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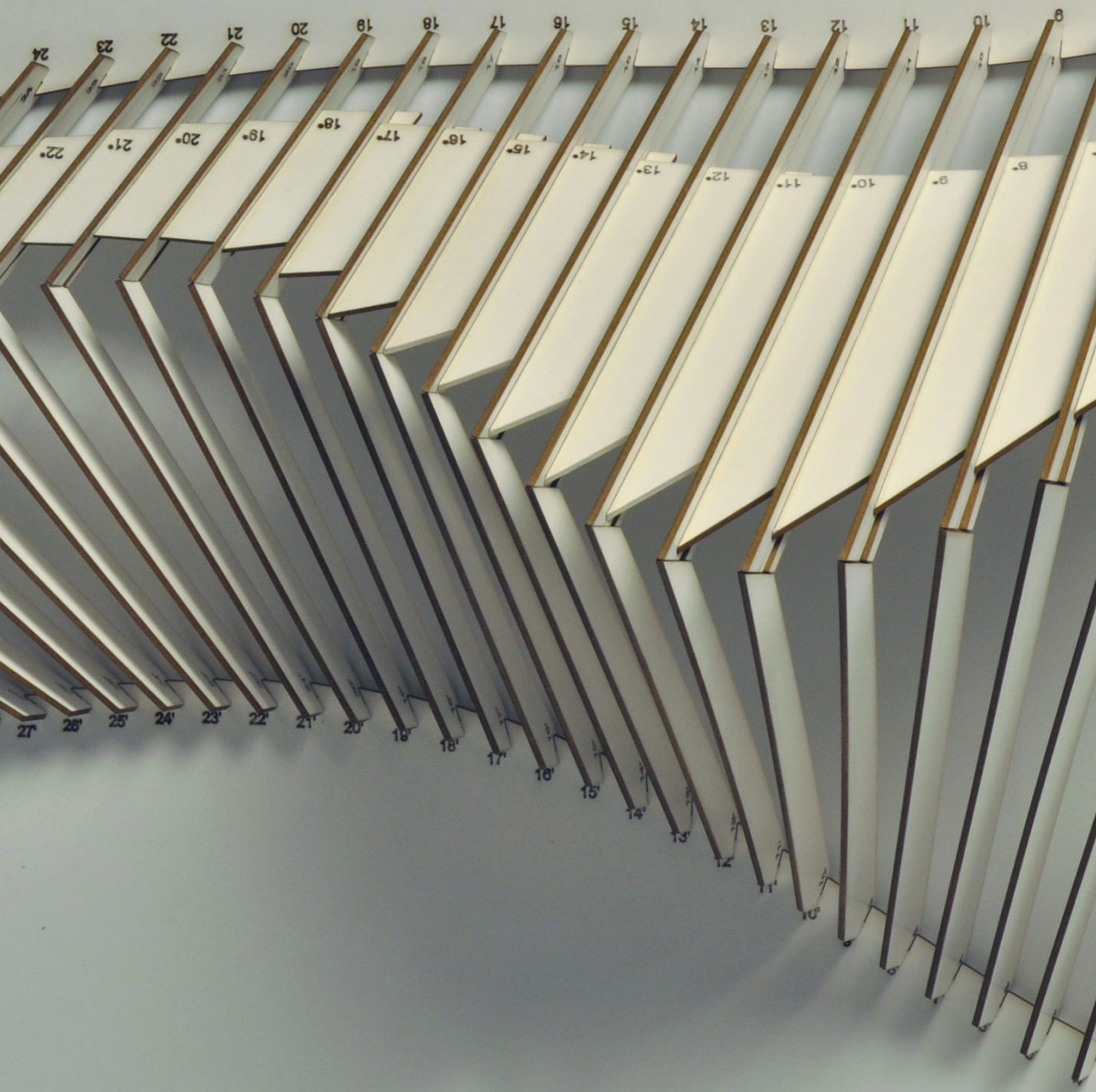


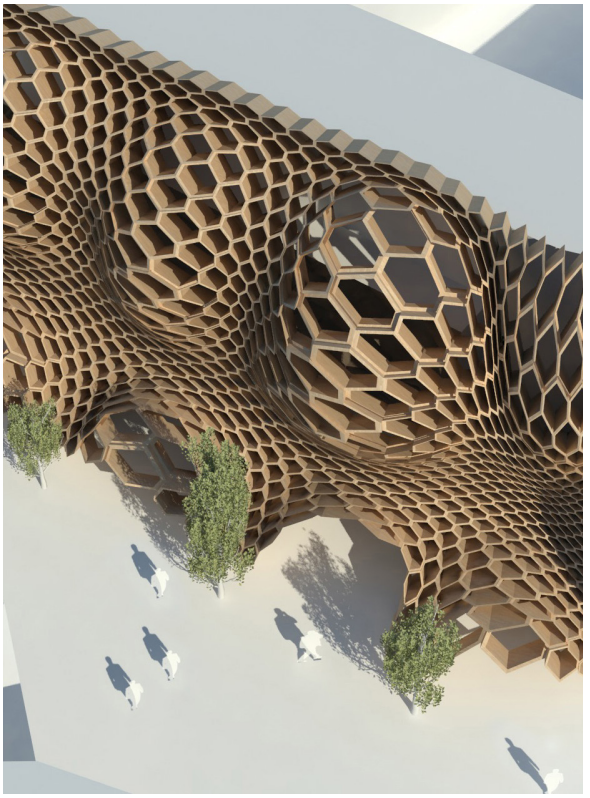
Academic guide
Course 2021 / 2022

Postgraduate Diploma in Parametric Design and Spaces

Postgraduate Diploma in Parametric Design and Spaces

The Postgraduate Diploma in Parametric Design and Spaces at EINA looks at the design of spaces and architecture in the context of innovative technologies.

The main goal of the programme is to provide the knowledge and skills necessary for the development of an integrated design strategy that intersects computation, parametric design, biomimetic engineering and digital fabrication, to create complex and more efficient objects, spaces, or architectural systems.



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Coordination
Jordi Truco

Edition
1st

Dates
05/10/2021 to 15/03/2022

Credits
30 ECTS

Schedule
Tuesday to Wednesday, from 5pm to 8pm and Thursday, from 4pm to 8pm

Language
English

Duration
200h onsite and 550h independent work

Price
3.600 € (10% discount for former students and Alumni UAB Premium

Vacancies
Minimum 10 and maximum 26

Title
Postgraduate Diploma in Parametric Design and Spaces by the UAB

Design
This postgraduate programme will focus on the relevance of new digital paradigms in the design architectural process. The programme includes computational morphogenetic processes (the design of shapes and spaces), experimenting with parametric software, scripting and algorithmic design. Using these digital tools, we will establish our own grammars to create systems, which will become architectural and habitable spaces.

Production
New technologies also bring us closer to new production processes (rapid manufacturing, digital fabrication) that lead to non-standard architectural formalizations. Mass production processes no longer depend on repetition, but on a digital system of permanent reconfiguration. All these production techniques will be studied, and applied to our projects and designs

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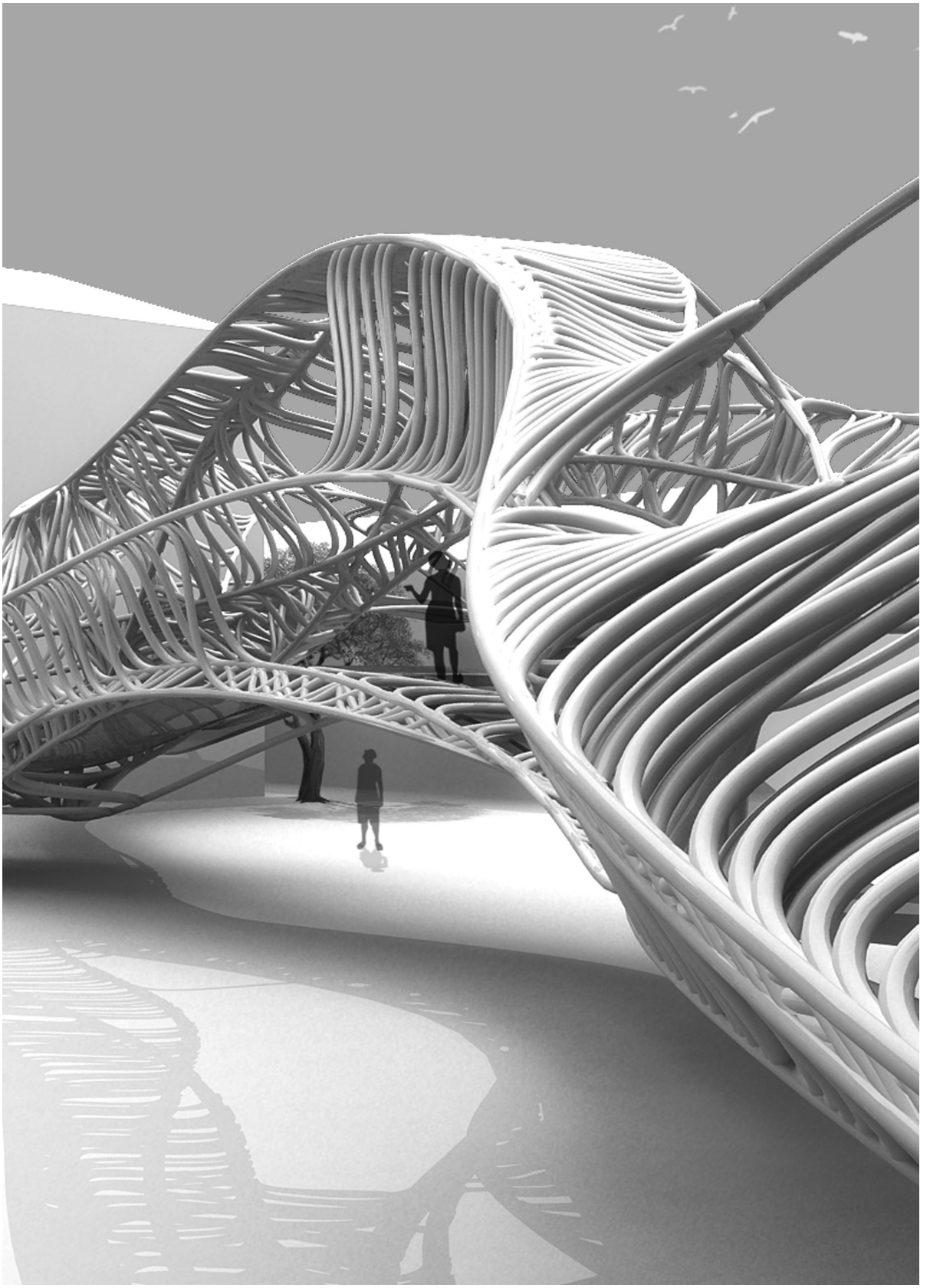
Theory
We have come a long way from architectural modernism and rationalism. Words like postmodernism, deconstructivism and minimalism no longer sound contemporary, and there is no clear dominant style on the horizon. On the other hand, there is an ongoing revolution in the processes of formal generation and control of information, both material and virtual, which is clearly a product of the digital age. Entering these new design and creation scenarios in a digital environment will lead us to discover the new avant-garde.

Our international teaching staff are experts in the field, and are also contributors to the panorama of contemporary architecture and design.



Goals

The course aims to:

⟶ Provide the student with a competitive and innovative professional profile that integrates the latest criteria, trends and project tools.

⟶ Provide theoretical foundations to talk about design strategies and contemporary spaces and architectures within the new paradigms of the digital environment.

⟶ Highlight the study of digital manufacturing and production systems, which are more innovative though less conventional, and long used in established fields, such as the automotive and aeronautic sectors.

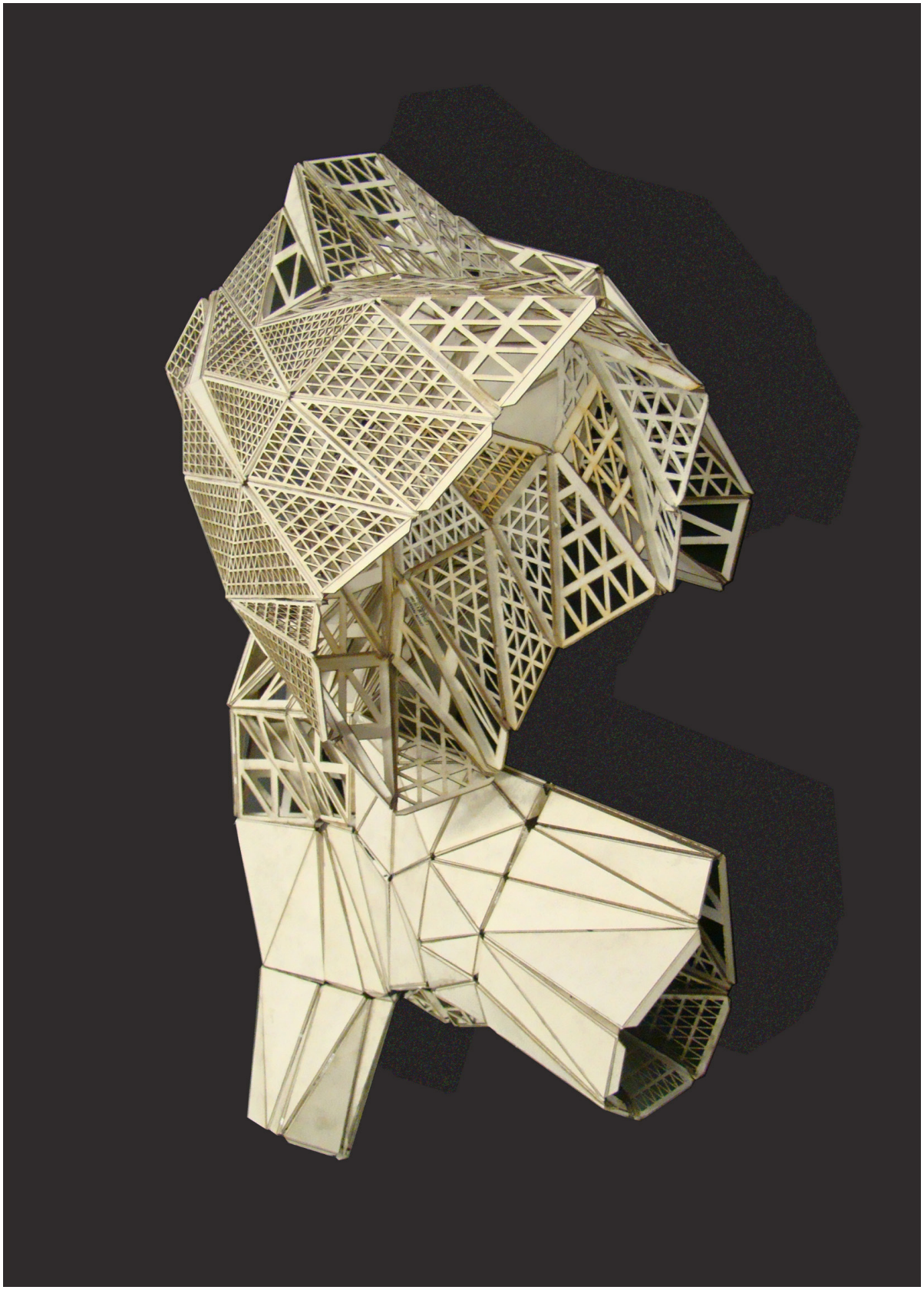
⟶ Encourage research and exploration in project processes to produce new results and/or open new lines of thought or reflection.

⟶ Deepen the study of parametric systems and software, which will be used to develop new processes of creation, analysis and control.

⟶ Introduce students to the evolution of new materials, which will play a fundamental role in the future formalization of the built environment.

Student profile

The programme is offered to designers and to graduate architects and engineers who are interested in researching architecture and space design in the context of innovative technologies.



Programme

The programme is structured into the following modules:

→ **Design and Computation Seminar** (6 ECTS)

→ **Integral Envelopes Design Studio** (6 ECTS)

→ **Digital Fabrication Laboratory** (6 ECTS)

→ **Parametric Software and Programming** (6 ECTS)

→ **Final Project. Time based formations through computational process** (6 ECTS)

MODULE 1. DESIGN AND COMPUTATION SEMINAR (6 ECTS)

→ **Seminar 1. Genetic vs Generative**

→ **Seminar 2. Contemporary Paradigms in computational design**

→ **Seminar 3. Talks**

MODULE 2. INTEGRAL ENVELOPES DESIGN STUDIO (6 ECTS)

→ **Phase 1. System Interrelations**

→ **Phase 2. System Capacity**

→ **Phase 3. System Performance**

MODULE 3. DIGITAL FABRICATION LABORATORY (6 ECTS)

→ **Digital Fabrication Lab**

MODULE 4. PARAMETRIC SOFTWARE AND PROGRAMMING (6 ECTS)

→ **Parametric software and programming**

MODULE 5. FINAL PROJECT. TIME BASED FORMATIONS THROUGH COMPUTATIONAL PROCESS (6 ECTS)

→ **Final Project**

Teaching Staff

Natalia Alonso
She is an Architect graduated at the Pontificia Universidad Javeriana in Colombia. In 2020 she graduated in Master in Biodigital Architecture at ESARQ, International University of Catalonia, UIC

Pau de Solà-Morales
He holds a degree in architecture and urbanism from the ETSAB (1993) and a Master's Degree in Design and a Doctorate in Design from Harvard University (2000).

Andres Dejanon
He holds a degree in Architecture from the Pontificia Universidad Javeriana in Colombia, Master in Digital Art (UPF). In 2012 he studied a Master in Advanced Design and Digital Architecture at Elisava, and DEA in Architectural Projects (UPC).

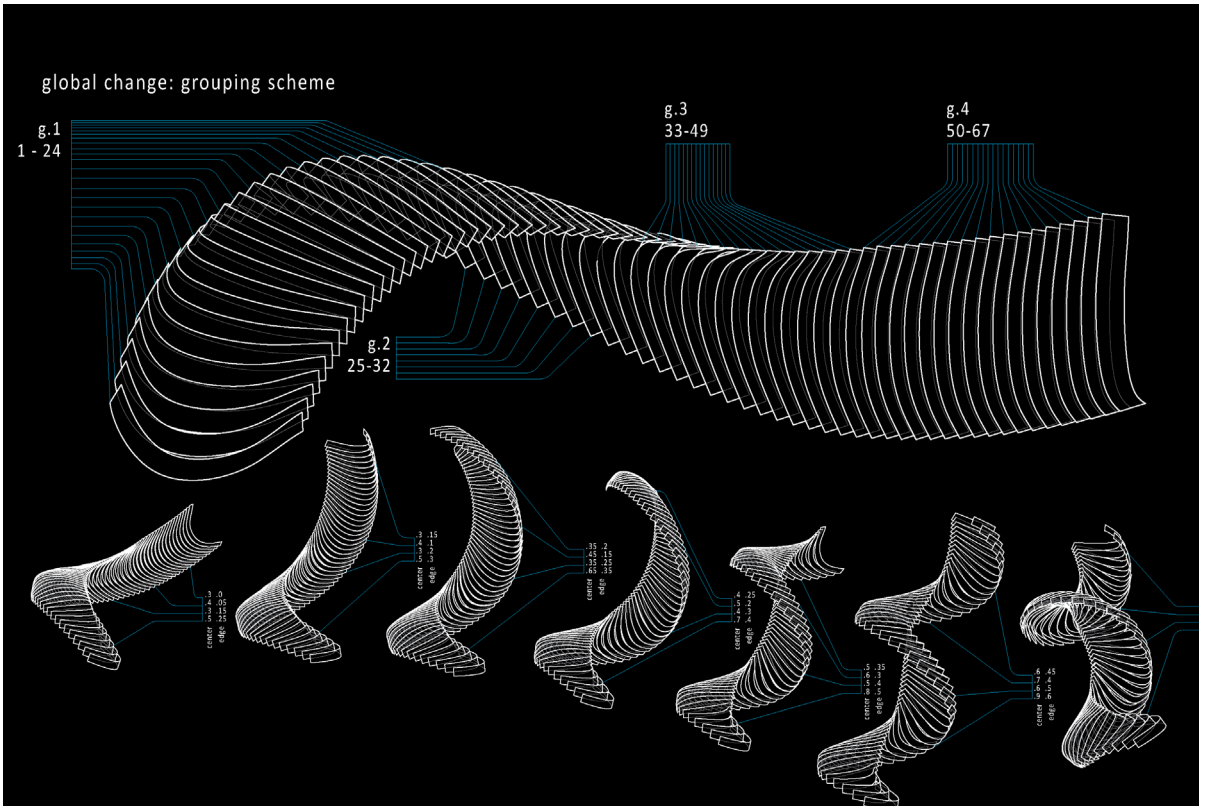
Sylvia Felipe
She graduated in Architecture at the Escuela Técnica Superior de Arquitectura de Barcelona ETSAB. In 2003 she received the MAarch Distinction for "Emerging Technologies and Design" from the Architectural Association of London AA. UK.. She was an undergraduate lecturer in design at ELISAVA from 2010 to 2018.
www.hybridarch.net

Raúl Oliva
Works for himself in his architecture and interior design studio Raúl Oliva Arquitectos, carrying out building and urban design projects throughout Spain.
www.roarquitectura.com

Anna Pla-Català
Architect graduated at the Architectural Association School of Architecture in London. She holds a Master of Science in Advanced Architectural Design from the Graduate School of Architecture, Planning and Preservation (MScAAD-GSAPP) at Columbia University of New York (LaCaixa).

David Steegmann
Doctor architect. Associate professor at the DPA ETSAB-ETSAV (UPC). Research Teaching Staff at EINA.

Jordi Truco
He graduated in Architecture at the Escuela Técnica Superior de Arquitectura de Barcelona ETSAB. In 2003 he received the MAarch distinction in "Emerging Technologies and Design" at the Architectural Association of London AA. UK. He has also received the first prize of the Royal Academy of the Arts of London in Architecture, student category, 2003.
www.hybridarch.net



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MODULE 1. DESIGN AND COMPUTATION SEMINAR

Seminar 1. Genetic vs Generative

Description
Since Modernism began to wane, at the same time as the historical revisionism of style took place, architectural theory has shown great interest in positivist design methodologies.

Studies of architectural complexity and dynamic systems have sparked a renewed interest in networks, bottom-up methods, adaptive systems, genetics, and automatic form creation as the foundation for a new generation of design techniques.

In addition, the universalization of digital technologies in the last decade has allowed the necessary checks to be carried out and clear results to be produced from all this research.

The seminar will focus on new methodologies that offer a greater range of possibilities for architecture and establish solid bridges between theory and practice.

Seminar 2. Contemporary Paradigms in computational design

Description
An analysis of various buildings and contemporary constructions made from strategies and tools similar to those studied in the course.

Students will carry out a case study of one of the examples discussed during the seminar, and a subsequent critical assessment of the architectural results, comparing the example with other buildings conceptualized and built in a distinct way.

Seminar 3. Talks (visiting professors)

Description
Three guests will discuss real-life examples, drawing from their own experiences with computer design tools in production, manufacturing and construction systems.

MODULE 2. INTEGRAL ENVELOPES DESIGN STUDIO

This is the first design workshop of the course. Here we will develop a system that can proliferate (grow and spread) and create forms with structural capacities and with differentiated porosity, which will later be used as an envelope and structure for the course project.

Phase 1. System Interrelations

Description
The starting point of the workshop experiment is researching a biological situation in which the distinction between skin and structure is dissolved. This biological example will serve as a basis to extract and formulate specific relationships between the structural logics, the geometric principles and the performative aspects of the investigated system. The parametric variables and operational growth rules that govern the system will then be described.

Phase 2. System Capacity

Description
Once the parametric variables of the material system have been established, an allometric growth process will be defined and developed so it proliferates. The growth gives rise to different species of system, or to a broader global system with differentiated subsets. Everything learned and understood about the system will be described in parameters. We will use Grasshopper to develop a series of tests and 3D models.

Phase 3. System Performance

Description
We will focus on the performative aspects of the developed system. The main objective is to see how when parametric manipulations (stimuli) are applied, the system gives different formal responses.

MODULE 3. DIGITAL FABRICATION LABORATORY

Digital Fabrication Lab

Description
The objective of the workshop CADCAM In the CAD/CAM and Rapid Tools workshop, students are provided with the knowledge and skills to manufacture part of the material produced during the course with digital manufacturing tools. These tools will be used to explore the properties and results of CAD/CAM, both visual and tectonic.

CAD/CAM produces impressive results in the present day, but it's important not to lose a certain critical focus on these productions, which can sometimes be too partial and superficial. What is important here is not the final object produced, but the use of the CAD/CAM tool to constantly inform the design process.

Manufacturing with CAD/CAM should help us rethink the design process. As a result, we will see what the mass production of non-standard differentiated objects means. This theoretical and practical course introduces students to digital production and the possibilities it offers designers as a platform for both testing ideas and producing final objects.

Methodology
When thinking about a model to be built, consider the parameters. For example, if the shape needs to be curved, a strategy of building according to these more curved and smoother geometries may be best: for example, machined in the CNC or by 3D printing. If the drawn object is defined by polygonal shapes, based on lines, planes or triangles, consider a construction by sections, planes, triangulations, assemblies, unions, etc. with the laser cutting machine.

Here we aim not to create designs and subsequently decide on the finishing techniques, but to use the process itself to choose the best options for construction, material, form and so on.

MODULE 4. PARAMETRIC SOFTWARE AND PROGRAMMING

Parametric software and programming

Description
The software that is the central tool of the course, Rhinoceros and Grasshoppe, is taught through tutorials and practice.

These programmes allow for the creation of complex morphologies by manipulating parameters. Using these digital tools, students will establish their own language to create systems of forms that become architectural and habitable spaces.

For designers exploring new shapes using generative algorithms, Grasshopper is a graphical algorithm editor tightly integrated with Rhino's 3D modeling tools. Unlike Rhino Script, Grasshopper requires no programming or scripting skills, but allows designers to build shape generators, ranging from the simple to the incredibly complex.

MODULE 5. FINAL PROJECT. TIME BASED FORMATIONS THROUGH COMPUTATIONAL PROCESS

Final Project

Description
During the course, we will explore both abstract inquiry (working with intrinsic logics) and responding to programme needs (friction with extrinsic logics).

This part of the course assumes a good command of the software, having finished and deepened in Module 2 (Integral Envelopes Design Studio), where students have developed a growth system with structural properties and its own tectonics. Here, students go a step further and incorporate extrinsic information (i.e., the conditions of the place, the use, certain simple programming needs) into the procedural design logics to generate friction between abstract research and extrinsic logics, thus forcing a dialogue between disparate narratives.

The challenge is to apply this knowledge in a real situation, with a real program, achieving an architectural proposal in a given environment. Two lines of work are proposed according to the interests of the student, where an architectural scale or an interior space scale is entered.

⟶ Option 1: Apply the system and volumetry created in the definition and development of a building, (museum, cultural center, activity center)

⟶ Option 2: Apply the system created in the course to the definition of the spaces, divisions, volumes, and textures of an interior (commercial space, retail, exhibition space)

The projects will be developed through 3D models, models produced with digital manufacturing strategies and rendered plans and infographics

Services and facilities

Interships and job opportunities
Contact with companies, institutions and professionals is fundamental to your professional development. Your training will be reinforced thanks to the real projects developed and the work experience acquired.

EINA provides you with a wide range of entities that you can choose according to your interests and always with the advice and tutoring of the management team of this area.

On the other hand, EINA offers you the service of the job bank.

Facilities at your service
EINA puts at your disposal all the equipment you need to develop your studies, both at the central headquarters in Sarrià and at the Barra de Ferro space in Ciutat Vella.

In each of the facilities you will always find a professional who will assist you in and out of school hours:

⟶ Models and prototypes workshop

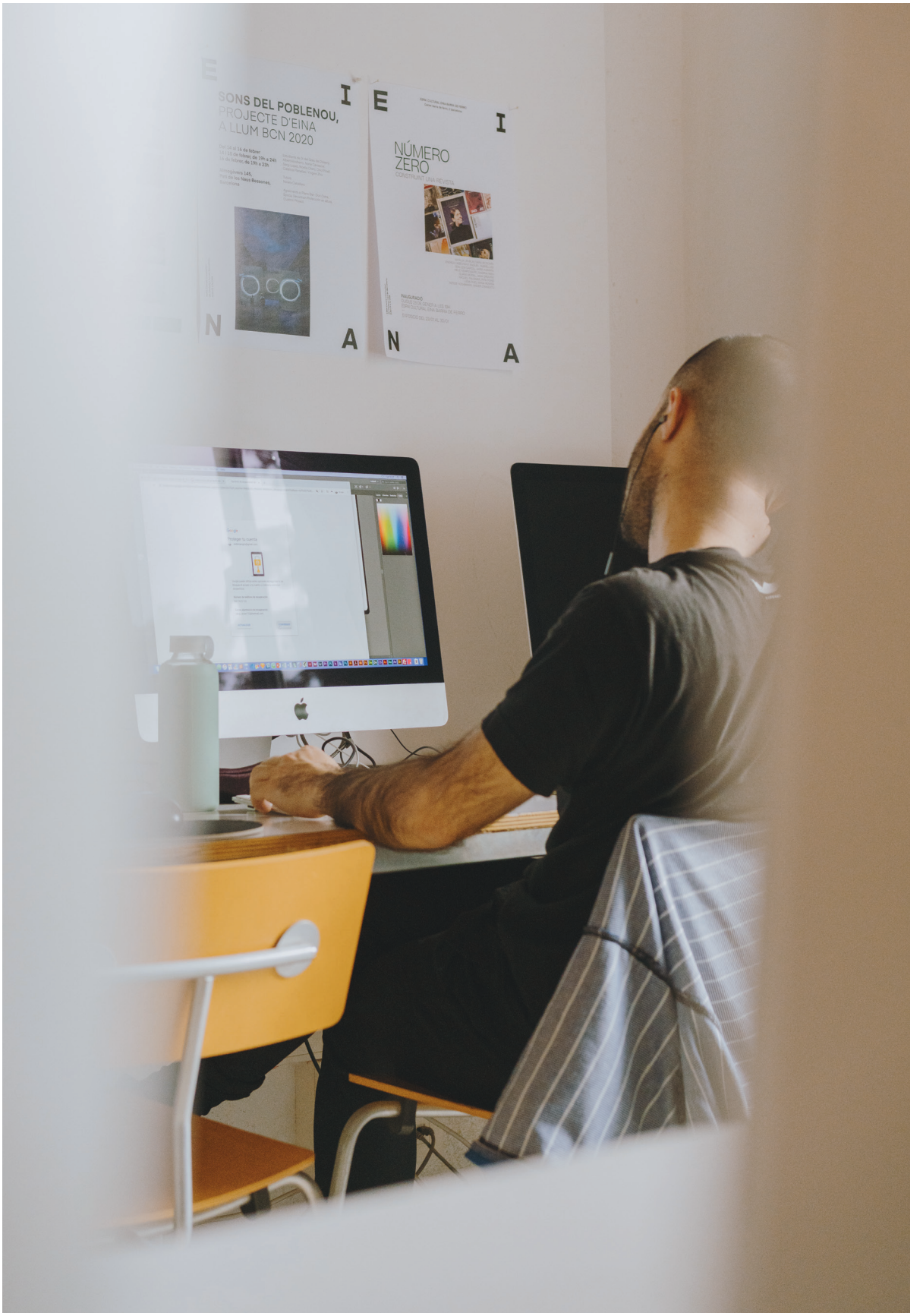
⟶ Graphic creation workshop

⟶ Library

⟶ Photography studio

⟶ Computer rooms

⟶ Exhibition hall


SONS DEL POBLENOU,
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Contact

REQUEST AN INTERVIEW

postgraus@eina.cat
932 030 923

VENUE

EINA headquarters

Passeig Santa Eulàlia, 25
Monday to Thursday from 9am to 5pm
Friday, from 9am to 2pm
Telephone: +34 932 030 923
Mail: info@eina.cat

Bus: V7 / H2 / H4 / 68 / 75 / 130
FFGC: Peu del Funicular / Sarrià

EINA Barra de Ferro

Barra de Ferro, 2
Monday to Saturday, from 4pm to 8pm
Telephone: +34 93 295 58 62
Mail: espai@eina.cat

Bus: 17 / 10 / 40 / 45 / 120
Underground: Jaume I (L4)

NETWORKS

Instagram EINA: @einabcn
Twitter: @einabcn
Facebook: @einadisseny
Vimeo: @einabcn
Instagram EINA Barra de Ferro:
@einabarradeferro

Photographs

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de Disseny i Art de Barcelona.
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**Passeig Santa Eulàlia, 25
08017 Barcelona. T+34 932 030 923
info@eina.cat / www.eina.cat**