

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information		
Name	Samuel(Sam) Johannes Verdegaal	
Student number	4351673	
Studio		
Name / Theme	Explore Lab	
Main mentor	Ir. E.J.G.C. van Dooren	AE+T Architectural Engineering
Second mentor	Ir. F. Adema	AE+T Building Product Innovation
Argumentation of choice of the studio	My fascinations brought me to the unconventional topic of Vertical Farming (PFAL). Explore Lab allows me to explore this topic from a perspective that I think will enable the most meaningful and unique contribution to existing architectural knowledge regarding PFAL's.	
Graduation project		
Title of the graduation project	The Elegance of Vertical Farming	
Goal		
Location:	De Randstad (The Netherlands)	
The posed problem,	Approached from the perspective of production quality & efficiency, Plant Factories with Artificial Lighting (PFAL) will materialize as a closed box. This would disregard the potential anthropological contribution it can provide to the urban environment it is situated in. Thus PFAL's should be designed as an open box to experience. Not only the product, but also the production process must interact with the consumer.	
research questions and	Research phase: Which factors that enable optimal production quality and efficiency, are relevant for architects when designing Building Integrated PFAL's?	

	Design phase: How can Plant Factories be elegantly and socially integrated into the urban fabric, while maintaining optimal production quality and efficiency?
design assignment in which these result.	Architectural design of a Building Integrated PFAL.
Process	
Method description	
<p>Research Phase (Literature research): Developing a qualitative factor list, along with an overview of the most important and/or fascinating findings relevant for an architect to consider when designing building integrated PFAL's.</p> <p>Design Phase (Design studies/research by design): Using the acquired know-how during the research phase to ensure optimal production quality and efficiency. Different (building scale) typologies will be developed to help determine the tradeoffs applicable to architects when designing Building Integrated PFAL's.</p>	

Literature and general practical preference

Architectural Projects

- Aerofarms, Newark (United States). – PFAL (commercial)
- PlantLab, 'S Hertogenbosch (The Netherlands). – PFAL (commercial / research)
- GrowX, Amsterdam (The Netherlands). – PFAL (commercial / research)
- Anhui Sanan Biological co., Ltd., Anhui (China). – PFAL (commercial)
- GrowWise Center, Eindhoven (The Netherlands). – PFAL (research)
- Agrotopia, Roeselare (Belgium). - PFAL / Greenhouse / Distribution
- Bagua, Dongguan (China). WUR Urban Greenhouse Challenge 2. - PFAL / Education
- FutureCrops, Westland (The Netherlands). – PFAL (Commercial)
- ARTechno, Westland (The Netherlands). – Automated systems

Literature

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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)?

From my perspective, the master track Architecture can provide (student)architects with the knowledge to design structures that positively impact their environment through integrating both technological and an anthropological aspects. Plant factories are a rather novel typology that, from the perspective of architects, is not yet sufficiently understood. Being expected to become an increasingly present part of the urban environment, this research allows for an early understanding of what the architectural integration of plant factories into the urban environment entails.

Although developed from an architectural perspective, due to the multidisciplinary nature of plant factories, this graduation project touches on subjects that are also relevant for the other tracks of the MSc AUBS.

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

The factors developed during the research phase provide an overview useful for all architects challenged with the implementation of vertical farming technologies. Furthermore, the design phase develops design adaptations that allow for the aesthetic and social integration of PFAL's into the urban environment, while retaining optimal production quality and efficiency. What this means, is that this project enables benefits for:

Investors and farmers; economically viable business model, in which anthropological aspects are transformed from a burden into a gain.

Consumers: fresh & healthy food, plus providing interaction with and an understanding of how their food is produced (initiating an anthropological fix).

(Urban) environment: aesthetic and sustainable contribution to the environment.

Reducing (e.g.) greenhouse emissions, pesticide and fresh water use.

Inhabitants / users (/consumer): Aesthetic enhancement of their surroundings together with an enlightened experience for its spatial users. In other words, besides producing food, the Plant Factories now also allow spatial users to learn and experience a process rather fascinating with which most would otherwise never come in contact with.

Naturally the aesthetic and social potential for PFAL's can be developed further beyond this graduation project. For such research this project provides a steppingstone from a perspective that was previously scarcely available.