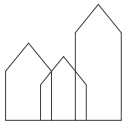


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SEMESTER SYLLABUS 5TH SEMESTER RENOVATION AND ELECTIVE PROGRAMME ELEMENT ARCHITECTURAL TECHNOLOGY

Bachelor of Architectural Technology and Construction Management

VIA University College Horsens

Autumn 2018

CONTENT

1	THE PROGRAMME	5
1.1	The study environments	5
1.2	Teaching- and workforms	6
1.2.1	Individual learning offers	7
1.3	Study activity / Attendance	7
1.4	Quality assurance and development of the programme	8
1.4.1	Your involvement	8
1.4.2	The local DSR (Student Council)	9
<hr/>		
2	THE SEMESTER	10
2.1	Entrance requirements	10
2.2	Learning aims for 5th semester (transcribed from the curriculum)	10
2.3	The project work	11
2.3.1	Single-subject teaching	12
2.3.1.1	Building Design (BDS)	12
2.3.1.2	Structural Design (STD)	14
2.3.1.3	Building Services (BSE)	15
2.3.1.4	Building Planning and Management (BPM)	15
2.3.1.5	Law (LAW)	16
2.3.2	Other study elements	17
2.4	The Elective programme element	17
2.5	Tests and evaluations	19
2.5.1	Evaluation of the compulsory part	19
2.5.2	Evaluation of the elective programme element	20
<hr/>		
3	TEACHER TEAM SPECIFICS	20
3.1	Guiding time schedule	20
3.2	References and knowledge base	20
3.2.1	Cross-disciplinary references	20
3.2.2	Single-subject references	20

SEMESTER SYLLABUS

Welcome to the 5th 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, bachelorproject and in the end before you enter the labor market.

The theme of the semester project is 'Renovation'.

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 4th 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 10 ECTS out of 30 ECTS 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 6th 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](#).

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 education¹.

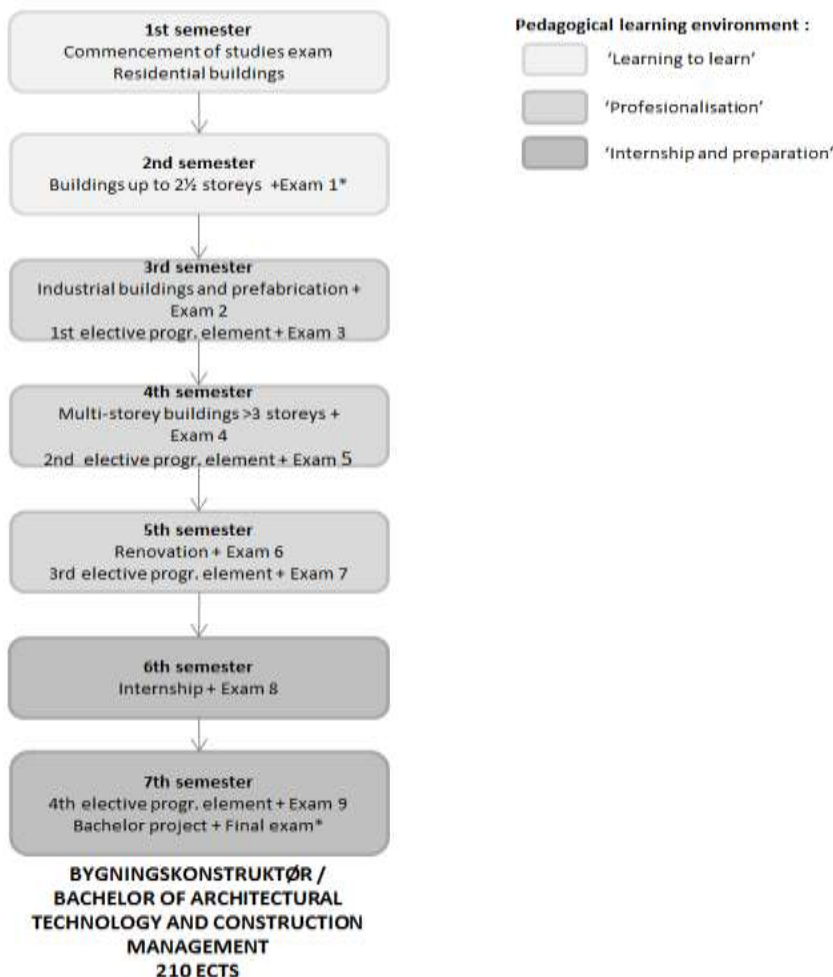
As a student, you have your own 'workplace' at the college, which we encourage you to use. The 'workplace' will change from semester to semester, depending on the size of the classes and your choice of specialization.

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

Note: * indicates participation of an external examiner

¹ 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. 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 Problem-based 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 develops and demonstrates 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.

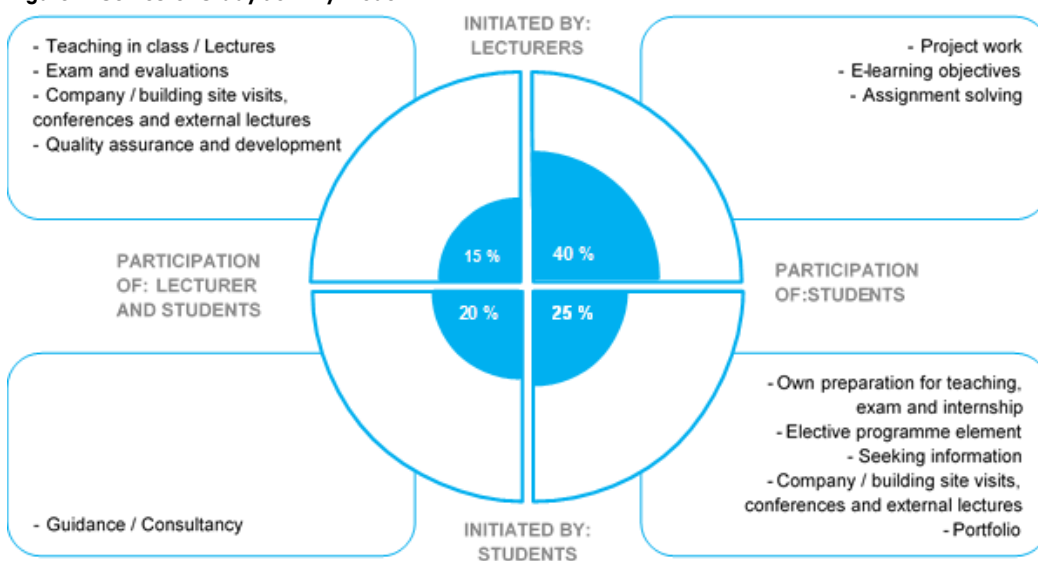
Portfolio is an important tool in the study programme, which you are to use to reflect upon your own learning.

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 spend 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

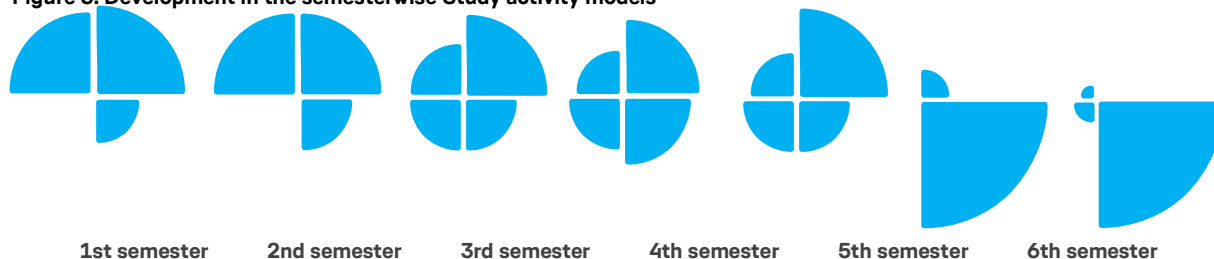


Source: Development at VIA Built Environment

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. 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](#). 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.

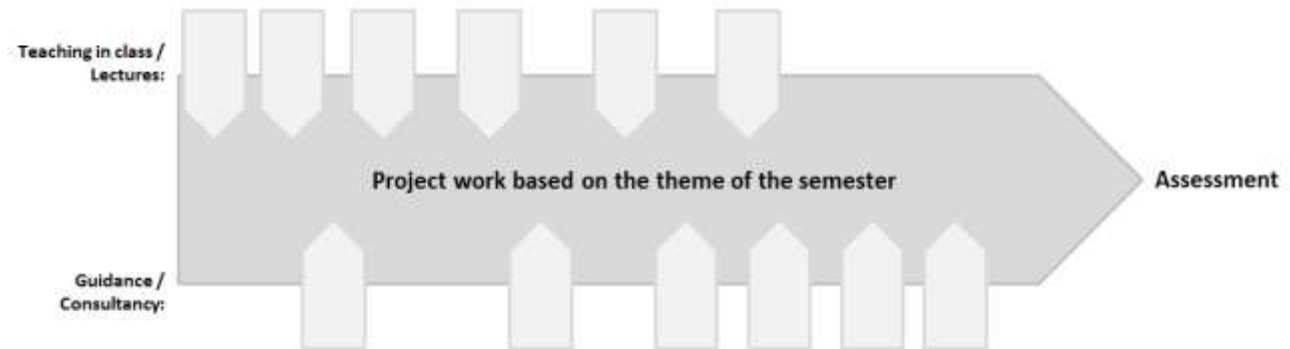
The programme management at VIA Built Environment in Horsens, Aarhus and Holstebro respectively continuously involve the local DSR in a discussion of the work with quality assurance and development of the programme, including:

- 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 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 5th semester, you must have been registered for the exam in the 4th 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

By the end of the compulsory programme element, the student should have knowledge of:

- the correlation between the various professional issues related to the theme of the compulsory programme element
- relevant communication theories and methods to convey discipline-specific issues, including digital media within the theme of the compulsory programme element
- tools and standards in relation to the theme of the compulsory programme element
- constructions, sustainability, planning and control tools, technical installations, static principles and documentation in relation to the theme of the compulsory programme element
- project design and execution methods in relation to theme of the compulsory programme element
- different energy-optimising renovation and conversion concepts

Skills

By the end of the compulsory programme element, the student should have knowledge of:

- use methods and tools to collect and analyse information in relation to the theme of the compulsory programme element
- convey practice-related technical issues related to the theme of the compulsory programme element to relevant partners and users
- assess and understand social, cultural and ethical connections in production and the collaboration on its execution

- assess theoretical and practice-related issues concerning the theme of the compulsory programme element and make substantiated choices
- apply project-design and sustainable methods in relation to the theme of the compulsory programme element and use methods for planning the execution of the work

Competencies

By the end of the compulsory programme element, the student should have knowledge of:

- identify their own knowledge and learning needs based on the knowledge, skills and competences acquired in the course of the completed compulsory programme elements
- acquire new knowledge and translate it to practice in respect of the profession
- set up a business of their own within the profession's areas, independently and in collaboration with others
- handle the management and control of small companies, independently and in collaboration with others
- handle the tender process, independently and in collaboration with others
- manage projects professionally, in terms of time, financially and legally
- plan, quality assure and manage the production of complex building and construction tasks, independently and in cooperation with other professions
- handle communication between users, clients, authorities, consultants and contractors about the production of complex construction tasks or building components
- involve relevant social, environmental, financial and technological aspects in the production process;
- apply the acquired knowledge and the skills included in the theme of the compulsory programme element to carry out technical construction work based on a substantiated analysis of discipline-specific relevant issues and their solutions
- manage the project-design and production process for a renovation and conversion project, taking relevant social, environmental, financial and technological aspects into consideration
- take part in discipline-specific and interdisciplinary collaboration
- document the planning of their own work based on self-management principles

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 It's Learning

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)	3 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)	4 ECTS-points
Law (LAW)	Law (LAW)	2 ECTS-points
The Elective programme element	The Elective programme element	10 ECTS-points
Total duration of the semester:		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)

Duration	1 ECTS-point
Learning aims - Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - methods and practice applied within the field of refurbishing/ conversion of multi-storey residential buildings, constructed during the period from approximately 1850-1980 - building history and different approaches to refurbishment, both local and international - 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
Learning aims - Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - design building improvements in consideration of and with respect for existing architectural design
Content	<ul style="list-style-type: none"> - Introduction to building refurbishment - Introduction to style history applying to the period 1850-1980 - Building refurbishment and energy consumption improvements – in a sustainable and architectural perspective - Analogue and digital tools in sketching and communication of construction

Source: Created at VIA Built Environment

Subject Box 2: Building Design (BDS)

Duration	6 ECTS-points
Learning aims – Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - 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 - the history of old multi-storey buildings and the problems related to building physics, structures and details - the complex of legislation, literature, guidelines, etc., constituting the technical foundation of refurbishment and conversion projects in Denmark
Learning aims – Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - master working methodology used in the elaboration of the documentation necessary in the design phases - 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)
Content	<p>Designing in the following phases:</p> <ul style="list-style-type: none"> - Registration - Scheme Design - Detail Design 1 - Detail Design 2 <p>General:</p> <ul style="list-style-type: none"> - Design using AutoCad, Revit, regulatory requirements, project scrutiny, outlining structure and installations, relevant building technique, prefabricated building components, material science - Steel structures as primary basic structural elements in a building extension, etc. - Roofs in refurbishment projects – including dormers - Light weight storey partitions and dry lining walls primarily with the use of steel profile studs - Wet rooms - Corrosion and protection against corrosion - Typical construction principles used in refurbishment projects - Analogue and digital tools in sketching and communication of construction

Source: Created at VIA Built Environment

Subject Box 3: Material Science (BDS/MSC)

Duration	3 ECTS-points
Learning aims – Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - Sustainability in relation to financial, social og environmental considerations including certification schemes - the use of materials in connection with building refurbishment - structure, properties, processing procedures, codes of practice, environmental aspects, work environment, protection, commercial availability, aspects related to construction, maintenance and life cycle assessment, etc. for the materials: <ul style="list-style-type: none"> o Wood o Masonry o Concrete o Steel/metal o Roofs (roofing materials) o Sheet materials o Environmentally harmful substances

Learning aims – Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - analyze, select and fit the building materials mentioned above - substantiate and document the selection of materials
Content	<ul style="list-style-type: none"> - Preparation of a building component log - Preparation of material specifications on drawings - Preparation of material analyses for a number of chosen materials - Analogue and digital tools in sketching and communication of construction

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)

Duration	2 ECTS-points
Learning aims – Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - important structural parts acting as overall stabilizing members in the existing building and also in building extensions - table-dimensioning and assembling methods used in building extensions and structures, beams, columns and joints - shoring methods used in connection with the refurbishment of existing buildings, including possible underpinning
Learning aims – Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - understand and be able to account for existing building systems - be able to account for structural connections between existing and new building systems (when existing structures are interfered with) - carry out simple rough calculations of relevant structural elements such as steel columns and beams - account for the practical execution of such interventions (when planning and designing structural interventions in a building) - account for and to list all relevant loads occurring in the building - incorporate industrially produced building components as part of the structural stability of the building - communicate structural analyses orally, in writing and graphically and be able to substantiate your choices - apply appropriate characteristics in relation to statics demands in a BIM model, and undertake drawing extracts from the model to show these characteristics - undertake collision and consistence control on drawing extracts
Content	<ul style="list-style-type: none"> - Defining relevant types of loads - Structural analysis of buildings: Existing, future and during construction - Sizing (dimensioning) – by the use of tables - Rough estimation of steel column, beams, frames and steel connections - Shoring of buildings during construction - Masonry bearing and replacement of masonry - Steel structures as building components - Reinforcing existing foundations (geotechnical bearing capacity)

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)

Duration	2 ECTS-points
Learning aims - Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - the technical installations in old buildings, including pathways, materials, and principles used for water, drain and sewer installations - mechanical/balanced ventilation in old buildings - sound conditions in old buildings and knowledge about the improvement of sound conditions in existing structures - different methods used for optimising energy consumption in old multi-storey buildings and in building extensions, including renewable forms of energy
Learning aims - Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - make proposals for sound improvements in older multi-storey buildings and, if needed, incorporate such measures into the project - select the optimal ventilation system for the refurbishment project - establish pathways for water, heat, ventilation and sewer pipes respecting fire and sound demands - calculate the heat loss frame for an extension in accordance with the current BR - calculate the profitability of an energy improvement in accordance with the current BR - 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
Content	<ul style="list-style-type: none"> - Sound analysis - Analysis of requirements in the current BR for calculating U- and Ψ-value and energy use in renovation and extension of old buildings - Analysis of the use of renewable energy sources - Ventilation systems using heat recovery - Pathways and service ducts/areas in old buildings

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)

Duration	4 ECTS-points
Learning aims - Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - organizational structure and contract forms - overall political, legal, administrative and financial aspects and their interrelation with respect to urban renewal in Denmark - Plan for Health and Safety with respect to the phases at this semester - services rendered in the various design phases in accordance with the Danish PAR and FRI 'Services for Client Consultancies'. - principles and possible applications of the methods listed below used for planning, management and costing - the options in the BIM model for integration with calculation and management tools
Learning aims - Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - organizational structure, contract forms, cooperation and project management - carry out professional and interprofessional teamwork to be documented through methodology and working process

	<ul style="list-style-type: none"> - account for relevant management types and organisation structures - put into practice the requirements in 'Services for Client Consultancies' when planning project design work - design a refurbishment project within the current framework of urban renewal - perform systematic information retrieval with the purpose of preparing documentation with respect to the case - take off quantities in own project and be able to use the quantities in cost calculations - understand and carry out overall network planning for the project - appoint safety coordinator - create tender time schedules
Content	<ul style="list-style-type: none"> - Planning tool - Budgeting construction costs - Taking off – principles and systematics - Pricing building components - Keeping a log of building components and materials - Design/construction phases and services rendered to the client

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)

Duration	2 ECTS-points
Learning aims – Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - Compensation for breach of contract (with focus on the GC system) - Termination of liability, including complaint regulations and statute of limitations - Legislation on the conclusion of employment contracts
Learning aims – Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - Account for basic tender regulations with respect to 'equality of treatment', and transparency and the consequences of the chosen tender contact form in relation to the project - Prepare a consultant contract on the basis of GC for Consulting Services with possible deviations and be able to account for the consultants liability and authority to act on behalf of the principal - Prepare a Case Specification on the basis of GC and account for possible deviations - especially in case of defect, time/delay, payment (extension of 3rd semester) and additional work, hand over and termination of responsibility
Content	<p>GC for Consulting Services GC for the provision of works and supplies with focus on preparation of the Case Specification Compensation for breach of contract Government order on Winter Precautions The Circular on Price and Time The public procurement rules as related to the semester case including both the Client/Consultant and Client/Contractor relation Legal scrutiny related to the GC of services, the liability and the Consultant contract The rules of Power of attorney. The act of limitation International Labour Organization (ILO) Convention overall Involvement of case law from the Court of Justice, The Arbitration Court and the Danish complaint Board for Public Procurement</p> <ul style="list-style-type: none"> - The relations between Client – Consultant, Consultant – Sub Consultant, Client - Contractor

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 5th semester, you get an opportunity to work with a specific building technology topic or problem within renovation of your own choice. It must related to the project in the compulsory part.

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.

As part of the elective programme element, you can participate in a study trip / university cooperation, e.g. a workshop in China focusing on energy renovation. For planning reasons, this course must be chosen on the 4th semester. Another option in the elective programme element could be interdisciplinary cooperation with external parties – e.g. collaboration with another education or a company.

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"

Duration	10 ECTS-points
Aim	The aim of this Course of study is for you to increase your knowledge and competencies within energy efficient and sustainable refurbishment. This Course of study is based on a continuation of the project in the compulsory part.
Learning aims – Knowledge	You must gain knowledge about: <ul style="list-style-type: none"> - the different types of certification schemes used in relation to sustainable construction - composition of materials, characteristics, working up, standard specifications, environmental aspects, protection, trade forms, structural aspects, chemistry etc. - Life Cycle Analyses, LCA - Life Cycle Costing, LCC - cradle to cradle, C2C - how the indoor climate influences a healthy and sustainable building - the development of architecture in relation to sustainable construction - 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

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

Source: Created at VIA Built Environment

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

Duration	10 ECTS-points
Aim	<p>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.</p> <p>This Course of study is based on a continuation of the project in the compulsory part.</p>
Learning aims – Knowledge	<p>You must gain knowledge about:</p> <ul style="list-style-type: none"> - material composition, characteristics, working up, standard specifications, environmental aspects, protection, trade forms, structural aspects, chemistry etc. - and knowledge about materials used in older buildings, including recyclable materials and materials containing hazardous substances. - choosing healthy materials – low emission materials - choosing materials and constructions considering cycle costing as well as knowledge about life cycle analyses. - operation and maintenance, OM
Learning aims – Skills	<p>You must be able to:</p> <ul style="list-style-type: none"> - carry out design work at Detail Design 2 level - analyze materials in older buildings and prepare demolition plans as well as plans for the handling of waste - prepare plan for recyclable materials in a concrete case - analyse and choose healthy materials – justifying and documenting such choices - 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 - perform overall financial calculations
Content	<ul style="list-style-type: none"> - Material science - Certification and labelling systems - Examination of existing materials in older buildings - PCB, asbestos, lead and other hazardous substances - Reuse of materials, C2C - Overall financial calculations, LCC - Knowledge of Life Cycle Analyses, LCA

Source: Created at VIA Built Environment

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

Duration	10 ECTS-points
Aim	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.
Learning aims - Knowledge	- Defined individually in relation to a specific project.
Learning aims - Skills	- Defined individually in relation to a specific project.
Content	- 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.

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

Study element	Evaluated before the final test	Evaluated in the final test
Exam 6: Project work in relation to 'Renovation'		X
Exam 7: The elective programme element		X

Source: Created at VIA Built Environment

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

2.5.1 Evaluation of the compulsory part

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 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](#).

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

The guiding time schedule will be published/handed out by your class teacher.

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.](#)