

Live the experience of designing and fabricating a real-scale, self-sufficient prototype in the immersive **Master in Advanced Ecological Buildings & Biocities**

MASTER IN  
**ADVANCED  
ECOLOGICAL  
BUILDINGS  
& BIOCITIES**

**BARCELONA**

MAEBB01 90 credits  
MAEBB02 130 credits

Directed by:  
**Daniel Ibañez**  
**Vicente Guallart**

**Iaac**

Institute for  
advanced  
architecture  
of Catalonia

BARCELONA



vall d'aura

Self  
sufficient  
Lab

# MASTER IN ADVANCED ECOLOGICAL BUILDINGS & BIOCITIES

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**MAEBB01** / 11 Months 90 credits  
**MAEBB02** / 18 Months 130 credits

[iaac.net](http://iaac.net)  
[www.valldaura.net](http://www.valldaura.net)  
[iaacblog.com](http://iaacblog.com)

**iaac** Institute for  
advanced  
architecture  
of Catalonia

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European Forest  
Institute



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## WHAT?

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**The Master in Advanced Ecological Buildings and Biocities is an immersive academic program with an emphasis on using an applied practice approach to train professionals with advanced expertise in the design and construction of ecological buildings and biocities. The program is available in two formats, MAEBB01 and MAEBB02, of 11 or 18 months, both taking place in Valldaura Labs, Barcelona.**

During the first months in Barcelona students embark on a series of intensive and cumulative modules and workshops that tackle all fields related with the design and construction of advanced ecological buildings and biocities, including material, thermal and metabolic building systems. After developing the necessary skills and experience, students collectively develop the design concept, strategies, fabrication techniques and blueprints for an ecological building prototype which they will build during the final phase of the MAEBB01 program. MAEBB02 allow a personal research and prototype development related with any topic from the Master Program.

The programs are organized around six principles:

**Immersive Education:** This Master offers a unique immersive education experience at Valldaura Labs. Sleeping, eating, socialising, studying, prototyping, designing, building happens all at this unique location.

**Learning by Doing and Living:** Students learn based on experiential learning and hands-on building of full-scale prototypes. This master is fundamentally hands-on with an emphasis on professional expertise. Every year of the Master program will build a 1:1 building prototype.

**Multidisciplinary Education:** Students have access to courses and workshops from many interrelated disciplines around buildings.



**Connected Education:** Students collaborate with other academic design centers and institutions which are developing similar projects.

**Documentation Process:** Each student registers and documents in a unique, open and online platform all the knowledge generated on the Master program.

**International community:** This postgraduate program is oriented towards students both from mature economies, such as Europe or North America, as well as emergent economies such as China, India or Latin America.



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## WHY?

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**The challenge of cities is no longer their digitalization, but how this shift could make them more ecological and human.**

Technology should benefit the biological world, promote human life and the development of natural species. We must design and build cities that function more like forests, like **self-sufficient ecosystems** that produce the resources they need to thrive, and that promote life. Nature has developed distributed systems where millions of elements are connected and form part of complex ecosystems that promote a more balanced way of life. This should be our urban model for the digital era.

The Master in Advanced Ecological Buildings and Biocities rigorously investigates the role of digital tools and technologies towards a more balanced symbiosis between built and natural environments, while proposing structures and systems for how this can happen towards **the future of our cities.**





Tiny house 01 built during MAEBB 2018-19

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**MASTER IN  
ADVANCED  
ECOLOGICAL  
BUILDINGS &  
BIOCITIES  
MAEBB 01**

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**Master in Advanced Ecological Buildings and Biocities 01**

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**Accredited by School of Professional and Executive Development at the Polytechnic University of Catalonia – European Higher Education Area (EHEA)**

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**Edition: 3<sup>rd</sup> Edition**

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**Credits: 90 ECTS**

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**Direction: Daniel Ibañez & Vicente Guallart**

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**Duration: 11 Months  
From October 2020 to August 2021 //  
Immersive and full time**

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**Language: English**

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**Admission: Architecture, Engineering, Design, Bachelor or higher degree from other related professions**

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**MASTER IN  
ADVANCED  
ECOLOGICAL  
BUILDINGS &  
BIOCITIES  
MAEBB 02**

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**Master in Advanced Ecological Buildings and Biocities 02**

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**Accredited by School of Professional and Executive Development at the Polytechnic University of Catalonia – European Higher Education Area (EHEA)**

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**Edition: 1<sup>st</sup> Edition**

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**Credits: 130 ECTS**

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**Direction: Daniel Ibañez & Vicente Guallart**

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**Duration: 18 months – From October 2020 to March 2022  
Immersive and full time**

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**Language: English**

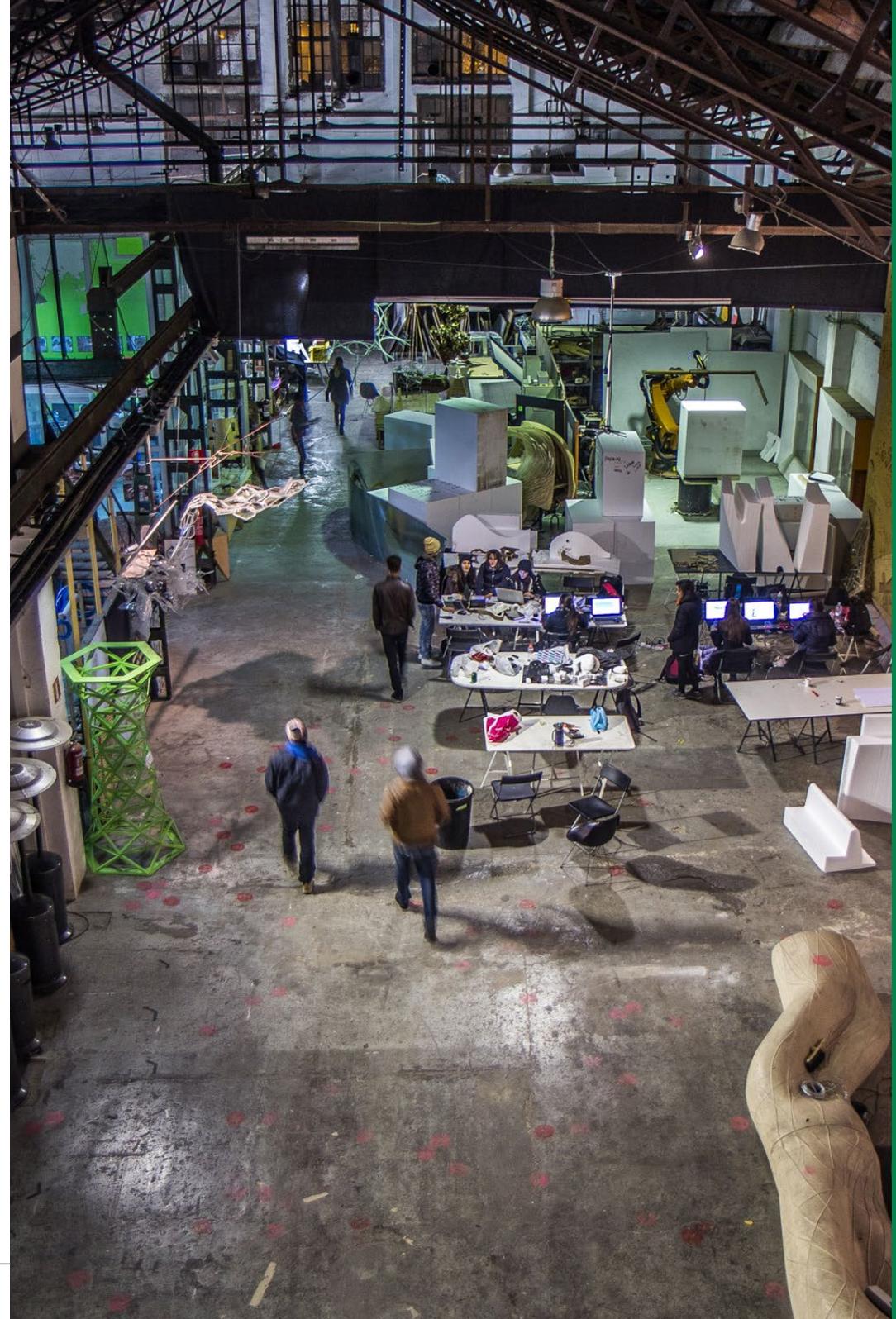
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**Admission: Architecture, Engineering, Design, Bachelor or higher degree from other related professions**

The Institute for Advanced Architecture of Catalonia (IAAC) is an international centre for research, education, production and outreach, with the mission of envisioning the future habitat of our society and building it in the present.

Based in Barcelona, the Institute offers multidisciplinary programs that explore international urban and territorial phenomena, with an emphasis on the opportunities that arise from the emergent territories, and the cultural, economic and social values that architecture can contribute to today's society.

# WELCOME TO THE INSTITUTE FOR ADVANCED ARCHITECTURE OF CATALONIA



# IAAC THE INSTITUTE FOR ADVANCED ARCHITECTURE OF CATALONIA

**IAAC sets out to take Research and Development to architecture and urbanism, and create multidisciplinary knowledge networks.** To this end, the Institute works in collaboration with several cities and regions, industrial groups, research centres, including the City Council of Barcelona, the Collserola Natural Park, the Massachusetts Institute of Technology (MIT), the City Intelligence Lab of AIT, as well as diverse companies among which CISCO, Endesa, BuroHappold Engineering, Carlo Ratti Associati, MVRDV and many others.

In collaboration with these entities, the Institute develops various research programs that bring together experts in different disciplines such as architecture, engineering, biology, sociology, anthropology and other fields of investigation.

IAAC has made a name for itself as a centre of international reference, welcoming students and researchers from over 60 different countries.



## IAAC IS EDUCATION

With a wide range of pioneering master programmes, giving the next generation of architects and changemakers the space to imagine, test and shape the future of cities, architecture and technology.



## IAAC IS HERITAGE

With the Vallldaura Labs, a self-sufficient research centre located in the Collserola Metropolitan park, 20 minutes from the centre of Barcelona and surrounded by 130 hectares of forest, where a series of laboratories are implemented for the production and testing of Energy, Food and Things.



## IAAC IS RESEARCH

Thanks to a series of projects with industry as well as projects funded by the European Union and developed in collaboration with public and private European partners, oriented to explore the role of technology in our society and cities.



## IAAC IS COMMUNITY

Beyond its educational and pro-research work, seeks permanent contact and cooperation among the hundreds of teachers, researchers, institutions and companies that have worked with us or that pursue the objective of providing solutions to the great challenges of humanity.



## IAAC IS OUTREACH

Through lectures, publications, exhibitions and competitions. Thanks to initiatives such as the IAAC Lecture Series, the Advanced Architecture Contest or the Responsive Cities Symposium, IAAC promotes its values in the discussion about architecture, cities, society and technology, facing the nowadays worldwide challenges.



## IAAC IS INNOVATION

With the Fab Lab Barcelona, the first and most advanced digital production laboratory in EU, and the Green Fab Lab, the first digital fabrication laboratory oriented to self-sufficiency: two places where you can build almost anything.

Fab Lab Barcelona has consolidated its role within the Fab Lab Network as one of the worldwide leaders of the Digital Fabrication Revolution as well as the Coordinator of the Fab Academy Programme.

**Iaac**  
Institute for  
advanced  
architecture  
of Catalonia

IAAC is located in the Poblenou neighbourhood of Barcelona, in the recently created district known as 22@, an international reference for companies and institutions oriented toward the knowledge society. In the 22@, cutting-edge firms, universities, research and training centres are integrated with different agents of promotion that facilitate interaction and communication among them.

The neighbourhood is close to the historic centre and the seafront, and features some of the most iconic landmarks of the city such as the Agbar Tower and the Design Hub building. The ongoing projects of the Plaça de les Glòries and the Sagrera APT station are also making it one of the most dynamic enclaves in the city.



## PUJADES CAMPUS

IAAC is housed in two old factory buildings, with 4.000 m2 of space for research, production and dissemination of architecture.

The space itself is a declaration of principles, embodying an experimental and productive approach to architecture.

The IAAC Pujades Campus premises include the Fab Lab Barcelona, an architecture and design-oriented digital fabrication laboratory, and a second Fabrication Laboratory, entirely dedicated to the development of IAAC students projects.



## VALLDAURA CAMPUS

Valldaura Labs is IAAC's second campus located in the Collserola Park, the green heart of Barcelona's Metropolitan Area.

The campus is a 130 hectares park and testing ground for innovation, that features the latest technologies in the fields of energy, information and fabrication.

The core of this innovative project developed by IAAC is a series of laboratories that work to set a new benchmark for self-sufficiency.

The Valldaura Labs premises include the Green Fab Lab, a fabrication laboratory oriented towards self-sufficient and productive solutions. The Food Lab and the Energy Lab, allowing students to research the specifics of the production of key elements involved in self-sufficiency.



## MASTER IN ADVANCED ECOLOGICAL BUILDINGS & BIOCITIES MAEBB 01

IAAC's immersive Master in Advanced Ecological Buildings and Biocities (MAEBB) is an innovative educational format that offers interdisciplinary skills and understanding through the research on new categories of projects, technologies and solutions related with the design, prototyping, and fabrication of ecological buildings.

The curriculum of the program is diverse: from intense and targeted workshops with leading experts to module courses, regular seminars and lectures, as well as a year-long project with an emphasis on real scale prototyping.

The program addresses the following themes: Contemporary Theory and Practice of Ecological Architecture, Digital Fabrication, Ecology, Solar Energy and Thermodynamics, Eco-Materials, Advanced Structures and Metabolic Building Systems.

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ACADEMIC STRUCTURE

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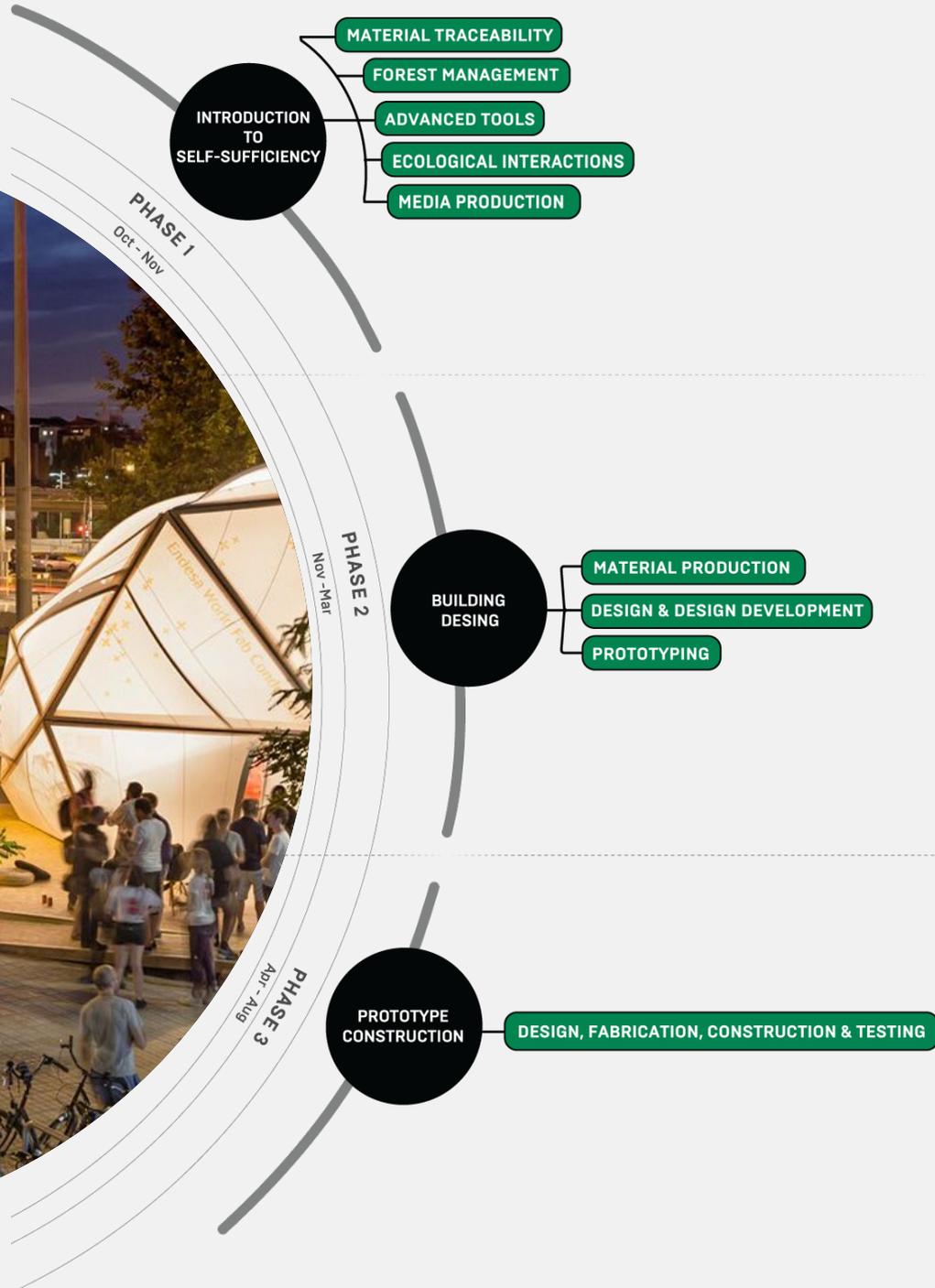
SEMINARS & WORKSHOPS

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# MASTER IN ADVANCED ECOLOGICAL BUILDINGS & BIOCITIES

## MAEBB 01

The program is structured in three interrelated phases: The first phase of the program will take place during the first two months in which students will take a series of modules and seminars. The second phase takes place during the following five months, developing the project for an urban self-sufficient building, including all the different layers. The last phase occurs during the last five months of the program, in which students will collectively create the design concept, strategies, fabrication techniques and blueprints for an ecological building prototype, and they will embark in the construction of the previously-developed building phase.



### INTRODUCTION TO SELF-SUFFICIENCY

PHASE 1

#### Immersive Experience October to November

The opening course of the Master program incorporates a wide range of concepts and skills, as a means to introduce students to key elements of the program, and living in community.

The workshop involves learning about the local production of resources (including food, energy and things), the management of the forest, material traceability and tree selection for material production, as well as design and construction at a 1:1 scale, with the intention of introducing students to critical skills related to using tools and equipment, construction schedules, team building and team working, project management and design-build. The workshop culminates in a 1:1 scale constructed structure built collectively by students.

### BUILDING DESIGN

PHASE 2

#### Building scale conceptual design November to March

With the objective of equipping students with the necessary skills and knowledge required to master the intricacy of factors related to designing ecological buildings, phase 2 of the postgraduate program focuses on the conceptual design and design development of an advanced ecological building in the context of a biocity. Throughout a series of iterative and linearly progressive modules, students develop an advanced ecological building at a block-scale. This process uses applied learning techniques with the objective of teaching students how to demonstrate the application of acquired concepts and subjects within the framework of advanced technologies and ecological design. Students have the opportunity to explore and investigate key aspects of ecological design development before implementing them in the design and construction of a prototype ecohouse later in the year.

### PROTOTYPE CONSTRUCTION

PHASE 3

#### Collective design, prototyping and construction April to August

This phase consists in the collective design, fabrication, construction, and testing of the self-sufficient prototypes for a small unit to be deployed in Valldaura Campus or anywhere, after agreement with partners organizations.

PHASE 1

# INTRODUCTION TO SELF-SUFFICIENCY

The opening course of the Master program incorporates a wide range of concepts and skills, as a means to introduce students to key elements of the program. During the first weeks of the Master the students will start a series of introductory workshops to the multiple aspects that are addressed during the Master Program and in community life in Valldaura

## FOREST MANAGEMENT

During this course, students will have the opportunity to know how the forest works, how it grows, and how sustainable management can be carried out, so that each year wood can be obtained for the production of energy (biomass) or the production of structures or buildings. The different tree species, their form of growth and their impact on the atmospheric supply of CO2 will be analyzed. The course will work with a specialist for cutting down trees and subsequent handling.

## PARAMETRIC DESIGN

Parametric processes and new design methodologies are not only changing how we design and think but reshaping the processes on how we approach a goal. Advanced digital tools is a course which purpose is to explore the relationship between emergent digital parametric driven design at architecture scale based on algorithmic design logics. These tools help us to focus on design logics allowing us to create automatized scripts in order to test multiple variations of the same design logic. These technologies gives us not only the ability to generate non-standard, customized designs but the ability to bring into consideration many more conditioning on the design workflows to develop performance designs and optimized them.

## ADVANCED TOOLS

In this course we will look at the principles of environmental building design, starting with basic climate analysis, environmental site analysis, environmental design process and passive/responsive solar design systems. We will be using specialist simulation software (grasshopper + ladybug tools) to evaluate the performance of buildings in terms of Shadowing, Solar radiance and Daylight Performance. This knowledge will enable students to further explore these principles in their projects, as well as expand into this field.

## ECOLOGICAL INTERACTIONS

The course is an experienced based engagement in management and implementation of an intensive organic agriculture farm. Whilst practical and hands on, a general botanic theory will guide the development and investigation of agricultural and ecological systems and complex planting methods. Full traceability in nutrient flows, energy and labour costs will be mapped from planting to produce, from garden to plate and from below ground to above ground. This will be achieved by constant sensing, logging, scanning and plant development tracking over time. In this way we will measure the productivity of our farming experiences, making them measurable, methods comparable and ultimately demonstrate the viability of our interventions.



## MEDIA PRODUCTION

This course creates the basis for the production of content through various formats (writings, videos, photographs, documentaries) that will be used throughout the course to communicate the various projects and initiatives that are developed in Valldaura. The objective is to achieve greater dissemination and influence of ideas linked to ecological design, bio cities, and the development of a low carbon economy. The course will be led by media professionals and students must produce and publish their own content. During the Master a documentary will be produced. In it, the relationship between the contents that students develop and various aspects related to the city and the ecology will be explored.

## READINGS

This seminar provides the intellectual and theoretical foundations for all study and explorations of ecological buildings and biocities. Students are introduced to the premise of advanced design through digital tools, and the role of architects in creating a symbiosis between natural and built environments.

## LECTURES

The Master program hosts lectures by external experts in the multiple interrelated disciplines. The goal of this lectures is to provide students with a broad perspective on the construction of cities, development of ecological buildings, as well as the constructive techniques and systems. Additionally, students have full access to all the lecture series organized at IAAC in its 22@ location.

PHASE 2

# BUILDING DESIGN

**Structure of the Modules:**

**THERMODYNAMIC FABRICATIONS**

Faculty: Javier Garcia Germán

This module playfully develops morphological prototypes derived from heliotropic and thermodynamic inputs. These morphological prototypes respond to both external and internal inputs. This includes radiation, convection, conduction, but also humidity, temperature and wind flows. These inputs are the only design inputs to start crafting form-oriented prototypes. There is no consideration of any active systems. The goal of this module is to: (1) explore external design strategies including compactness, slenderness, expansivity, horizontally, fragmentation as well as the positionality (over, under, elevated, etc) in response to solar, wind and temperature inputs; (2) explore internal design strategies including revisited devices such as as courtyards, atriums, solar chimneys, double skins, horizontal galleries, diagonal ventilations, etc..

**ECOSYSTEMIC STRUCTURES**

Faculty: Elena Orte and Guillermo Sevillano

After the loading of conditions for the design of ecologically positive buildings, this module explores its structural possibilities. Considering new technological advancements in manufacturing processes as well as in material innovations, this module formalizes previous exploration in a structural scheme. This section will design, fabricate and test few structural variations of the project. The outcome of this module is a series of digitally fabricated models.

**METABOLIC BUILDING SYSTEMS: WATER, ENERGY & INFORMATION**

Faculty: Jochen Schreer/ Oscar Aceves/ Guillem Camprodon

Buildings are bundles of materials and flows that are in constantly flowing in and out of its footprint. This module explores these metabolic systems that support the daily life of buildings to projectively envision new ways of dealing with them. If most of buildings today have a linear metabolism, consuming resources, energy, water and information and generating waste products and emissions, the potentials to develop building as a circular metabolism is yet to be fully develop. By looking at water systems, foods, information, carbon emissions, waste products, the goal is to come up with feedback loops that enhance the ecological performance of buildings.



**WALL AND FAÇADE DESIGN & FABRICATION**

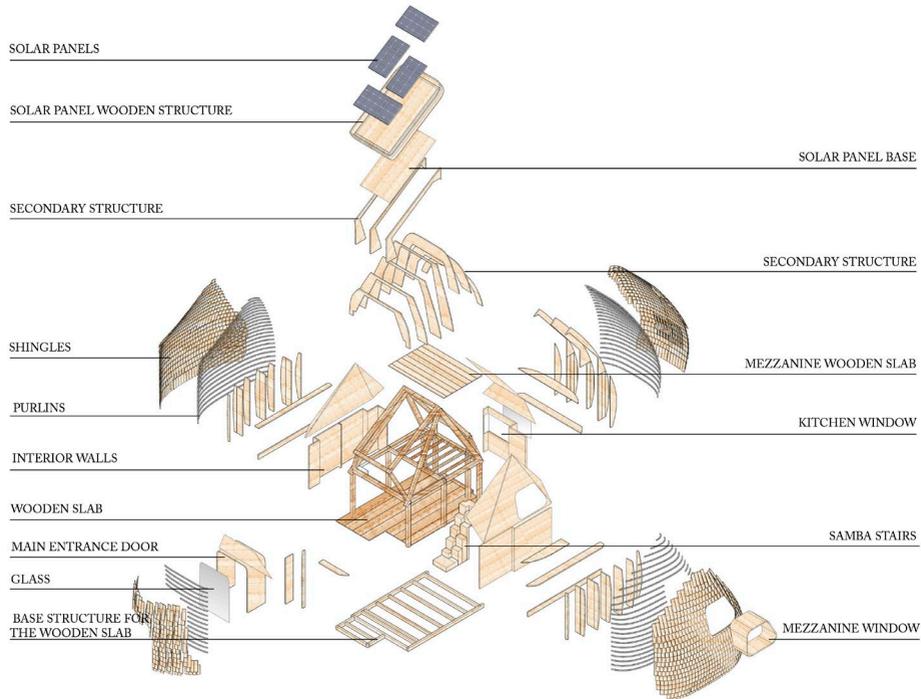
Faculty: Miquel Rodriguez

An important percentage of the environmental, thermal and ecological performance of a building has to do with the façade. Historically at the center of the design concerns, today façade design is in many cases the selection of solutions from pre-given catalogs and systems. This module is intended to control the performance of a building through its wall system. By designing the material(s), the arrangement of layers, thickness and its shape, buildings could achieve a much powerful environmental, thermal and ecological performance.

**SYNTHESIS AND EXHIBITION**

Faculty: Vicente Guallart, Daniel Ibañez and Marziah Zad

While the effort of this Master is on the design and prototyping of ecologically driven buildings, this module will address the potential site settings that could be relevant of the project. Envisioning the complete design of the project on a particular place enables to think in questions of density, urban design, landscape architecture. The goal, therefore, is to create larger systems having the eco-buildings as unit. The goal is to explore potential feedback-loops and couplings with the immediate physical environment from a urban design and landscape architecture perspectives.



PHASE 3

# PROTOTYPE CONSTRUCTION

## MATERIAL PRODUCTION

Faculty: Michael Salka

One of the bigger environmental impacts of buildings is its material configuration. This module explores the use of ecological materials such as timber. Each student is assigned with one tree from Valldaura forest to transform it into a construction commodity to be later implemented into the prototype. Each student is commissioned with the task of tracing the complete transformation of the tree into an architectural form.

## DESIGN AND DESIGN DEVELOPMENT

Faculty: Daniel Ibañez, Vicente Guallart, Marziah Zad

This block consists of the design and development of the technical documents of a real ecological building prototype that will be fabricated and built during two months at Valldaura during summer of 2021. For that to happen, students utilize all the knowledge and expertise acquired during the previous months working as a single team of faculty and students for the design development of the project. This phase of the Master will be joined by renowned experts advising on a series of topics ranging from ecological material to energy technologies.

## PROTOTYPING

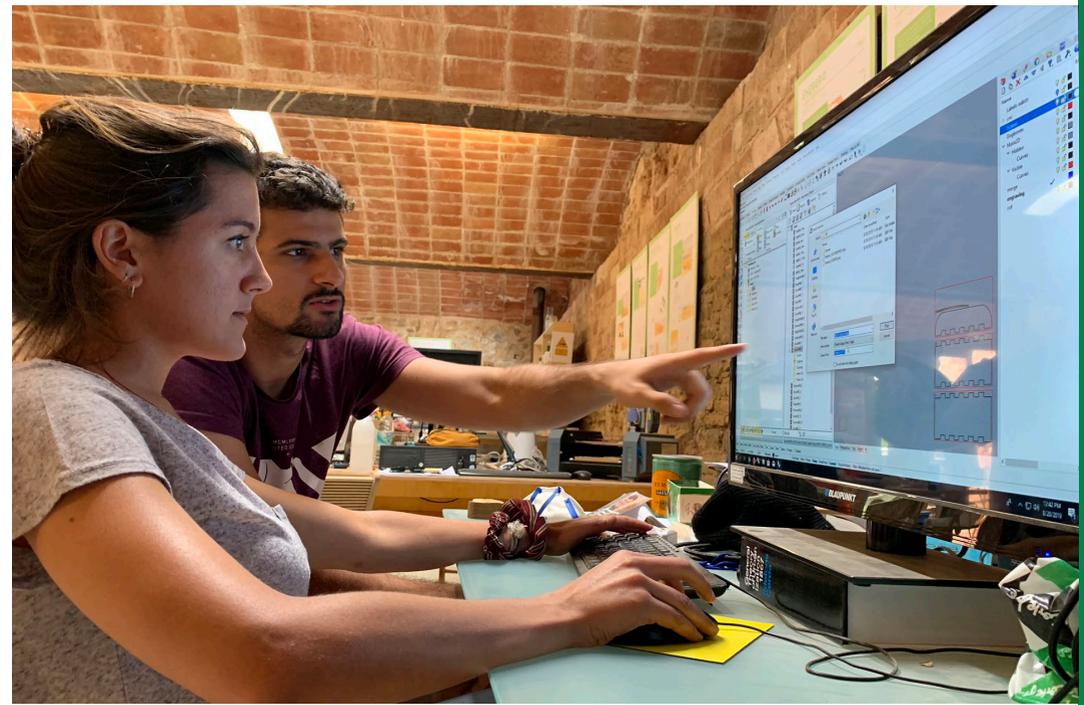
Faculty: Daniel Ibañez, Vicente Guallart, Marziah Zad, Michael Salka

Following the design development process, students will undergo prototyping the approved collective design, in order to determine optimal construction techniques and strategies as well as troubleshoot particular challenges. Students will use this time to develop a fabrication and assembly timeline as well as determine the best order of operation for each aspect of the construction. Students will test construction systems, structure and details in advance of the final phase, as a final opportunity to experiment with practical systems and explore possible solutions, in order to ensure that fabrication and assembly of the final phase runs smoothly.

## CONSTRUCTION

Faculty: Daniel Ibañez, Vicente Guallart, Marziah Zad, Michael Salka

During two months, students work on the construction of an ecological building prototype at a real scale. This building prototype integrates all the technical and constructive elements in order to make it livable. This process utilizes parametric design techniques, advanced digital fabrication and ecological design principles. Students live the experience of building it's one building in collaboration of professionals and local experts in a unique natural environment.





Lecture by:  
Carmen Pigem - RCR Arquitectes



Lecture by: March Palahí - EFI Director



Valldaura Tech Brunch -  
Co-Action to fight the Climate Crisis  
Co-organized with COACT



## MASTER IN ADVANCED ECOLOGICAL BUILDINGS & BIOCITIES MAEBB 02

The MAEBB02 structure follows an 11 month long postgraduate program followed by a 7-month long intensive applied research program in the field of Advanced Ecological Design.

MAEBB02 second year, comprises an applied research agenda which incorporates investigation and research in material ecology, metabolic cycles, renewable energy and resources, and advanced construction systems at the intersection of advanced technologies, ecological awareness and architectural design.

The second year of MAEBB02 focuses on the development of advanced, ecologically conscious solutions in collaboration with professional partners and Industries to answer the current needs and challenges of our environment and rapidly depleting non-renewable resources.

# MASTER IN ADVANCED ECOLOGICAL BUILDINGS & BIOCITIES

## MAEBB 02

### Academic structure

The objective is to allow students an opportunity for in-depth study and to develop a line of research related to themes and concepts learned throughout the immersive Master in Advanced Ecological Buildings program. The program is structured around a comprehensive development of an existing body of research, together with instruction from IAAC faculty and feedback from industry partners.

The course runs as an independent study of a mixed group of graduates from the MAEBB program, with interests in strategies in self-sufficiency, ecological awareness, material ecology, and advanced technologies towards an environmentally aware building design. During the second year, students have the opportunity to develop a project of their chosen focus. If the project illustrates a strong potential that is seen from the IAAC, the institution can take the decision to collaborate in the launch of a crowdfunding campaign in order to support the evolution of the project into a business development process of its own.

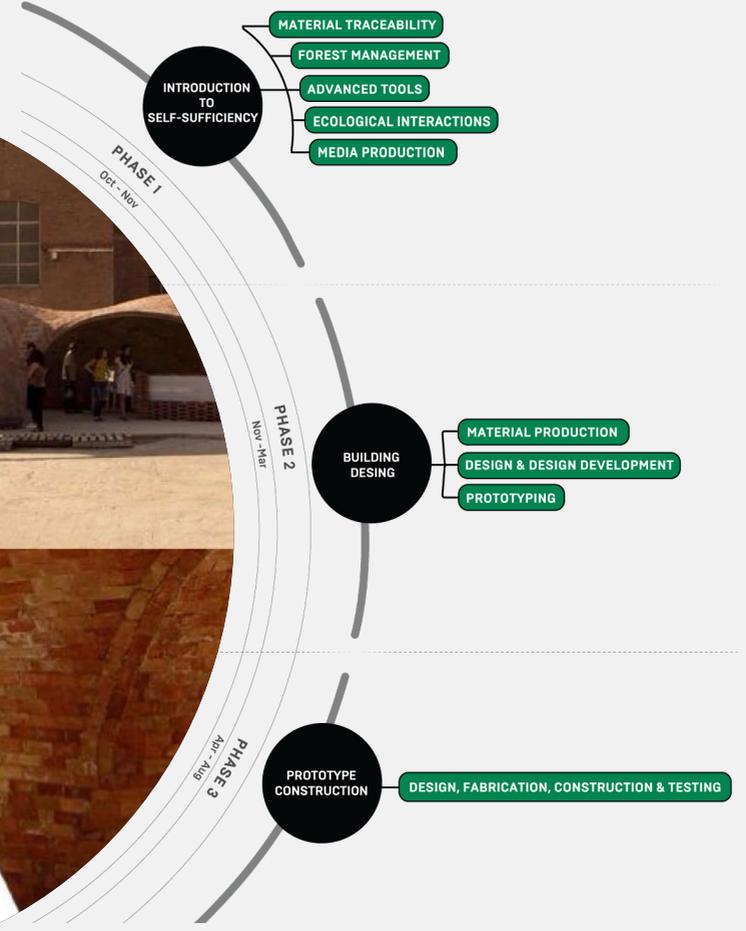
### The activities included in the program are:

Research and explorations on a line of research approved by the program faculty and directors.

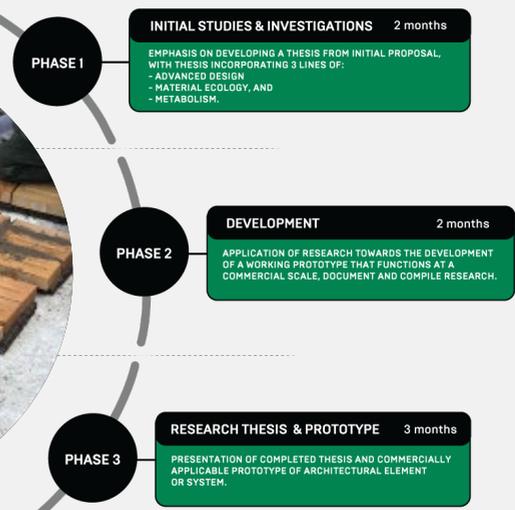
Project proposal, including a research report, prototypes and relative models communicating design intent, feasibility and functionality of the proposal

Research thesis and 1:1 scale prototype of proposal which aligns as closely as possible with commercial functionality and practical architectural application.

### MAEBB 01 11 MONTHS



### MAEBB 02 07 MONTHS





## RESEARCH LINES

### Advanced Design

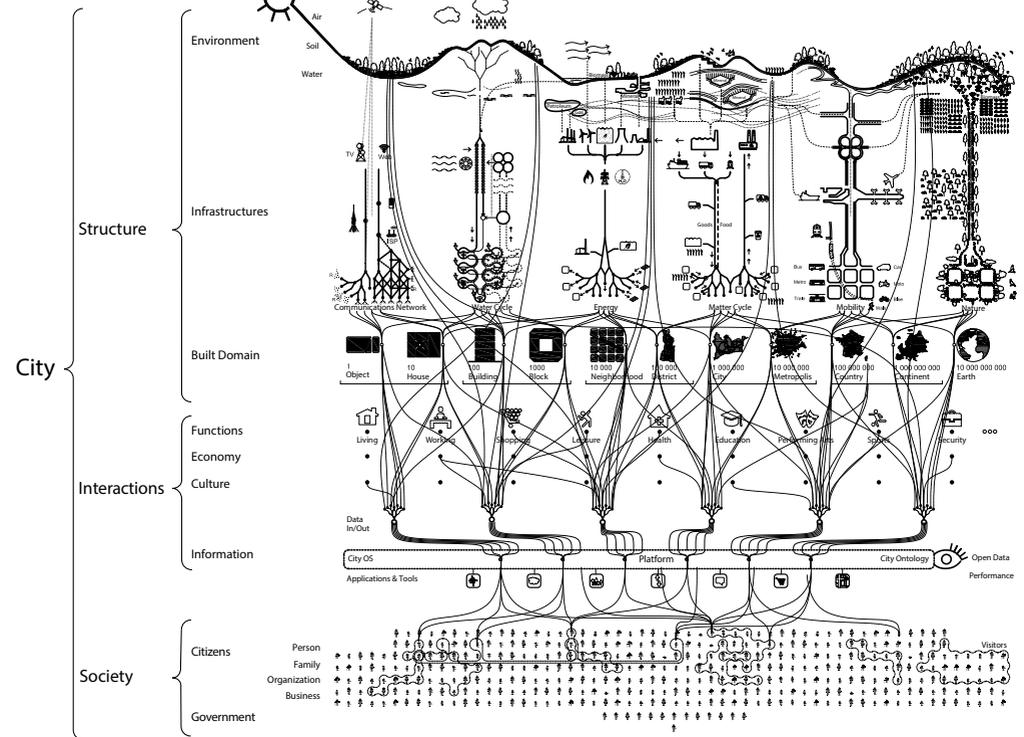
New digital technologies allow for a more advanced and associative design approach; simultaneously responding to complex and independent criteria related to climate, renewable resources, structure, performance, manufacturing and much more.

### Material Ecology

Based on a scientific approach to the environmental impact of materials in construction, this line creates a platform to study material footprint and find solutions to incorporate environmentally friendly materials in design, or to find solutions for repurposing existing waste into innovative and progressive opportunities in building materials.

### Metabolism

Investigation of energy and water cycles, building cycles, thermodynamics are a core focus of this research line. Any proposal should account for strategies in moving towards the objective of self-sufficiency and zero net emissions through study and optimization of related metabolic structures.



Anatomy of a Biocity

## LEARNING OBJECTIVES

Opportunity for comprehensive and in depth research in advanced ecological design strategies

Integration of digital tools, campus facilities and network to support and direct research and design solutions for a holistic understanding of applied research in the professional field

Material research following an investigative methodology in the development of materials, solutions to repurposing of existing waste materials, and understanding material footprint and ecology.

Development of a research-based design methodology that integrates multiple aspects related to future ecological design and construction related to metabolic structures, economy, material ecology, policy, environment, etc.

**MASTER IN ADVANCED ECOLOGICAL BUILDINGS & BIOCITIES FACULTY**



*Directed by:*  
**VICENTE GUALLART**

*Directed by:*  
**DANIEL IBAÑEZ**

**IAAC Founder / Valldaura Labs Director / MAEBB Co-Director**

**MAEBB Co-Director**

Vicente Guallart was chief architect of the Barcelona City Council during 2011-2015, with the responsibility of developing the strategic vision for the city and its major development projects. He is the co-founder and former director the Institute for Advanced Architecture of Catalonia (2001-2011) where he led projects such as Media House Project (with MIT's CBA), HyperCatalunya, or the Fab Lab House. His professional office, Guallart Architects has developed widely published projects in several scales around the world, and he published many books during his professional career.

Daniel Ibañez is a director of the Master in Advanced Ecological Buildings and Biocities. In parallel to his leadership role at IAAC, Daniel is a practising architect and urbanist, and founder and co-director of the design firm Margen-Lab: a transcalar targeted office invested in the developing more ecologically powerful and materially exuberant design. Daniel currently is an instructor and Doctor of Design candidate at the Harvard GSD, editor of New Geographies, and researcher at the Harvard Office for Urbanization. Since 2015, Daniel is an editor at UrbanNext.

*Head of Studies:* **MATHILDE MARENGO**

*Coordinated by:* **MARZIAH ZAD**

**FACULTY**

**LAIA PIFARRÉ**  
Operations Manager at Valldaura Labs

**ELENA ORTE**  
MAEBB Faculty

**MARZIAH ZAD**  
MAEBB Academic Coordinator

**GUILLELMO SEVILLANO**  
MAEBB Faculty

**MICHAEL SALKA**  
Technical Coordinator of Valldaura Labs

**MIQUEL RODRÍGUEZ**  
MAEBB Faculty

**JORDI UBACH**  
Food Lab Manager

**OSCAR ACEVES**  
MAEBB Faculty / Energy

**HONORATA GRZESIKOWSKA**  
Urbanization.org coordinator

**JOCHEN SCHEERER**  
MAEBB Faculty / Water

**JONATHAN MINCHIN**  
Ecological interactions - fab lab Barcelona

**GUILLEM CAMPRODON**  
Sense making - Fab Lab Barcelona

**JORDI PRAT**  
Green Fab Lab Manager

**MARTA DOMÈNECH**  
MAEBB Faculty / MAP 13

**DARIA BYCHKOVA**  
MAEBB Faculty

**DAVID LÓPEZ**  
MAEBB Faculty / MAP 13

**TRISTAN COPLEY SMITH**  
MAEBB Faculty

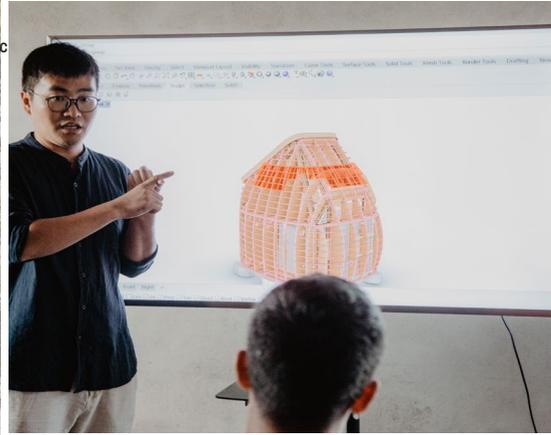
**MARIANA PALUMBO FERNÁNDEZ**  
MAEBB Faculty / MAP 13

**JAVIER GARCÍA-GERMÁN**  
MAEBB Faculty

**ALEX OLLERO**  
MAEBB Faculty

MAEBB

# MAKING PROTOTYPES



## VALLDAURA TINY HOUSE 01 2019

The prototype ecohouse is the collective final project of the 2018-2019 MAEB Master program, and the result of 6 weeks of dedicated design and 8 weeks of fabrication and assembly accomplished by students, with the support, guidance and technical assistance of sponsors, specialists, consultants and instructors.

This prototype showcases many inclusive, innovative, environmentally aware and self-sufficient solutions, including:

- An integrative design, synthesizing inputs from across the diverse building cultures and systems of our international student body
- A fully traceable primary structure, fabricated completely from zero km pine harvested from the Valldaura forest
- Translation of a low tech, universally established shingling system into a morphologically responsive, materially optimized envelope using advanced computation, and fabricated from zero km oak harvested from the Valldaura forest
- Fully off grid and self-sufficient metabolic systems

One of the significant factors in the design and construction of the Prototype Tiny House is the conscious effort to reduce the building's ecological footprint through intelligent solutions in material use, transport and production. MAEB is very proud to have made advantageous use of a harvest of timber from the Valldaura forest this year, to produce the Tiny House structure and envelope.

## FABLAB CONDENSER 2014

The Fablab Condenser is a pavilion for the FAB10 Symposium completed in Barcelona, in July 2014. It is a project with the Initial design by Margen-Lab, produced by IAAC and collaborative designed, build, and customized by the FabLab Network.

The pavilion is a thermodynamic prototype — a bioclimatic dome installed at the fast-changing Plaça de Glories, within the framework of the BCN FAB10 Congress, the 10th international congress on digital fabrication.

It was designed on a global scale (Margen-Lab in collaboration with IAAC and the Fab Lab Network), the materials are renewable and have an organic origin (wood and linen, materials grown with the sun) and manufactured locally (industries and fabrication laboratories from Barcelona and vicinity). The prototype was designed (written in code) in 2 months, manufactured in 5 days and assembled in 4 arrived with the help of volunteers from Fab Labs (fabrication laboratories) worldwide.

All materials used are of organic origin (linen and wood) and obtained locally. All industries and companies involved in the process are medium scale and located within an 80km radius.

Finally, the assembly process is fully reversible. Wood and fabrics are easily removable (in just one day) and easily reusable or recyclable.





## ENDESA PAVILION 2011

ENDESA Pavilion is a self-sufficient solar prototype installed at the Marina Dock, within the framework of the International BCN Smart City Congress. Over a period of one year it will be used as control room for monitoring and testing several projects related to intelligent power management.

The pavilion is the prototype of a multi-scale construction system. A facade composed by modular components, like solar brick, that respond to photovoltaic gaining, solar protection, insulation, ventilation, lighting ... The same parametric logic adapt façade geometries to the specific environmental requirements for each point of the building.

It is a single component that integrates all levels of intelligence that the building needs. From "Form Follows Function" (classic XX century statement) to "Form Follows Energy". The facade opens reacting to the solar path, being active and becoming permeable towards south, while becoming closed and protective towards north. The behaviour of this skin makes visible the environmental and climatic processes that surrounds the prototype.



## FABLAB SOLAR HOUSE 2010

The IAAC designed the Fab Lab house as an entry into the 2010 Solar Decathlon Europe.

The Solar House is a new generation FabLab home with the goal of world-wide personal manufacturing through the platform of Fab Labs, or fabrication laboratories. The production methodology of the house is founded in a structure fabricated from common materials sourced globally (plywood panels, etc.), and in the use of locally found machinery (laser cutting and/or milling machine). It is an affordable housing solution, designed with a combination of simple construction, geometric sophistication and technological wealth, both in its creation as an energy system as well as in the active and passive management of the house.

### MATERIAL SELECTION

The selection of wood, not steel, as the basic structural material is deduced from two lines of thought, the first being that a solar house must be reduced from a solar material and the second that the choice of wood leads to structural elements and components which are small, light and manageable.

### CONSTRUCTION AND ASSEMBLY

We propose a pre-fabricated wooden construction in which all its structural components are laser cut. Upon arrival to site, each section is then lifted and fixed into place.

### TECHNOLOGICAL EFFICIENCY

Through the utilisation of a global network of production laboratories (FabLab's), we begin to promote the idea of using the Internet to make things.



MAEBB

# COLLABORATIVE ENTITIES

VISOREN



TALLFUSTA



SALTOKI



PREMAPRETA



DISTRIBUCIÓ SOSTENIBLE



ALTER-ENTORN



SANESECO



SANTA & COLE



NOUMENA



MAUSA



PHILIPS



PARC DE COLLSEROLA



