Graduation plan P2

Personal information

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Graduation Studio

Name / Theme:	Architectural Engineering Graduation (AE)Studio / Flow
Tutor Architecture:	Annebregje Snijders
Tutor Research:	Jan Jongert
Studio Argumentation:	AE combines technical knowledge and design to solve current problems with an architectural emphasis.

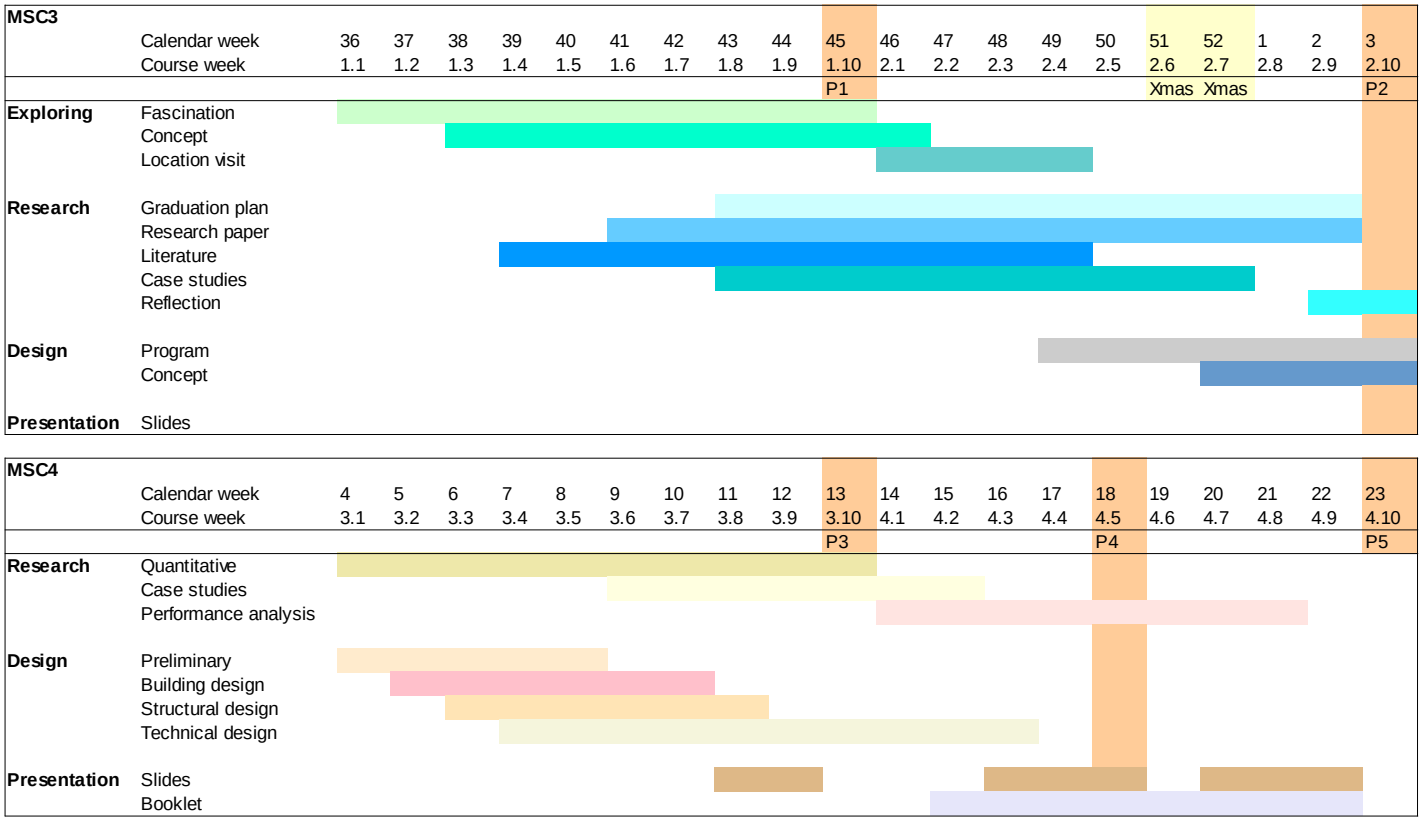
Graduation project

Title:	Biotecture Village
Objective:	To locally organize the flows of food, energy, water and waste and incorporate them into the design of an autarkic eco-village that exemplifies sustainable living in Parkstad.
Location:	Zandgroeve Heerenweg-Oost, Heerlen
Coordinates:	Latitude: N 50°54'32.644" | Longitude: E 5°58'27.822" | Altitude 95 - 110m
The posed problem:	Resources nowadays travel great distances to their destinations, often leading to losses along the way. Therefore, the challenge of today is to locally organize sustainable food, energy, water and waste flows.
Relevance:	The area around the municipality of Heerlen is struggling with high vacancy rates, shrinkage and changing demographics. In order to mediate this trend, IBA-Parkstad was established to search for innovative solutions that would sustainably benefit the region and its identity. Along themes of "recycle city", "energy city" and "flexible city" changes will be made to reinvigorate public space, green landscape and urban neighbourhoods. These changes will need to ensure a sustainable and attractive future for the region and its municipalities. In the spirit of this, I want to explore innovative housing solutions and permaculture, which can enable a local independence of resources while adding spatial quality to the surrounding. As the need for reducing architecture's carbon footprint has been growing in the past decades, the relevance of circular design and closing material flows has been proven.
Research question:	How can the flows of food, energy, water and waste be locally organized and incorporated in the design of an autarkic eco-village that exemplifies sustainable living in Parkstad?
Sub-questions:	- To what extent can earthship biotecture aid to the autarky of Dutch housing? - How much surface area is required to produce enough food for the village? - How much energy can be generated with waste flows? - Which flows should be organized centrally / de-centrally?

Process

Method description: This research is mainly informed by literature and case studies. IBA-Parkstad documents have provided background information about the projected urban developments. E-mail correspondence with permaculture enthusiasts and lectures were used to assess the need of such lifestyle in the region. Existing research literature and case studies about earthship biotecture was used to examine its potential in the local climate and what parts of its design principles are of use during the design process. Research about closed greenhouses as energy producers has been used as well. Consequently, case studies about the use of anaerobic (biogas) digestion in conjunction with a Combined Heat and Power system (e.g. Zonneterp Greenhouse Village) have been used to quantify a general approach for the eco-village. With this collected information material flow analyses can be made and each flow can be quantified using spreadsheet calculations.

Time planning



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