

# Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



## Graduation Plan: All tracks

| Personal information |                   |
|----------------------|-------------------|
| Name                 | Zeynep Naz Yelken |
| Student number       | 5724716           |

| Studio                                |  |
|---------------------------------------|--|
| Name / Theme                          | Architectural Engineering Graduation Studio  |
| Main mentor                           | Thomas Offermans   |
| Second mentor                         | Christien Janssen<br>(Regina Bokel - Substitute)   |
| Argumentation of choice of the studio | Climate Design, Passive Design   |
| Argumentation of choice of the studio | The architectural engineering (AE) studio creates all possible options for students to follow their own research of choice. This creates an environment where themes that might not be relevant for the majority of the studios can be explored in the AE. When it comes to architectural design, I always prefer to integrate themes related to climate design, materialization and contextualization which made AE a highly appealing choice. The course allows me to explore equally significant issues such as building energy consumption, consumerist tourism vision and deterioration of mediterranean region due to these reasons. As someone who experienced these negative effects in person due to where I am from, the architectural engineering studio becomes an ideal place for developing this research. I also value combination of innovation as part of architectural design and AE studio allows me to dive deeper into this and create a complete project with themes, I am passionate about. |

| Graduation project              |  |
|---------------------------------|--|
| Title of the graduation project | Architectural design vision for sustainable and energy efficient tourism developments in the Mediterranean climate   |
| Goal                            |  |
| Location:                       | Malta, Marsaskala (Mediterranean Climate)  |
| The posed problem,              | Countries that are rich in their natural beauty, culture, and climate conditions have always become targets of architectural tourism developments. Especially in the 20th century, with the unstoppable growth of globalization, mass tourism became the main solution for accommodating large amounts of touristic movement profitably in hotels. Extensive constructions that offered a sense of globalized luxury, while holding significant amounts of tourists in isolated bubbles of tourism activities showed potential for short-term profits (Dredge, 2022, p. 277). This view not only encourages a blindsided view for tourists to disregard the impact on assets of visited locations, but also creates a consumerist design vision and user behaviour for tourism developments. |

Additionally, within the development of these projects, the importance of local stakeholders is kept as a secondary importance which affects the sustainability and resilience of local communities (Jojic, 2019, p. 158). Considering the clear shift towards experience and culture-oriented tourism in Europe, it is necessary to follow an all-around vision (Jesse Maida, 2023). However, an all-around application of sustainable tourism focusing on energy efficient projects that benefit both local and commercial interests still lack development. This also reflects heavily on the [building] energy and resource consumption by heating, cooling, and lighting (Mejjad et al., 2022, p. 4).

A major issue of tourism projects relate to high amount of energy and resource consumption throughout the lifespan of the buildings. This is especially important since buildings (or hotels) accommodate tourists for long periods of time regardless of the resources they consume. Considering over 50% of building energy consumption is related to buildings heating, cooling, and lighting, it is important to investigate a solution relevant for the tourism industry (UCLA, 2015). Moreover, "growing desire for better indoor environment, energy demand for heating and cooling is expected to increase steadily" especially when it comes to the Mediterranean context (Imessad et al., 2014). This can bring an even higher energy trend for locations like the Mediterranean region.



Figure 1 Positive and negative impacts of tourism in the Mediterranean region (Aston University - EU, 2012; Casals Miralles et al., 2023; Mejjad et al., 2022; WWF, n.d.).

As one of the effective methods of achieving energy efficiency in buildings, passive design strategies show potential to be integrated in the tourism industry. The potential of passive design strategies is significant since it aims to mitigate climate change through detailed evaluation, research, and architectural design. This makes passive design strategies highly appealing as it focuses on 'low tech' and cheaper solutions unlike high-tech services that might consume more energy and investments to perform well. It is also shown that implementation of passive design strategies "has proven to be highly effective, which translate into

significant energy savings and mitigation of GHG (greenhouse gases - carbon dioxide, methane and nitrous oxide) emissions” (Elaouzy & El Fadar, 2022a, p. 15; Ritchie et al., n.d.). It is also relevant to develop a strategic vision for building efficiency for a high consumption-oriented sector like tourism.

One of the reasons for the lack of passive design strategy adaptation is based on a “clear lack of regulations, policies and funding programs to encourage building owners [or designers] to apply passive design strategies” (Elaouzy & El Fadar, 2022a, p. 15). Recognizing this research gap, as well as the lack of sustainable advancements in the tourism sector (the high profit and low-cost vision), the deployment of a low cost and design-oriented solution shows potential. Related to the lack of guidelines and regulations for passive design strategies, an important factor is to “consider the coordination of various passive strategies with the characteristics of the building in question, and the local climate” (Elaouzy & El Fadar, 2022b). Therefore, it is relevant to determine which strategies are appropriate for selected building “characteristics.” A critical point in this situation is that indoor temperature control is heavily dependent on thermal comfort of the users. This energy demand is, therefore, significantly controlled by the user experience or behavior and may vary from person to person. This issue comes together with the consumerist tourism mentality that the sector promotes for the users. However, in order to promote sustainable tourism industry, it is essential to create a vision for climate conscious buildings and people. Therefore, the research aims to implement passive design strategies to create an ideal indoor environment to promote less need for climate control and lighting. Moreover, creating a foundation for passive architecture in tourism developments can lead to adaptation of these strategies to be easier and more appealing for designers.

The selected site is in Malta in the town of Marsaskala. The town of Marsaskala is expected to grow more than 40% over the years for both the local and touristic population and becomes an appealing spot for its closeness to the capital and the airport. The climate issues on the island are faced with higher consequences (such as scarcity of resources, drought, lack of water sources, high seasonality, and high consumption-oriented tourism) and therefore requires a more thorough implementation when it comes to design decisions. Malta is also the 5th biggest contributor to EU for travel and tourism-based GDP and expected to grow this industry by 80% between 2024-2028 (Chapman & Speake, 2011; Vella & Malta Tourism Authority, n.d.). So, the site is chosen as an “extreme” climate context regarding the Mediterranean climate and tourism development in the Mediterranean region

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| <p>research questions and</p>   | <p>Thematic Research Question:</p> <p>How architectural tourism developments such as hotels can minimize their energy consumption with effective and efficient implementation of passive design strategies in the Mediterranean climate and promote application of these strategies?</p> <p>Sub-questions:</p> <ul style="list-style-type: none"> <li>• What are the most common hotel morphologies and typologies used in the Mediterranean region?</li> <li>• What kind of design parameters drive decision-making in hotel design?</li> <li>• How much energy can be saved with the implementation of natural ventilation passive design strategies?</li> <li>• What kind of design constraints do natural ventilation passive design strategies bring for different types of hotel morphologies and typologies?</li> </ul> |
| <p>design assignment in which these result.</p>   | <p>Overall Design Question [Assignment]:</p> <p>How can architectural tourism developments in the Mediterranean region decrease their energy and resource consumption and <u>benefit both local &amp; commercial interests?</u></p>  |
|   |  |
| <p><b>Process</b></p>   |  |
| <p><b>Method description</b></p>  |  |
| <p><b>Method for Thematic Research</b></p>  |  |
| <p>In order to make the researched information accessible and adaptable, it is important to create a design manual/guide for tourism developments in the Mediterranean regio/climate. This can ensure the accessibility and availability of information which can be utilized seamlessly during the project development phase. This is done after the initial literature research based on passive design, tourism management and hotel design study cases (See Appendix A for methodology overview).</p> |  |
| <p><b>Understanding applicable passive design strategies</b></p>  |  |
| <p>To be able to assess the potential of passive design strategies effectively, these strategies are filtered according to their applicability for the Mediterranean climate. This is achieved through a review of literature and research papers focusing on passive design strategies applied in the Mediterranean climate on different projects and research. As a focus location, Malta, is chosen to perform a climate analysis and further deepen the knowledge on the Mediterranean climate.</p>   |  |

### **Define analysis criteria and context**

The methodology for constructing a passive design manual for tourism developments focuses on; performing architectural and technical evaluations for passive design strategies on hotel designs. These hotel designs are defined as the most common morphological and typological options used in projects currently. Therefore, the context of the research is defined as 4 morphologies: High-rise tower, y-shaped, terraced and village complex and 3 typologies: single-loaded slab, double-loaded slab, and atrium. Assessing architectural and technical evaluation on these design contexts can help provide an overview of the most appealing options for tourism developments.

The architectural evaluation is based on considering conditions that are highly valuable for both hotel designs and passive design strategies. By understanding these themes, it is possible to create criteria of evaluation for both design restriction (for hotel design) and design applicability (for passive design.) These criteria are gathered through case studies of existing hotels in the Mediterranean region and research papers on tourism theory and passive design in the Mediterranean. These assessment criteria are orientation, number of accommodation units, facade openings & privacy and landscape & outdoor activities.

### **Simulate energy demand**

The selected simulation method is through a Rhino, Grasshopper plug-ins Solemma-ClimateStudio with the assistance of Energy Plus and Ladybug plug-in for solar analysis. The simulation creates spatial composition for 4 morphologies and 3 typologies and aims to understand the energy load and passive design potential. A part of this analysis tests the effectiveness of natural ventilation passive design on hotel en suite guestrooms and hotel hallways on Solemma-ClimateStudio. The solar passive design potential is done by understanding the overall solar exposure and the facade area that requires shading according to solar exposure over 6 hours during the day.

### **Assess architectural design freedom.**

To bring an architectural perspective to the success and application of passive design strategies, two architectural assessments are made. The first part focuses on design adaptability by understanding which design criteria are affected to achieve different types of passive design strategies and suggests most appropriate morphologies and typologies. The last part aims to point out the architectural design potential that these morphologies and typologies can offer along side their previously found energy performance. These suggestions and conclusions are made through case studies and architectural evaluations.

### **Evaluate and synthesize**

This is finalized with the data gathered from energy simulations and solar analysis as well as architectural assessments. The combination of all evaluation types is gathered to see which morphologies show most potential (either by being the most energy efficient, most architecturally flexible, or adaptable) and listed. All the design requirements, opportunities, constraints, and conclusions are synthesized in a design manual to provide an overview of passive design implementation in tourism developments. Additionally, the passive design manual will be used starting from the early design phase to investigate integration of passive design strategies on the existing building in Marsaskala. The strategies will be integrated by trying to satisfy the architectural design opportunities (mentioned in the design manual) and optimal energy efficiency. Therefore, it is expected to create a feedback loop between the design manual and the project.

## Method for Overall Design Question [Assignment]

The initial part of the research focuses on understanding the management and design of hotels, types, theory, and case studies. It is aimed to gather information related to appropriate programs and the connection of these programs used in hotel design. This is supported with case studies which focus on program areas (and ratios) in mediterranean hotels. The information gathered about hotel designs will create the foundation for design decisions during the project development phase.

As the research aims to integrate a tourism project into the selected site in Malta, Marsaskala, relevant site analysis and visits will be performed for the second part of the method. As the selected site is occupied by an abandoned hotel the analysis will include both urban and building evaluations. The site analysis will focus on visual analysis to understand mobility, topography, existing buildings, types of urban spaces and public-private relations. The site visits will ensure that data related to social aspects of the project is also strong. Part of this visit focuses on performing street interviews with 15 people and will inquire about opinions related to the site, tourism in the town and the need for a hotel. These interviews will only be based on Marsaskala and will ask the residents about the most needed urban facilities (park, restaurant, square, community center, shopping district, museum etc.) according to their perspective. These outcomes will be combined with an official public submission opened by the local council of the town in June 2020 about the site.

After the preliminary information is collected, the design phase will aim to integrate the theory, case studies, site analysis and visits to compose a tourism project benefiting both local and commercial stakeholders. Additionally, the passive design manual will be used from the early design phase to investigate integration of passive design strategies on the existing structure. The strategies will be integrated by trying to satisfy the architectural design opportunities (mentioned in the design manual) and energy efficiency. Therefore, it is expected to create a feedback loop between the design manual and the project.

## Literature and general practical preference

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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)?

The focus of the graduation project aims to influence the energy demand of hotels by integrating passive design strategies. This is done through various energy simulations, architectural analysis, case studies and architectural interpretations. The architectural engineering studio in its essence aims to allow opportunities for innovative, technical, and architectural ideas to synthesize and result in a complete project. So, the graduation project thrives as the studio allows these themes to come together and be guided by experts in the topic. When it comes to the master track architecture and the master program, the study offers a detailed vision for creating an all-around architect by focusing on technical, societal, aesthetic, and functional themes. The architectural engineering course therefore holds qualities from the AUBS programme as the student is expected to consider variety of stakeholders, themes, and concerns. Considering the complexity of the topic, sustainable tourism, the themes can range from design to entrepreneurial to local communities. These complexities are highly relevant for the ecosystem of AUBS and AE studio creates an essential location to explore these.

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

The graduation project focuses on tourism, climate design and sustainable communities which is combined to be a new sustainable tourism vision. Tourism as an industry is heavily consumption oriented, which is usually disregarded due to high profitability which creates a challenging dynamic to work as a designer. If the construction industry needs to progress towards a sustainable vision, even the most profitable sectors cannot be disregarded. Therefore, it is highly relevant to introduce a passive design vision within the professional and scientific framework of architecture to promote its potential. Passive design strategies in their essence put more responsibility on the architect during the early design phase and allow



a cheap way of integrating energy efficiency strategies. It is also a significant opportunity within the construction and tourism sector to show the effectiveness of passive design strategies on existing buildings. The results of the project can also become an example for developing profitable, sustainable, and respectful tourism projects and show the potential of achieving sustainability through architectural design.

This study seeks to comprehend how an architect within this ecosystem may intervene during the design process so that sustainability becomes a basis rather than an add-on. Therefore, looking into passive design becomes significant since it requires early design phase action to be implemented successfully. By making this information organized, accessible and available for architects, it is aimed to influence the design development phase of tourism projects.