SEMESTER SYLLABUS

SEMESTER 1

Semester theme: Residential Building

Bachelor’s Degree Programme in Architectural Technology and Construction Management

VIA University College

Revised February 2019
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Welcome to the Architectural Technology and Construction Management Programme at VIA

We hope you enjoy your time as a student at VIA, whether you opt for the 2-year Academy Profession Degree in Construction Technology or the 3½-year Bachelor’s Degree in Architectural Technology and Construction Management.

You will make many new acquaintances among both students and staff, and you will probably find yourself learning and being taught in a way that is different to what you have been used to.

The programme is project based, and centres on a number of very specific types of building project, from simple one-family houses and industrially produced buildings to more complex multi-storey and renovation projects. In the final semester, you will round off your studies with an elective programme component and a Bachelor’s project to be chosen by you, perhaps in collaboration with a particular company or client.

You will learn to ‘project-design’ building projects – that is, to plan, draw, describe and manage the production of projects just as consultants, building component manufacturers and contractors do in practice in the construction industry.

During the programme, you will learn a lot about yourself and your preferred learning style, and you will acquire new social, technical and theoretical skills in a variety of fields used in the construction sector. Along the way, you may find one field especially exciting, and want to be qualified more specifically in that particular field. You can do that by using the electives in Semesters 4 and 5 to tailor the programme, and you can also opt for a placement, elective programme component and Bachelor’s project focusing on your preferred field.

We encourage you to make use of all the opportunities available to you in the form of teaching, physical and digital services and, last but not least, the social opportunities for sound collaboration with fellow students and College staff.

The learning environment in Semesters 1 and 2 is called ‘Learning to Learn’. This means that there is a particular emphasis on acquiring appropriate study habits and gradually finding your feet in your new role as a student. It is a role that requires a more independent and responsible attitude to your own learning, for example, than you are used to from previous stages of your education.

The semester consists of the ‘Residential Building’ national subject component. All teaching in the semester is directed towards the work you and your group will do on a small residential building project.

The semester’s national subject component carries 30 ECTS credits and includes the following subject areas: Communication and Collaboration (10 credits), Production (5 credits) and Project Design (15 credits).

**Recommended reading**
As guidance to you and others on the different semesters of the programme, a syllabus like this one has been prepared for each semester.

*Figure 1: Document hierarchy*
Each semester syllabus consists of two main sections:

1. The Semester, which is introduced with a description of the overall structure of the semester, followed by a brief description of the prerequisites we need you to have in place in order to start the semester. The content of the semester is then described in more detail: the interdisciplinary semester project, including subjects and other study components, and the local subject components.

2. The Teaching: the semester team’s description of the semester’s particular case study and teaching plan, and a reading list. The activities and the case study of the semester are organized by the individual semester team so as to give you the best possible support in achieving the semester’s learning objectives.

## 1 THE SEMESTER

In this semester, you will mainly be working on one continuing project within the overall theme of the semester, which is residential building. As shown in

<table>
<thead>
<tr>
<th>Class teaching/lectures:</th>
<th>Project work on the theme of the semester</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance/consultancy:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure, each subject will be directed towards the project.

Theoretical presentations by the teaching staff are often mostly concentrated at the beginning of the course; later on, the teachers will mainly assist with guidance/consultancy relating to the project. It is through the process of working towards the solution of problems that you, the student, will develop your competency as an architectural technologist.

![Diagram showing project work and evaluation]

<table>
<thead>
<tr>
<th>Class teaching/lectures:</th>
<th>Project work on the theme of the semester</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance/consultancy:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Interdisciplinary project work

Source: prepared at VIA Built Environment
1.1 Admission requirements

In order to enrol on Semester 1, you must meet the admission requirements set out in the Executive Order on Admissions for the programme.

1.2 Study activity

The teaching and working formats used in this semester are shown in the Study Activity Model for the semester.

The Study Activity Model indicates that we expect you, the student, to spend approximately 825 hours studying in each semester, and also that there are a variety of teaching and working formats, indicating that not all learning is initiated by the teaching staff and/or has a teacher present. This means that you, the student, also bear considerable responsibility for your own learning.

Thus, the Study Activity Model also shows what we expect of you as a student and what you can expect of us as regards your attainment of the learning objectives.

![Study Activity Model](image)

**Figure 3:** The semester’s Study Activity Model

*Source: prepared at VIA Built Environment*

The Portfolio and study techniques are important tools on the programme, and you should use them to reflect on your own learning.

1.3 Quality assurance

You and your fellow students play a vital role in the quality assurance and quality development of the programme. It is important for management and teaching staff to receive your feedback so that, together, we can both ensure that you and your fellow students obtain a high level of educational benefit, and create the conditions for a satisfactory teaching and learning environment.

The table below shows how you as students will be involved in the evaluation of teaching activities during the semester, who will be the main users of your feedback, and when the evaluation will be carried out.
Table 1: Student involvement in teaching evaluation during the programme

<table>
<thead>
<tr>
<th>Element</th>
<th>Method</th>
<th>Main users</th>
<th>When held</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectation adjustment at the start of a new course of instruction at the institution</td>
<td>Dialogue, based on the semester syllabus, at the introductory session of the semester</td>
<td>Teachers and students</td>
<td>At the start of each semester</td>
</tr>
<tr>
<td>Halfway evaluation of course of instruction at the institution</td>
<td>Method chosen by teaching team</td>
<td>Teaching team</td>
<td>Approx. halfway through semester, as shown in indicative timetable</td>
</tr>
<tr>
<td>Final evaluation of course of instruction at the institution</td>
<td>Online questionnaire</td>
<td>Programme management and teaching team</td>
<td>Each semester to undergo final evaluation once in every three times it is taught. If due to be held, will be shown in indicative timetable.</td>
</tr>
<tr>
<td>Ongoing dialogue</td>
<td>Dialogue between teachers, students and programme managers, e.g. day-to-day or via the local campus/programme student council</td>
<td>Teachers and students</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Final evaluation of placement in Denmark and abroad</td>
<td>Online questionnaire aimed at all placement venues</td>
<td>Programme management, International Office and placement coordinators</td>
<td>Placement venue final evaluation to be carried out after each placement period</td>
</tr>
<tr>
<td>Quality assurance, including final evaluation of study visit abroad</td>
<td>Online questionnaire etc.</td>
<td>Programme management and International Office</td>
<td>At the end of each study visit abroad</td>
</tr>
<tr>
<td>Student satisfaction survey</td>
<td>Online questionnaire</td>
<td>Programme management and VIA senior management</td>
<td>Every 2 years. If due to be held, will be shown in indicative timetable.</td>
</tr>
</tbody>
</table>

Source: prepared at VIA Built Environment

You can see results, KPIs and action plans for yourself at Studienet (Aarhus), Studienet (Horsens) or Studienet (Holstebro).

Here, you will also find further information on the work VIA University College does around quality. The results of current evaluations are presented at the semester introductory session. Your class representatives also play a vital role in communicating what is discussed at campus/programme student council meetings.

1.3.1 Local student council

At VIA, there is one combined Student Council per campus with class representatives from all study programmes, but the individual programmes also have local student councils.

The VIA Built Environment management teams at Horsens, Aarhus and Holstebro continually involve the local student council in discussions about the quality assurance and quality development of the programme, including:
- employer involvement,
- graduate involvement,
- final evaluation of teaching,
- final evaluation of placements in Denmark and abroad,
1.4 Project work

Project work consists partly of assignments to be tackled individually and partly of assignments to be tackled in groups of 2-4 students.

The reason for working in groups is partly that this is a very widely used working style in the building sector, and partly that there is learning value in problem-focused collaboration on a specific project with other students who have different experience and skills.

Although students work in groups, it is nevertheless important that you as a student can independently acquire and apply the knowledge you gain from the different subjects.

1.4.1 Subject-focused teaching

Single-subject teaching covers rules, theories, methods and techniques within each specific subject area. When the individual subjects are taught will be set out in detail in the team’s teaching plans, which will be made available on It’s Learning. Examples of subject-based interpretation of the Semester 1 learning objectives for the individual subjects are listed in Annex 3.1. The specialist presentations of the individual subjects will, separately and together with the project work, support your attainment of the learning objectives for the semester.

Table 2 shows the areas each subject is divided into. The subject areas are described separately in the subsections to follow.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Subject areas</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Design (BDS)</td>
<td>Architecture and Building Design (BDS/ABD)</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Building Construction (BDS/BCN)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Materials Science (BDS/MAT)</td>
<td></td>
</tr>
<tr>
<td>Structural Design (STD)</td>
<td>Structural Design (STD)</td>
<td>10%</td>
</tr>
<tr>
<td>Building Services (BSE)</td>
<td>Building Services(BSE)</td>
<td>11%</td>
</tr>
<tr>
<td>Building Planning and Management (BPM)</td>
<td>Building Planning and Management (BPM)</td>
<td>18%</td>
</tr>
<tr>
<td>Communication (COM)</td>
<td>Communication (COM)</td>
<td>7%</td>
</tr>
<tr>
<td>Recording (REC)</td>
<td>Recording (REC)</td>
<td>9%</td>
</tr>
<tr>
<td>ICT</td>
<td>ICT</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: prepared at VIA Built Environment
1.4.1.1 Building Design (BDS)
The overarching theme of the semester is Residential Building, with Danish architectural history as the point of departure. Teaching will be based on the following content:

Building Design, Architecture and Building Design (ABD)
- history of architecture
- the tasks of the architect
- layout, analysis and visualization tools
- sustainable construction
- house layout on the plot

Building Design, Building Construction (BCN)
- preparation and presentation of own assignment
- groundwork, foundations and floor structures
- external walls and secondary elements to external walls
- roof constructions and secondary elements to roof constructions
- oral, graphical and digital presentations of the above
- analogue and digital tools for drawing and communicating building work (see 'ICT and BIM on the ATCM programme')
- sustainable structures

Building Design, Materials Science (MAT):
- information searching and documentation in the subject area; roof, wall and floor bed materials
- manufacturer and construction site visits

1.4.1.2 Structural Design (STD)
The subject presentations under STD will support the attainment of the learning objectives for the semester, alone and together with content under other subject groups. Teaching will be based on the following content:
- base units, density, weight and specific gravity
- action, reaction, resolution and composition of forces
- design assumptions and construction choices
- vertical loads
- wind loads
- load transfer and foundations
- load-bearing and reinforcing main system
- reinforcements, anchors, ceiling diaphragms and force-transmitting assemblies
- types of support and load
- masonry:
  - wall expanses
  - brick beams
  - pre-stressed beams
  - wall ties

1.4.1.3 Building Services (BSE)
The subject presentations under BSE will support attainment of the learning objectives for the semester, alone and together with content under other subject groups. Teaching will be based on the following content:
- pipelines and installations on the plot
- requirements, materials, laying depths and laying conditions for the following different types of supply pipeline:
  - district heating
  - natural gas
Principles and routing for drainage and sewerage, water, heating, ventilation and electrical installations:
- routing in floors, walls and roof/ceiling (space conditions)
- building code ventilation requirements
- drawing signatures

Energy-efficient building regulations:
- calculation of U-values for individual regular structures in the project
- Window U-values

1.4.1.4 Building Planning and Management (BPM)
The subject presentations under BPM will support attainment of the learning objectives for the semester, alone and together with content under other subject groups. Teaching will be based on the following content:
- study planning (personal planning)
- types of contract and procurement process
- construction scheduling
- calculations and quantity extraction
- content journal
- quality assurance
- working environment

1.4.1.5 Communication (COM)
The subject presentations under COM will support attainment of the learning objectives for the semester, alone and together with content under other subject groups. Teaching will be based on the following content:

learning/study techniques and collaboration
start of portfolio, including:
- self-reflection and reflection on the topic (objectives, self-evaluation and knowledge sharing)
- learning styles, supervision sessions, group contracts, project meetings
- introduction to group-based working
- study techniques, including:
  - Information searching
  - reading and note-taking technique
  - study technique tools relevant to the above, perhaps (but not necessarily) including Mind Map, OneNote etc.

Dissemination:
- oral and written (including electronic) presentation technique for evaluations and examinations
- preparation of meeting invitation, agenda, action minutes and discussion minutes, with emphasis on groupwork
- report writing: introduction with emphasis on problem statement, structure and data collection

1.4.1.6 Recording (REC)
The subject presentations under REC will support attainment of the learning objectives for the semester, alone and together with content under other subject groups. Teaching will be based on the following content:

Documenting the legality of the building project:
- Level measurement and spot heights (incl. applied mathematics)
- Recording the building site
- 3D landscape plan
- situation plans
- contour plans (incl. applied mathematics)
- staking out
- from point cloud to 3D model
- from topographic maps to Revit

1.4.2 Other programme components (local subject components)

During the semester, the semester team may arrange other study components, in consultation with the students if appropriate. This will then appear on the timetable or the schedule planner for the particular class.

1.5 Electives

The electives on the Architectural Technology and Construction Management programme start from Semester 3 and are described from that point on.

1.6 Examinations and evaluations

An internal evaluation is carried out at the end of the semester. You and your group must give a digital/oral presentation of significant parts of your work on the semester project, to be followed by an oral evaluation by the teaching staff. The evaluation will not be marked. Regarding the use of digital presentation at the evaluation, please see the current guidance. At the evaluation or at the end of the semester, your teachers will advise you how to focus your effort so as to be ready for the examination after Semester 2.

General examination information is available on Studienet (Horsens), Studienet (Aarhus) and Studienet (Holstebro).
2 THE TEACHING

Please see the class area on It’s Learning, where the semester case study, the timetable, information on the semester project and the teaching matrix/timetable will be uploaded.

2.1 Indicative timetable

The semester timetable will be reviewed at the beginning of the semester. The indicative timetable will then be available in the class folder on IT’s Learning.

2.2 Reading list and knowledge base

2.2.1 Additional subject-specific sources

Additions to the reading list and knowledge base are listed in Annex 3.2.
3 Annex

The annex represents a subject-specific interpretation of the Semester 1 learning objectives. The main aim of the semester is that you, the student, should adopt an appropriate way of working and collaborating and learn to work analytically and reflectively, so that you are at all times able to document the reasoned choices made in the course of the group’s work. The semester’s teaching is organized so as to support this aim to the best possible extent and in accordance with the learning objectives.

To help you find your way around this new subject area, below is an example of a subject-based interpretation of the learning objectives based on the end goals of the semester. This interpretation should give you and understanding of what is expected and how the subject teaching relates to the national subject components of the curriculum (Communication, Production and Project Design).

3.1 Overview of learning objectives supported by subject teaching

Building Design (BDS)
Examples of learning objectives supported by BDS content:

Building Design, Architecture and Building Design (BDS/ABD):
Knowledge of:
- the concepts, methods and practice of the subject area;
- recent architectural history focusing on small-scale Danish residential building;
- basic architectural guidelines for functional and aesthetic house layout;
- basic knowledge of sustainable architecture.

Skills:
- explain a residential building layout by analysing the use of the building;
- carry out an information search and functional analysis relating to the subject area;
- gain an understanding of drawing through the drafting process, freehand drawing and 3D modelling.

Building Design, Building Construction (BDS/BCN):
Knowledge of:
- the knowledge base, methods and practice of the subject area in relation to residential building;
- holistic sustainable building;
- contemporary building methods and building structures;
- functional and outcome requirements for building structures, including knowledge of sustainable and energy-efficient building, methods and practice;
- analogue and digital tools for building-related project design and communication.

Skills:
- analyse and select suitable building structures for your project;
- gain an understanding of drawing and construction through drafting and 3D modelling;
- plan and develop an existing concept proposal to final proposal level;
- produce documentation and communicate information about the project using 2D/3D drawings, orally and in writing

Building Design, Materials Science (BDS/MAT):
Knowledge of:
- the knowledge base, methods and practice of the subject area;
- materials with applications relating to the theme of the semester;
- production, processing and trading of materials.
- the incorporation of materials into structures; their function and performance in relation to application: relevant properties, standards requirements, chemistry, environmental impact, certification schemes, life expectancy and reuse;
- the life-cycle concept in relation to durability, maintenance and sustainability.

Skills:
- analyse and select materials at an elementary level;
- justify and document choice of materials on the basis of the properties of the materials.

**Structural Design (STD)**

Examples of learning objectives supported by STD content:

Knowledge of:
- units and concepts associated with basic statics and mathematics;
- static systems, and the ability to identify the static system in a small residential building;
- masonry in relation to load-bearing capacity, fields and brick beams in small houses;
- static documentation in accordance with the Building Code.

Skills:
- account for loads and stability in the house;
- explain the static load paths through the building, communicating orally and through draughtsmanship;
- account for the static system in a residential building;
- perform extracts from drawing plans to illustrate the static system;
- apply mathematics and numerical methods to relevant assignments (level C) in the project design of small-scale residential buildings.

**Building Services (BSE)**

Examples of learning objectives supported by BSE content:

Knowledge of:
- different types of supply pipeline and their positioning on the plot in relation to buildings and boundaries; different required laying depths;
- different heating systems for a small residential building;
- different types of ventilation for a small residential building;
- different types of wastewater pipes inside the building; underground sewerage, rainwater and drainage pipes on the plot, and connection to the municipal system;
- different water, heating, electrical and communications installations.

Skills:
- lay out the plot and the house in relation to supply and branch pipes;
- perform ventilation analyses in accordance with the Building Code;
- perform analyses and estimated calculations for room heating;
- lay out building services on the basis of analyses and estimated calculations;
- calculate U values for individual regular structures.

**Building Planning and Management (BPM)**

Examples of learning objectives supported by BPM content:

Knowledge of:
- effective study planning methods;
- planning and management of project design work;
- basic principles of execution planning;
- construction cost estimation methods;
- quality assurance methods and principles (quality understanding);
- project boards and their different actors, including project phases and types of contract;
- basic principles of digital archive and document structure;
- structure and content of the content journal.

Skills:
- plan study in an appropriate way;
- discuss the construction process in relation to the theme of the semester and show familiarity with the construction sector partners;
- apply common project planning methods within the theme of the semester;
- communicate with relevant parties about project and execution planning;
- use network diagrams and the Gantt method to analyse the execution and interrelation of simple construction activities;
- extract quantities and estimate prices using square-metre prices and building-component prices;
- propose budget estimates to relevant parties (client);
- use digital document structure in own project work on a group basis;
- use the content journal to document choices and decisions made in the project.

Communication (COM)
Examples of learning objectives supported by COM content:

Knowledge of:
- theories and methods of communication relevant to the exposition of construction industry issues, including the use of digital media within the theme of the compulsory programme component;
- elements of the communication structure in a digital presentation;
- group collaboration; self-evaluation and group learning methods;
- the importance and structure of the agenda and minutes;
- the elements of a report, particularly the problem statement, report structure and data collection.

Skills:
- communicate practice-oriented and professional topics, orally and in writing;
- devise the structure of a report on the basis of a defined problem statement;
- collect data according to methodological principles;
- practise the ability to collaborate with other students;
- reflect orally and in writing on own learning, including collaboration with others;
- write a report to document work done and position reached;
- use relevant study techniques.

Recording (REC)
Examples of learning objectives supported by REC content:

Knowledge of:
- the principles, theories, methods and tools applied in surveying and stake-out in the field of construction and civil engineering;
- the instruments used to survey and stake out buildings, and the accuracies achievable in surveying;

Skills:
- assess stake-out tasks, understand and apply situation plans with contours and other types of map used in the construction sector;
- record and assess building components, systems and building condition;
- assess practice-oriented and theoretical issues and give reasons for the choice of relevant potential solutions;
- communicate practice-oriented and professional problems and solutions to partners and users.
3.2 Additional subject-specific sources

Interdisciplinary sources
- ICT and BIM
- List of recommended textbooks and readers
- The Building Code
- SBI Recommendation 272 - Danish Building Research Institute recommendation on the Building Code
- Description of Services for Building and Landscape 2018
- ICT and BIM
- http://www.autodesk.com/education/home
- www.detdigitalebyggeri.dk
- Molio 'BIPS Tools'

Building Design (BDS)
- Dansk - Engelsk Illustreret byggeordbog / Illustrated Building Dictionary by Ulrik A. Hovmand
- Enfamiliehuset gennem 100 år (100 Years of the One-Family House - pamphlet issued by Nybolig)
- Library periodical collections etc.
  - www.altomhus.dk
- SBI Recommendation 224 – Moisture in Buildings
- SBI Recommendation 233 – Radon-Proofing of New Buildings
- SBI Recommendation 253 – Small Houses: Design and Function
- SBI Recommendation 266 – Small Houses: Wetrooms, Water and Wastewater installations
- SBI Recommendation 267 – Small Houses: The Building Envelope
- SBI Recommendation 273 – Roofs
- Molio/BIPS drawing standards:
  - C213, Drawing Standards, Part 1, General, 2012
  - C213, Drawing Standards, Part 2, Architect, 2018
- TRÆ 55 (Timber 55) – Facades
- TRÆ 58 (Timber 58) – Timber Trusses 2
- TRÆ 59 (Timber 59) – Timber Trusses 1
- TRÆ 64 (Timber 64) – Wood Floors, Laying
- TRÆ 65 (Timber 65) – Roof Battens
- TRÆ 67 (Timber 67) – Subroofs
- Grundlæggende byggeviden (Fundamental Building Knowledge), 5th edition, Claus Bjerre & Jørgen Larsen
- Byggeriets materialer (Building Materials), Lasse Bengtson & Preben Selck
- TEGL 37 (BRICK 37) – Execution of Exposed Brickwork
  - byg-erfa.dk
  - traefo.dk
  - duko.dk
  - mur-tag.dk
  - http://www.ens.dk (Danish Energy Agency website)
  - http://www.autodesk.com/education/home
  - www.detdigitalebyggeri.dk
  - www.bips.dk
  - Revit Introductory Reader
  - Various Revit guides
  - CAD & ICT site on Studienet

Structural Design (STD)
- Teknisk matematik, B-niveau (Technical Mathematics, Level B), volume 1, Preben Madsen
- Teknisk Ståbi (Technical Vade Mecum), 24th edition
- Grundlæggende statik (Basic Statics, reader)
- SBI Recommendation 254 – Small Houses: Strength and Stability
- SBI Recommendation 231 – Foundations of Small Buildings

**Building Services (BSE)**
- *Er der plads nok?* (Is There Enough Room?), Danish Technological Institute, 2009
- DS 418, Calculation of Heat Loss from Buildings, 7\(^{th}\) edition
- Kloak og Afløb, gældende projekteringsregler (Sewerage and Wastewater: Current Design Regulations), VIA, 2014

**Building Planning and Management (BPM)**
- Project Design Methodology (from concept proposal to building operation)
- byggeproces.dk
- retsinformation.dk
- General Conditions for the Provision of Works and Supplies within Building and Engineering
- The Price and Time Circular on danskbyggeri.dk
- Descriptions of Services for Construction: www.frinet.dk
- General Conditions for the Provision of Works and Supplies within Building and Engineering:
  - The Price and Time Circular: http://www.danskbyggeri.dk/
- www.byggeproces.dk

**Communication (COM)**
- Stray Jørgensen, P. latest edition, *Formalia i opgaver på videregående uddannelser* (Formal Requirements for Assignments on Higher Education Programmes), Samfundslitteratur, Frederiksberg
- Stray Jørgensen, P. latest edition, *Klart sprog i opgaver på videregående uddannelser* (Clear Use of Language in Assignments on Higher Education Programmes), Samfundslitteratur, Frederiksberg
- Stray Jørgensen, P. latest edition, *Notatteknik for studerende på videregående uddannelser* (Note-Taking Technique for Higher Education Students: Listen, Read, Note and Write), Samfundslitteratur, Frederiksberg

**Recording REC**
- plandata.dk (info on planning and planning regulations in Denmark, including local planning applications map)
- ois.dk (shortcut to property data for all of Denmark)
- arealinformation.miljoeportal.dk (data on the environment in Denmark)
- tinglysning.dk (can be queried to find out who owns a property and what liabilities and easements exist on a property)