this semester is to show how designers can integrate sustainable initiatives with interesting design and energy optimization for a typical Danish multi-storey building from the 1950s. This project type is a relevant topic not only in Denmark but also in the developed world as a whole. New ways must be found for using existing buildings, with particular focus on more densely populated cities in the future.

The energy consumption should be reduced to energy renovation class 1. This must be achieved by implementing low energy strategies. The inclusion of renewable energy forms will be welcomed, but these are an addition to the energy consumption reduction strategies.

Careful consideration must be given to the sustainability of new materials proposed in the design. For example, can recycled/ recyclable material be specified? Similarly, there should be a strategy for dealing with any waste material resulting from the proposed development.

#### 3.1 Guiding time schedule

To the extent possible, the semester will proceed in accordance with the guiding time schedule presented in Figure 6.

Figure 6: Guiding time schedule

5. semester international S.18				
Februar 2018	Marts 2018	April 2018	Maj 2018	Juni 2018
T 1	T 1	S 1 Påskedag	T 1 Første maj	F 1
F 2	F 2 Hand in outline	M 2 2. påskedag 14	O 2	L 2
L 3	L 3	T 3	T 3	S 3
S 4	S 4	O 4	F 4	M 4 23
M 5 Semesterstart 6	M 5 10	T 5	L 5	T 5 Grundlovsdag
T 6	T 6	F 6	S 6	O 6
O 7	O 7	L 7	M 7 19	T 7
T 8	T 8	S 8	T 8	F 8
F 9	F 9	M 9 15	O 9	L 9
L 10	L 10	T 10	T 10 Kristi himmelfartsdag	S 10
S 11	S 11	O 11	F 11	M 11 24
M 12 7	M 12 11	T 12	L 12	T 12
T 13	T 13	F 13	S 13	O 13
O 14 Upload registration	O 14	L 14	M 14 20	T 14
T 15	T 15	S 15	T 15	F 15
F 16	F 16	M 16 16	O 16	L 16
L 17	L 17	T 17	T 17	S 17
S 18	S 18	O 18	F 18	M 18 25
M 19 8	M 19 12	T 19 Group examination	L 19	T 19
T 20	T 20	F 20 Group examination	S 20 Pinsedag	O 20
O 21	O 21	L 21	M 21 2. pinsedag 21	T 21
T 22	T 22	S 22	T 22	F 22
F 23	F 23	M 23 Studytrip Hamburg 17	O 23	L 23
L 24	L 24	T 24 Studytrip Hamburg	T 24	S 24
S 25	S 25 Palmesøndag	O 25 Studytrip Hamburg	F 25	M 25 26
M 26 9	M 26 Easter holiday 13	T 26	L 26	T 26
T 27	T 27 Easter holiday	F 27 Store bededag	S 27	O 27
O 28	O 28 Easter holiday	L 28	M 28 22	T 28
	T 29 Skærtorsdag	S 29	T 29	F 29
	F 30 Langfredag	M 30 18	O 30	L 30
	L 31		T 31	

<span style="background-color: #d9e1f2; border: 1px solid black; padding: 2px;"> </span> Registration and outline	<span style="background-color: #d9ead3; border: 1px solid black; padding: 2px;"> </span> Scheme design	<span style="background-color: #fce4d6; border: 1px solid black; padding: 2px;"> </span> Studytrip holiday	<span style="background-color: #d9d2e9; border: 1px solid black; padding: 2px;"> </span> Detail Design I	<span style="background-color: #d9ead3; border: 1px solid black; padding: 2px;"> </span> Detail Design II	<span style="background-color: #d9ead3; border: 1px solid black; padding: 2px;"> </span> Examination
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Source: The semester team's creation

## **3.2 References and knowledge base**

### **3.2.1 Cross-disciplinary references**

- [ICT and BIM](#)
- [List of books and compendia.](#)

### **3.2.2 Single-subject references**

- [ICT and BIM](#)
- [List of books and compendia.](#)