AR-301(as)

Studio BA5 (Peris et Toral)

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Cursus	Sem.	Type
Architecture	BA5	Obl.
HES - AR	H	Obl.
Mob. AR	H	Opt.

Language of teaching	English
Credits	12
Withdrawal	Unauthorized
Session	Winter
Semester	Fall
Exam	During the semester
Workload	360h
Weeks	14
Hours	**6 weekly**
Courses	2 weekly
Project	4 weekly
Number of positions	

It is not allowed to withdraw from this subject after the registration deadline.

Remark

Inscription faite par la section

Summary

Habitat and comfort, architectures of the air, collective housing, place as site, superblock , study trip: Barcelona

Content

HABITAT AND COMFORT - ARCHITECTURES OF THE AIR

Living in comfort
This design studio proposes comfort as the main issue in the design of the collective habitat. Discussing comfort places the inhabitant and his body, along with their interaction with the environment, at the centre. The body is no longer thought of as an isolated and separate entity but as connected and linked to the world. This interaction takes place through the air.

Design with air
Invisible, almost immaterial, air could be considered the least architectural of the four elements. However, architecture is essentially habitable air that is conditioned to be filled with cultural meanings. The functions of air are many. Like water, it acts as an elemental fluid; like earth, it can become an insulating element; and like fire, it can make environments uninhabitable. Hence the importance of studying strategies to control air in order to put it at the service of human life.

Arrenging matter
The aim is to develop a design that effectively integrates the statics of materials with the thermodynamics of air, both essential elements for significantly improving the comfort of spaces. Solid matter not only arranges and shapes fluid matter but also interacts with it according to the properties of the materials, thereby regulating environments thermally and hygroscopically, attenuating noise, and facilitating processes such as air convection.

Climate responsive habitat
This approach allows the adaptation of the habitat to the environment and incorporates the natural cycles of the seasons by transforming external conditions such as temperature, relative humidity, and air velocity through the design of passive systems. Factors such as the geometry of the space, solar radiation, the presence of vegetation, solar protection, and, most importantly, the openings that create air inlets and outlets, will be decisive in designing this active void and the resulting microclimate

Domestic monumentality
The studio conceives this active void as a necessary volume of air that is no longer residual or simply the negative of the built space, but has its own consistency, is designed with other laws - the laws of thermodynamics - and acquires a common dimension, which escapes the human scale to achieve energy efficiency. We are talking about a kind of monumentality inscribed in domestic architecture. This internal spacing offers the opportunity to renaturalise the interior

of buildings through plants, trees and bushes that improve air quality and encourage contact with life and nature. This contact has been shown to reduce stress, improve mood and contribute to people's mental and emotional health and well-being. Rethinking circulation spaces as biophilic environments changes the prevailing perspective: they are no longer spaces to be cared for but spaces that care for us.

Social condenser

The recognition of interdependence and the impossibility of being an autonomous and self-sufficient individual lead to a relearning of how to view the world, not from the narrow and focused perspective of an individual, but through the eccentric lens of shared, communal life. These bioclimatic spaces, strategically placed in relation to the building's circulation flows, also provide a social return. Being situated near inhabited areas, they foster sociability over anonymity and act as social condensers.

Shared habitat

The study focuses on these interstitials areas around the house to explore the social and environmental potential of these transitional bioclimatic spaces, capable of reducing energy demand and generating mutually supportive environments that foster relationships between people. The tempered and bioclimatic condition of these spaces allows us to rethink the house from its internal limit and to review dualities such as interior/exterior, private/communal, owned/shared, open/closed to incorporate other forms of contemporary life in a shared habit

WAYS OF LIVING

Jevons paradox

Currently, the focus on efficiency as a sustainability strategy has led to a situation where, despite dwellings are becoming more efficient per square meter, the overall consumption of resources has not diminished. This phenomenon is known as the Jevons Paradox, in which improvements in efficiency per square meter result in increases in floor area per person, thereby maintaining overall consumption levels. In response, the course syllabus shifts its focus from efficiency to sufficiency in population density, setting a maximum allowable space of 30 mÂ² net per person and defining the minimum number of users per project by dividing the gross area by 40mÂ².

Sharing

To ensure quality of life is not compromised, the reduction in net surface area per person can be offset with shared spaces. To achieve this, each unit could either transfer more private space to the shared spaces or share it with more users. The course syllabus encourages rethinking the various scales of cohabitation, acknowledging that not all functions are suitable to be shared by the same number of users. Sharing can occur at a cluster level, across a floor plan, or throughout the entire building. Consequently, the more space that is shared, the larger the living areas available the users can enjoy. The aim is to match or exceed current standards in a sustainable way.

Minimum net surface areas for private units

- 20 m² for one person (one room)
- 35 m² for two people (two rooms)
- 50 m² for three people (three rooms)

All units will include a bathroom and a kitchenette.

Spatial mechanisms

Spatial mechanisms could be incorporated into the typologies to help perceive the spaces as larger than they are. This can be achieved through the implementation of double circulations, diagonals, interconnected rooms or multiple access points. These features endow housing with contemporary attributes such as porosity, de-hierarchisation, indifferentiation, inclusivity and flexibility.

Biophilia

On the other hand, it is recommended to explore living arrangements in common spaces that foster human interactions beyond the private unit. Organize shared spaces strategically to encourage encounters and redesign transition areas as biophilic environments that promote engagement with life and nature.

Bioclimatic strategies

In contrast to a regulatory framework that promotes only mechanical efficiency and active systems using renewable energy, the collective dimension of these intermediate spaces enables the implementation of environmental and thermodynamic strategies. These include designing buildings with bioclimatic courtyards and atriums that modify the building's form factor and passively lower energy demands. Today, we have the capability to measure, quantify, and simulate fluid dynamics and analyse various parameters to ensure comfort.

WAYS OF BUILDING

Material systems

Depending on the selected site, each group will be assigned a specific material for analysis, which will play a critical role in their future projects. Each team will work with a different material, delving into its manufacturing processes, energy requirements, and raw materials used. The properties and characteristics of these materials will be thoroughly examined. Furthermore, the study will extend to assembly methods, aiming for a comprehensive understanding of the construction

systems associated with each material. This accumulated knowledge will lead to the creation of an atlas, which will be shared among all students

Measuring

Each group will work on developing constructive solutions for the project envelopes. How these solutions interact with the spaces will be evaluated, both in the relationship between the interior and exterior and in the thermodynamic intermediate spaces. The purpose will be to analyse and measure the ability of the solutions to provide comfort, focusing on aspects such as insulation, inertia, humidity regulation and noise absorption

Form follows material

The approach involves working within a paradigm where form responds to material, performance, thermodynamics and biohabitability.

To ensure the efficiency and sustainability of architectural solutions, it is proposed to quantify transmittance, inertia, thermal lag, life cycle analysis and cost, using simulation measurement methods.

PLACE AS SITE: SUPERBLOCK

The Superblock is the result of an urban pacification strategy that promotes a shift in Barcelona's mobility. This project prioritizes the creation of green axis and squares, and establishes a circulation scheme that reorganizes urban traffic. It distinguishes main road axis that cross the city and local streets exclusively for residents, which are discontinuous. When vehicular mobility ceases to be the priority on these urban axes, an opportunity opens up to renaturalize and increase biodiversity. This change facilitates the increase of infiltration surfaces, contributing to rebalancing the water cycle and improving flood management, filling these areas with three layers of vegetation: trees, shrubs, and herbs. These vegetative layers aim to absorb CO2 and other greenhouse gases, in addition to regulating the urban microclimate and reducing temperatures, thereby mitigating the urban heat island effect.

This approach generates a new concept of street for the 21st century, free from car noise, with lower temperatures and improved air quality. This allows homes to reconsider their interaction with the external environment instead of isolating themselves and relying on mechanical air conditioning systems. The use of passive strategies that reduce energy demand and improve urban sustainability is encouraged.

The Superblock is a concept, a paradigm, but also the location of the project.. The aim of the projects will have to look for redensification strategies in the area of 9 (3x3) blocks around the superilla Rocafort - Consell de Cent.

DOCUMENTS

The student groups will have to produce a series of documents, including: site plan, inhabit plan, climate or material atlas, thermodynamics, human vs urban scale, and atmosphere.

This work will be conducted within the framework of integral sustainability, which transcends the mere aggregation of its three dimensions environmental, social, and economic sustainability to represent their common denominator. This means that solutions will be developed to address all needs without compromising any. To achieve this, strategies will be implemented that affect multiple aspects simultaneously, such as:

- Reducing to influence economic and environmental factors,
- Spacing with bioclimatic intermediate spaces to address social and environmental concerns,
- Sharing to tackle social and economic issues concurrently

Site plan

Each group of students will work on a different site from the various adjacent sites in the superblock, each characterised by different conditions, including new construction, extensions and the reuse of disused space. It will begin with a site analysis and should conclude with a group model and site plan explaining the relationship of each proposal to its context through different scales..

Inhabit plan

The document will focus on cluster typology with shared spaces at various scales of cohabitation, shifting the emphasis from reflection on dwelling to the transition between private and common spaces, rather than studying them separately

Material atlas

Each student group will analyse a material, studying its manufacturing process, properties, and perception at different scales (POWERS OF TEN), and will propose a construction system, which will be explained through an axonometric drawing and analysed using a simulation program. The analyses of the materials of all the groups will be compiled into a common atlas for the group

Thermodynamics

This involves developing a perspective section that considers the thermodynamic operation of the building and its behaviour in both summer and winter. The representation will include fluids and comfort parameters such as

temperature, relative humidity, air velocity, and thermal inertia

Human scale vs urban scale
A constructive section of the project that explains the relationship between the chosen construction system, human scale and urban scale

Atmosphere
This document features an image or representation of the interior environment that captures the materiality, the influx of natural light, and the appropriation of the space. The choice of technique is flexible; it may include a render, a photograph of a model, or a collage

Keywords

Housing, construction, thermodynamics, Cohabitation, Atmosphere, Urban scale, human scale, materials atlas, inhabit, Intermediate spaces, bioclimatic design, de-hierarchization, inclusion, shared spaces, biophilic design, courtyards, atrium, solar chimney.

Learning Prerequisites

Required courses

None

Important concepts to start the course

Housing, Thermodynamics, Cohabitation, Atmosphere, Intermediate spaces, Bioclimatic design, Biophilic design

Learning Outcomes

By the end of the course, the student must be able to:

- Design Architectural Projects: Develop projects that integrate comprehensive sustainability strategies, balancing environmental, social, and economic aspects.
- Apply Housing Strategies: Incorporate contemporary spatial mechanisms such as double circulations, diagonals, and interconnected rooms to achieve flexible, inclusive housing with an improved relationship between private and shared spaces.
- Optimize Building Materials and Techniques: Select and use materials efficiently, evaluating their thermodynamic, structural, and sustainability impacts. Students should be capable of quantifying and analysing thermal transmittance, thermal inertia, and other key parameters using simulation methods.
- Develop Thermodynamic Solutions: Implement passive and active strategies for thermal comfort, such as the use of bioclimatic courtyards and atriums, understanding and representing the building's thermodynamic behavior across different seasons.
- Create Sustainable and Biophilic Spaces: Design transitional spaces that foster community interaction and contact with nature, enhancing quality of life and habitability.

Transversal skills

- Take responsibility for environmental impacts of her/ his actions and decisions.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Negotiate effectively within the group.
- Set objectives and design an action plan to reach those objectives.

Teaching methods

The project involves working in groups of 2 or 3 people; it is also possible to complete the course individually, although group work is recommended due to the workload.

Each group will work on a different site and with a different material, which aims to avoid competition and promote solidarity and collaboration among all students. This diversity of approaches seeks to enrich collective learning and strengthen teamwork.
A biweekly format will be used, introducing various topics of the course -place, habitation, material atlas, thermodynamics, human-urban scale, and atmosphere. On Tuesdays, these topics will be presented through theoretical classes, providing tools and examples for each exercise. The following week, both days will be dedicated to practical sessions with individual corrections. On Mondays, at the start of each biweekly period, students will make public presentations of their exercises.

A study trip to Barcelona is planned for September 22nd to 24th to visit various superbloks and housing projects.
The personal budget for the trip is as follows:
- Round-trip flight GNV-BN via EasyJet: CHF 65
- Accommodation per night (2 nights): CHF 100
- Meal cost: CHF 10-20 per meal
- Total: Between CHF 325 and 550.

Assessment methods

Continuous assessment will be based on the work students develop throughout the course, including biweekly submissions and public presentation sessions. There will be a final review of the work done.
Continuous assessment, 50%. Final critique, 50%.
There will be 6 assessments corresponding to the 6 topics:
(1) Site
(2) Inhabit
(3) Materials Atlas
(4) Thermodynamics
(5) Human Scale vs Urban Scale
(6) Atmosphere

Supervision

Office hours	Yes
Assistants	Yes
Forum	No
Others	Team: Marta Peris Jose Toral Lara Giorla

Resources

Bibliography

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