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	Laetitia Devi Augustyniak
Student number	5852293

Studio		
Name / Theme	Public Building Graduation Studio 2023-24 / The Vertical Campus: A public hub of the future in the Hague	
Main mentor	dr. Stefano Corbo	Project Design (Architecture)
Second mentor	ir. Florian Eckardt	Technical Building Design (Architectural Technology)
Third mentor	dr. Sang Lee	Theory and Delineation (Architecture)
Argumentation of choice of the studio	The Public Building Studio intrigued me because of its proposal to challenge the classical horizontal campus into a vertical structure and to design a mixed-used, public hub for lifelong learning. Public buildings are the architectural interfaces of a city because they are providing spatial opportunities for people of distinct backgrounds, communities, and cultures to gather, exchange or access communal services such as education or societal organization. Through its appearance and spatial structure, it can display current values and systems of the society it's based in and represent past and future visions. How these future visions for public buildings can look like, is investigated in this graduation studio through concepts such as hybridization and multiplicity to respond to an urban diverse society. Thus, I was fascinated by the challenge to design a Vertical Campus and Public Hub in The Hague that brings various stakeholders, users, and cultures together, and how this complexity then can be translated into space and architecture.	

Graduation project	
Title of the graduation project	The healthy and happy Vertical Campus: How a biophilic university promotes mental health, well-being, and cognitive performance.
Goal	
Location:	Koekamp, The Hague, Netherlands
The posed problem,	The assignment of this graduation project is to design a Vertical Campus in The Hague. That leads to the question of what common issues students in higher education are dealing with and how these insights can conclude architectural ambitions on how a Campus in the 21st century should look like. Entering higher education after school, while exciting, can also be accompanied by uncertainty or anxiety, when unknown challenges occur. These aspects can affect the well-being and mental health of students, which also correlates to and can negatively impact the academic success of students (Eisenberg et al. 2009). The World Health Organization defines mental health as "a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community" and "is more than the absence of mental disorders" (WHO 2022), which can be simplified as "symptoms of positive feelings and positive functioning in life" (Keyes 2002). The topic of mental health in higher education already attracts attention by offering consultations. In the United States for example, the first mental health service for students was established 1910 at Princeton University (Kraft 2011). Likewise, the Delft University of Technology offers mental health services, and the student association 'Stylos' from the Faculty of Architecture and the Built Environment, organized a week of "Well-being days" in December 2023 to raise awareness on the significance of good physical and mental health. However, studies about the mental health status of students have been conducted in various countries such as the Netherlands and the United States. They display the need to deal with this topic even more and especially to prevent mental health issues also before they appear or deteriorate. During Covid, the Dutch National Institute for Public Health and the Environment commissioned a nationwide study to investigate the mental well-being of students in higher

	education. To detect the level, they used common psychological methods such as the "Cantril ladder", which measures "life satisfaction", and the "Mental Health Continuum" (MHC-SF 2.1), which conducts the "positive mental health". About 28.000 students participated in this study, whereby the results of the survey displayed that 51% expressed mental health issues that ranged from anxiety, performance pressure, insomnia (sleeplessness) or a feeling of loneliness. (RIVM 2022) But not just students in Europe experience mental health issues. The "Healthy Minds Study" conducted the mental well-being of students in North America between 2013 and 2021. During the studied period, numbers were constantly rising, so that in the year 2020-2021, 60% of the students stated to suffer from one or more mental health issues, as for example anxiety or depression (Lipson et. al 2022). These high numbers of students with mental health issues also increased during the covid-pandemic (Li et al. 2021). Therefore, this graduation project aims to implement architectural and spatial solutions based on the concept of biophilic design that support and promote mental well-being, increase cognitive performance, and can prevent mental health issues. Nevertheless, architecture alone can't solve these problems and it needs to be accompanied by general mental health services and policies. Biophilic design consists of the term biophilia. It can be derived from the ancient Greek "bios" and "philia", which means "life" and "love" or "love for life". It was defined by the biologist Edward O. Wilson "as the innate tendency to focus on life and lifelike processes" (Wilson 1984, p.1) and "refers to the inherent affinity people have for the natural world" (Kellert 2018, p.vii) because humans evolved in nature about 200.000 years ago, while the species just started to build and live in cities since 6.000 years (Kellert 2018, p.3). This concept includes design principles of "direct" and "indirect experience(s) of nature" such as using greenery, natural lighting, or materials (Kellert 2018). Implementing these elements can benefit people's mental health and cognitive performance. Various studies in that concern have been conducted (Zhong et al. 2022). One of these studies has been done by a group of scientists from the University of Michigan, testing how people's cognitive performance would change after walking through an urban or natural context. Their results displayed a greater positive impact of the natural environment on the participants' attention restoration. (Berman et al. 2008)

	Finally, the concept of biophilic design can be summarized with the question: "How does the built environment affect the natural environment, and how will nature affect human experience and aspiration?" (Kellert et al. 2008, p.vii).
research questions and	Since the studio assignment is to design a "Vertical Campus", I divided my research into two main questions: the notion of a campus and vertical extension. Both components come with different requirements that influence design decisions. Starting with the theoretical component of the "Campus": The studio assignment already proposes the aspect of multiplicity, hybridity, and a mixed-used concept, which will open the opportunity for various collaborations between higher education, practice, and the public. This will be part of the overall concept of promoting mental health and well-being in my design of the Vertical Campus. Thus, based on my problem statement, it began with the question *"How can architecture promote mental well-being?".* This first question led me to the concept of biophilic design because I found several studies that displayed the benefits of nature on mental health. This was broken down into one primary and four secondary research questions: 1. How can nature and biological components be architecturally implemented into a campus building? 1.1. What is biophilic design? 1.2. What architectural green spaces already exist? 1.3. How can green space be a spatial design tool? 1.4. What other activities are also benefiting (mental) health and can be combined with green space? Implementing natural elements into a campus is by itself not a new concept. The horizontally aligned, historical Oxford Campus also implemented green space in form of courtyards on the ground level, or parks in-between buildings and the city fabric. Building vertical helps to densify cities, while having a low footprint. On the other hand, there are climatic issues such as the heat-island effect in dense cities. This led me to my second main research field: 2. How can biophilic design principles and green space be implemented into a vertical structure?

	2.1. How can horizontal green space merge with a vertical building? 2.2. How does the city benefit from a biophilic campus? 2.3. How does the city climate improve through the building? 2.4. How can the site conditions support the use of as much natural daylight and ventilation as possible to design a more passive building system? These two thematic blocks can be combined into one overall research question: *"How can green spaces be integrated in a vertical campus to benefit students and the urban fabric of The Hague?".*
design assignment in which this result.	My design objective and assignment are to design a Vertical Campus in The Hague that promotes mental health, well-being and benefits the cognitive performance of students. To achieve that, principles of the concept of biophilic design are used, focusing on the benefit of green spaces and natural daylight. Furthermore, these biophilic design principles will benefit the city fabric by enhancing climate resilience. The Public Building studio splitted the area around the Central Station of The Hague into three zones for the Graduation projects. My building site is the zone of the "green border". This area consists of the interface between the urban fabric (from the Central Station to 'New Babylon', further to the residential areas in north-east direction) and the horizontal green spaces (of 'Koekamp' and the 'Haagse Bos'). The description "green border" is derived from its visual appearance of being divided by a strict green edge that makes them seem to be different areas of the city that don't belong together. The exact plot of my project is located in front of the Central Station of the Hague, in the beginning of 'Koekamp'. I propose to move the animal park, which is currently located there, to a part of the 'Haagse Bos'. The 'Koekamp' has great potential to add more value to the city center of The Hague, an entry point through its station close to Downtown. City fabric and green space don't need to be divided with a "green border". I'm not questioning the need for open and horizontal green spaces; however, I'm questioning the strict edge between them. That's why my objective is also to design a building that merges park and campus, by not just being a Vertical Campus, but also a kind of Vertical Park.

	Because in this approach lies unused potential in intertwining architecture and nature. Combining their characteristics into one building can activate new kinds of hybrid buildings that are a transition between city fabric and green space, blending in with and belonging to both environments. It fuses the advantages of densification and open green space. Eventually, humans need architecture and nature to thrive. Thus, by merging both, this hybrid typology aims to enhance the well-being and cognitive performance of its users, and the city's climate and ecosystem.

Process

Method description

To approach my research, first of all I follow the general method of the Public Building Graduation Studio of Research-by-Design. This method unites research and design by not dividing both aspects into different phases, but they are executed at the same time and constantly influence each other. Thereby, an integration of research and design can evolve because research isn't just done through analysis, before starting the actual design process. They are interwoven, which is achieved through using for both aspects the same tools such as drawings.

Besides that, I chose the method of literature research to support my design statement. I divided the literature research into three parts:

1) The current state of mental health and well-being of students to investigate if this is an issue that could be improved.
2) The theory and concept of biophilic design in general.
3) Looking into studies that investigated the impact of nature, green space and biophilic design on the mental well-being and cognitive performance generally, but particularly of students.

For the first part, I investigated research papers that assessed the state of mental well-being of students in different countries such as The Netherlands or the United States. These showed that the state of mental health in higher education is an issue. Especially, during the covid pandemic, various countries conducted studies to consider the impact of social isolation or lockdowns on students. Furthermore, I investigated how mental health is defined by sources such as the World Health Organization, and how it is measured in psychology.

Besides this theoretical foundation, I researched the concept of Biophilic Design in general, but especially in architecture. Here, I was looking shortly into the history of the concept and mainly into the main design principles such as natural lighting, and nature-inclusiveness. Additionally, I was looking into books about biophilic architecture to investigate how other architects and designers were implementing these biophilic design principles.

To link the first both aspects and to have a foundation for design decisions, I was researching various studies that investigated how mental health, well-being and cognitive performance can be improved through environmental factors such as plants, trees, and green space, or activities such as walking or socializing.

This was always accompanied by the studio method of Research-by-Design by testing what components can be implemented in the design of the Vertical Campus that would support the students' and in general users' well-being.

Literature and general practical references

Mental health

Eisenberg, D., Golberstein, E., & Hunt, J. (2009). Mental health and academic success in college. *B E Journal of Economic Analysis & Policy*, *9* (1). https://doi.org/10.2202/1935-1682.2191

Keyes C. L. (2002). The mental health continuum: from languishing to flourishing in life. *Journal of health and social behavior*, *43*(2), 207–222.

Kraft, D. P. (2011). One hundred years of college mental health. *Journal of American College Health*, *59*(6), 477–481. https://doi.org/10.1080/07448481.2011.569964

Li, Y., Wang, A., Ya-Lin, W., Han, N., & Huang, H. (2021). Impact of the COVID-19 Pandemic on the Mental Health of College Students: A Systematic Review and Meta-Analysis. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.669119

Lipson, S. K., Zhou, S., Abelson, S., Heinze, J. E., Jirsa, M., Morigney, J., Patterson, A., Singh, M., & Eisenberg, D. (2022). Trends in college student mental health and help-seeking by race/ethnicity: Findings from the national healthy minds study, 2013–2021. *Journal of Affective Disorders*, *306*, 138–147. https://doi.org/10.1016/j.jad.2022.03.038

RIVM: Rijksinstituut voor Volksgezondheid en Milieu. (2022). *Monitor Mentale gezondheid en Middelengebruik Studenten hoger onderwijs. Deelrapport I. Mentale gezondheid.* https://www.rivm.nl/publicaties/monitor-mentale-gezondheid-en-middelengebruik-studenten-deelrapport-1

WHO: World Health Organization. (2022, June 17). *Mental health*. https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response

Biophilic Design

Almusaed, A. (2011). Biophilic and bioclimatic architecture: Analytical Therapy for the Next Generation of Passive Sustainable Architecture. In *Springer eBooks*. https://doi.org/10.1007/978-1-84996-534-7

Hart, S. (2011). *Ecoarchitecture: The Work of Ken Yeang*. John Wiley & Sons.

Kellert, S. R., Heerwagen, J., & Mador, M. (2008). *Biophilic design: The Theory, Science and Practice of Bringing Buildings to Life*. John Wiley & Sons, Inc.

Kellert, S. R. (2018). *Nature by design: The Practice of Biophilic Design*. Yale University Press.

Lefosse, D. C., Van Timmeren, A., & Ratti, C. (2023). Biophilia Upscaling: A Systematic Literature Review based on a Three-Metric Approach. *Sustainability*, *15*(22), 15702. https://doi.org/10.3390/su152215702

Sussman, A., & Hollander, J. B. (2014). *Cognitive architecture: Designing for how we respond to the built environment*. Taylor & Francis Group.

TEDx Talks. (2022, March 1). *Biophilic Design: Supporting People and Planet | Oliver Heath | TEDxUCL* [Video]. YouTube. https://www.youtube.com/watch?v=wbb5uzj1b3I

Wilson, E. O. (1984). Biophilia. In *Harvard University Press eBooks*. https://doi.org/10.4159/9780674045231

Yeang, K. (2000). *The Green Skyscraper: the basis for designing sustainable intensive buildings*. Prestel.

Zhong, W., Schröder, T., & Bekkering, J. (2022). Biophilic design in architecture and its contributions to health, well-being, and sustainability: A critical review. *Frontiers of Architectural Research*, *11*(1), 114–141. https://doi.org/10.1016/j.foar.2021.07.006

Zhong, W., Schroeder, T., & Bekkering, J. (2023). Designing with nature: Advancing three-dimensional green spaces in architecture through frameworks for biophilic design and sustainability. *Frontiers of Architectural Research*, *12*(4), 732–753. https://doi.org/10.1016/j.foar.2023.03.001

Benefits of nature and biophilic design on well-being

Abdelaal, M. S., & Soebarto, V. (2018). History matters: The origins of biophilic design of innovative learning spaces in traditional architecture. *ArchNet-IJAR*, *12*(3), 108. https://doi.org/10.26687/archnet-ijar.v12i3.1655

Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science*, *19*(12), 1207–1212. https://doi.org/10.1111/j.1467-9280.2008.02225.x

Capaldi, C. A., Passmore, H., Nisbet, E. K., Zelenski, J. M., & Dopko, R. L. (2015). Flourishing in nature: A review of the benefits of connecting with nature and its application as a wellbeing intervention. *International Journal of Wellbeing*, *5*(4), 1–16. https://doi.org/10.5502/ijw.v5i4.449

Gillis, K., & Gatersleben, B. (2015). A review of psychological literature on the health and Wellbeing benefits of biophilic design. *Buildings*, *5*(3), 948–963. https://doi.org/10.3390/buildings5030948

Meredith, G. R., Rakow, D. A., Eldermire, E., Madsen, C. G., Shelley, S. P., & Sachs, N. A. (2020). Minimum time dose in nature to Positively Impact the Mental Health of College-Aged Students, and how to measure it: A scoping review. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.02942

Tennessen, C. M., & Cimprich, B. (1995). Views to nature: Effects on attention. *Journal of Environmental Psychology*, *15*(1), 77–85. https://doi.org/10.1016/0272-4944(95)90016-0

Williams, K., Lee, E., Hartig, T., Sargent, L. D., Williams, N. S., & Johnson, K. A. (2018). Conceptualising creativity benefits of nature experience: Attention restoration and mind wandering as complementary processes. Journal of Environmental Psychology, 59, 36–45. https://doi.org/10.1016/j.jenvp.2018.08.005

WHO: World Health Organization. (2016). *Urban green spaces and health* (No. WHO/EURO: 2016-3352-43111-60341). World Health Organization. Regional Office for Europe.

Other activities that are promoting well-being

Bowling, D. L. (2023). Biological principles for music and mental health. *Translational Psychiatry*, *13*(1). https://doi.org/10.1038/s41398-023-02671-4

Khalsa, S. B. S., Hickey-Schultz, L., Cohen, D., Steiner, N. J., & Cope, S. (2011). Evaluation of the mental health benefits of yoga in a secondary school: a preliminary randomized controlled trial. *Journal of Behavioral Health Services & Research*, 39(1), 80–90. https://doi.org/10.1007/s11414-011-9249-8

Levine, S. L., Cherrier, S., Holding, A. C., & Koestner, R. (2020). For the love of reading: Recreational reading reduces psychological distress in college students and autonomous motivation is the key. *Journal of American College Health*, *70*(1), 158–164. https://doi.org/10.1080/07448481.2020.1728280

Song, C., Ikei, H., Park, B. J., Lee, J., Kagawa, T., & Miyazaki, Y. (2018). Psychological Benefits of Walking through Forest Areas. *International Journal of Environmental Research and Public Health*, *15*(12), 2804. https://doi.org/10.3390/ijerph15122804

White, R. (2004). *Young children's relationship with nature: Its importance to children's development & the earth's future.* White Hutchinson Leisure & Learning Group. http://www.whitehutchinson.com/children/articles/childrennature.shtml.

Yılmaz, S., Vural, H., & Yılmaz, H. (2023). Effects of botanical gardens on student environmental perception. *Ecological Informatics*, *73*, 101942. https://doi.org/10.1016/j.ecoinf.2022.101942

Zollars, I., Poirier, T. I., & Pailden, J. (2019). Effects of mindfulness meditation on mindfulness, mental well-being, and perceived stress. *Currents in Pharmacy Teaching and Learning*, 11(10), 1022–1028. https://doi.org/10.1016/j.cptl.2019.06.005

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)?

Architecture is a profession that consists of various disciplines such as technology, art, natural sciences, engineering, philosophy, and sociology. It operates on different scales, in terms of size and user numbers, and concerns every human, particularly those who live in dense cities. Most of our lifetime, we spend inside buildings. Moreover, architecture requires a lot of material and financial resources. An architect always designs for others. Hence, architects have great responsibility for how resources are spent, especially when designing a public building. They are space for a diverse user group, coming from different backgrounds. This requires openness, inclusivity, and needs to offer space that benefits its distinct users and the society where this public building is located.

The public building graduation studio topic to design "The Vertical Campus: A public hub of the future in the Hague", already consists of the aspect of mix-use and programmatic hybridity. It aims to connect and be inclusive to various user groups by proposing a campus that not just includes higher education, but also offices and public program. Based on this, my research is adding to the studio assignment by investigating how space can be designed with biophilic design principles, so that it promotes mental well-being of its users inside and the urban fabric outside.

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

As I explained above in my problem statement, many students in the Netherlands experience mental health issues, which prevents them of reaching their actual academic potential. Furthermore, individual health is a foundation for a functioning society. That is why this topic is relevant. The literature research has shown that these issues can be also tackled through architecture. My graduation project will add to this discourse on a social level.

Furthermore, it's contributing to the architectural profession by exploring design possibilities on how urban fabric and green space could be merged. On the other hand, it adds to the question on how a Vertical Campus can be nature-inclusive by benefiting its users and environment without decreasing the quality and amount of horizontal green spaces.

Time Planning

P2 – P3:
After the feedback of P2, I will revise the work that I have done so far. That means to review and sharpen the conceptual design, its spatial structure, program distribution and circulation system. Thus, it will develop from *Concept Design* to *Preliminary Design*, which means going deeper into detail and particularly into the Technical Building Design (TBD). While refining the design, I will work further on the façade, building structure, materiality, sustainability concept, and optimizing floor plans and sections in scale 1:200. Furthermore, this will be accompanied by fragment drawings in 1:50 and a planning of the significant construction details. Finally, this will lead to the P3 presentation, and an elaborated "Research-by-Design Journal", which will be part of the Graduation report later.

P3 – P4:
This phase will lead to the *Final Design* at P4. After the P3 presentation, I will submit a reflection about the *Preliminary Design* phase. Moreover, I will implement the comments that I received on my P3 presentation to revise the current design. While reworking it, I will specifically design and draw construction details to explain the structure of the building. Additionally, I will examine the coherence of the design from urban scale to architectural details. At the end of this phase, I will have finished my Graduation Report.

P4 – P5:
In the beginning of the last phase, I will again revise the project with the feedback I got for my P4 presentation. Afterwards, it's mainly about creating the final drawings, materials and models that will explain and clarify the final design of the building. Furthermore, I will examine the coherence of the decisions that have been made during the process. This will lead to the *Final Presentation and Graduation*.