

# Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



## Graduation Plan: All tracks

Personal information	
Name	Zoë Emmanouilidis
Student number	5882990

Studio		
Name / Theme	Architectural Wood Design Studio	
Main mentor	Gilbert Koskamp	Architectural Design
Second mentor	Max Salzberger	Technical building design
Research mentor	Stijn Brancart	Academic Research
Argumentation of choice of the studio	<p>I chose this studio because I find wooden buildings in architecture to be the most beautiful, whether it is a wooden structure or a wooden facade. I have noticed that these buildings really interest me and bring a sense of calm to me.</p> <p>Currently, opinions on timber construction are divided. Some say that wood is romanticized and claimed to be good for the environment, while others argue that it has a short lifespan and might not be as environmentally friendly as it seems. Opinions on building with wood are mixed, and in this studio, I wanted to learn, in addition to the technical aspects, exactly how sustainable wood is.</p>	

Graduation project	
Title of the graduation project	Urban Timber
Goal	
Location:	Minervahaven, Amsterdam, The Netherlands
The posed problem,	<p>The construction sector mainly uses materials such as steel and glass for multi-storey buildings and rooftop extensions due to their structural strength and low maintenance requirements. However, these materials are environmentally burdensome and significantly contribute to CO<sub>2</sub> emissions. Wood, a bio-based and sustainable material, offers an environmentally friendly alternative but is limited in multi-storey applications due to concerns about durability, maintenance, and weather resistance. Therefore, the project focuses on</p>

	improving the lifespan and performance of wood in outdoor applications, with an emphasis on sustainability and aesthetics, through design and technical innovations.
research questions and	How can specific design and technical factors extend the lifespan of timber in exterior applications while maintaining environmental sustainability?
design assignment in which these result.	How can modular timber units increase urban density in Minervahaven while ensuring durable and sustainable facades?

### **Design objective:**

To create an optimized modular housing system that increases urban density in the Minervahaven area of Amsterdam through the vertical extension of existing buildings ('optopping'). This system will align with sustainable building practices by utilizing timber as construction and cladding material. The design will focus on developing modular units that can adapt to different spatial and functional requirements, while ensuring durability, longevity, and aesthetic quality of timber facades. This will be achieved through the careful selection of appropriate wood species, innovative detailing to protect the material from environmental factors, and architectural strategies such as the integration of overhangs and shading elements.

### **Research:**

The conclusions from the research will be implemented into the spatial and facade design of my project, ensuring a sustainable timber facade that requires minimal maintenance and has a long lifespan. By selecting durable, locally sourced timber species and applying design strategies like overhangs, shading, and ventilation, the façade will be protected from environmental wear. The modular units will be adaptable to various spatial needs and integrated through optopping, enhancing urban density. Parametric design tools will optimize performance and durability, while prioritizing circularity to allow for future repurposing. This approach ensures a sustainable, low-maintenance facade that aligns with the findings of my research.

## **Process**

### **Method description**

### **Research:**

A literature review was conducted to understand the technical aspects of timber, including available treatments and design choices that can extend the lifespan of timber facades. Interviews with material experts were held to gain deeper insights into practical applications, and case studies were analysed to explore successful strategies and challenges in projects. These methods provided valuable information that will inform the design of a durable, sustainable timber facade that minimizes maintenance needs and ensures long-term performance.

**Design:**

As the design phase progresses, additional case studies will be explored to observe how timber has performed over the years in various contexts. Further case studies will also be analysed, specifically focusing on optopping architecture and modular construction. It may be necessary to revisit the site to discover the potential it offers for the design. Mass studies will be conducted to determine the appropriate scale of the modules in relation to the existing building that will be topped up. The location will be further investigated to optimize the building's orientation and maximize its potential. Throughout this process, extensive sketching and modelling will take place to test what works and what doesn't. A conceptual design will be presented at P3, after which the design development will begin, with a reliance on my own research to refine and detail the project.

**Literature and general practical references**

Delft University of Technology

Veteka

Accoya

Eden B.V.

Foreco

Centrum hout

University of Göttingen

Stichting probos

Houtvademecum

**Reflection**

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

The studio's theme focuses on wood and urban densification. By designing modular units, these can be added or removed as needed, increasing density while maintaining flexibility. When more housing is required, additional units can be stacked, avoiding the constraints of a fixed building and allowing for adaptive growth based on demand.

Using timber for the facades contributes to the increased use of biobased materials in the city. By designing the timber facades to be durable and low maintenance, they have a longer lifespan and require no extensive upkeep.

By combining the architectural aspects with the technical insights gained from my research, I can create a cohesive architectural design that integrates both functionality and sustainability.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

Socially, it addresses the need for sustainable urban housing by increasing density through optopping, using timber facades to promote biobased materials. Professionally, it explores the use of timber in multi-storey construction, focusing on durable, low-maintenance facades and combining modular design with parametric principles for flexible urban growth. Scientifically, the research enhances understanding of timber's durability in exterior applications and contributes to sustainable building practices. It promotes environmentally friendly materials, offering insights that can inspire future innovations in the construction industry and help reduce environmental impact in urban development.