

# ArboReal Home \_home as a living structure

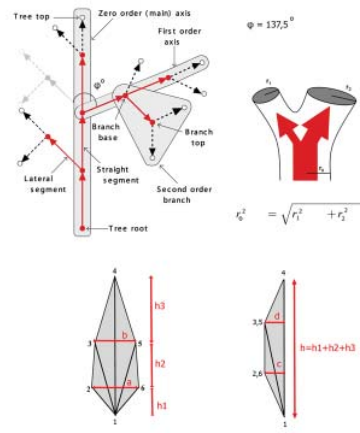
We think of the home as an indistinct that fits itself symbiotically into the surrounding ecosystem.

- How can we measure a tree?
- What kind of systems and techniques will allow us to understand the geography, the geometry, the structure and its logic?
- How can we apply the logics of the trees in a living space?
- How can we design a living structure grafted into shape?
- Could homes grow from native trees?

Nature, understood as a vast field for research, can be considered as the territory to develop any architectural process, thus requiring the recognition of its basic principles and functional logics, in order to be able to interact with it in a specific and precise manner.

It is important to identify what are the methods that allow us to measure and evaluate any kind of reality –geographic, physical, social, economical, or other- in which the project will be inscribed. For instance, one needs to know the measurement and analytical techniques of those elements that have historically been part of architecture, either as references or even tangentially. Yet today, natural elements like trees, mountains, rivers, waves or clouds, have also become objects of analysis, thanks to the advances in science (i.e. fractal geometries) and the development of sophisticated digital tools for representation. Beyond taking advantage of their extreme accuracy, today the use of these digital technologies presents us with further possibilities: indeed, we are now capable of creating structures, forms, textures and realities that can deploy the principles we have learnt from natural environments, in a way that allows us to profoundly react and interact with them.

Considering these premises, the Introductory Design Studio will be dedicated to resolving a very basic project (not simple), with the ultimate goal of setting up a clear work methodology, structured in the different phases that are required to develop any architectural endeavor, which aims at interacting with a place or specific contextual elements and emerge from the logics that exist in them.



1. a trunk

2. growing branch

3. weight limitation (no heavy...)

4. special limitation (grow out of trunk...)

5. genetics determination (verticality)

6. finding a way to grow (avoiding...)

branching process of growth, tendencies and limitations

trunk being "a mass" and a lift of the whole structure, connecting roots with foliage

structural and static characteristics

sectors: branching surrounded by the foliage - differentiated space inside and outside of the foliage

growth of the structure - a tree itself

structure - intense, condensed branches searching for a space to grow

sequence of horizontal sections



The Introductory Design Studio will be divided in 2 main phases:  
1. Tree Measurement (Oct. 9th –Oct. 27th)  
2. ArboReal House Design, development and fabrication (Oct. 28th- Nov.27th)

## **PHASE 1\_Tree measurement**

This phase will begin with the study of a tree, selected from a series of specimens, found in the Ciutadella Park in Barcelona. The objective of this phase is to gather very precise information to develop specific cartographic documentation, with clever graphic modes that accurately represent the collected data. From their assigned tree, students will be required to address at least these issues:

- Drawing in detail of the geometry of its trunk and branches, based on a specific observation and analysis, given limited and specific measuring tools.
- Photographic documentation and drawing in detail of its leafs and fruits
- Development of functional diagrams of the tree itself, such as the internal flux of energy, its exchange with the environment, its connection with the ground, its provision of habitat for other species, its growth, etc.

This phase will be also dedicated to draw, using digital tools, the different elements of the tree. This includes:

- Orthographic drawings and three-dimensional modeling of the macrostructure of the tree and its different elements
- Digitally represented functional diagrams of the tree

## **PHASE 2\_ArboReal House Design/Development/Fabrication**

This phase will focus on elaborating the geometric and functional principles for the design of an arboreal house structure, based on the logics that have been recognized with the previous analysis, as well as those that may be adopted and proposed by students as part of their individual projects.

Student's house design proposals should be based on basic geometric principles of the previously analyzed tree, applying the selected functional logics of their own or other arboreal species.

The house design proposal should take into consideration the specific tree with the objective of creating a new hybrid and botanical species (partially natural and partially artificial) where tree and house structure work as a single organism.

The final model to be presented will be a fabricated model in 1:5 scale of the tree.

## Calendar:

The class will meet on the following days:

### Phase 1

Friday, Oct 9 Introductory lecture + Visit to the Collserola park

Tuesday, Oct 13 PRESENTATION 1 (Photographic documentation, measurement system, measurements, detailed drawings of trunk, leafs and fruits)

Friday, Oct 16 Desk crits, Requirements: Global/Geometrical analysis, Diagrams of understanding the tree as an organism

Friday, Oct 23 PRESENTATION 2 (Representation, 2D and 3D digital models of tree's macrostructure and elements, functional diagrams)

Tuesday, Oct 27 MID REVIEW PRESENTATION PHASE 1 (with external critics)

### Phase 2

Wednesday, Oct 28 Introducton to Grasshoper/Short tutorials, Introduction to Phase 2

Friday, Oct 30 Desk crits, Requirements: Clear design proposal of the ArboReal House, Analysis of the Tectonics of the structure proposed

Mon Oct 2-Wed Oct 4 Intensive 2 day workshop developing the design proposal, Guest Tutor: Michel Rojkind

Friday, Nov 6 PRESENTATION 1 (Design proposals,working models)

Friday, Nov 13 Desk crits, Requirements: Structure/Skin/Material development, Tectonic detailed model, scale 1:5 of the tree

Friday, Nov 20 Desk crits, Project development

Friday, Nov 27 FINAL PRESENTATION



## References / Bibliography

### Books:

Benoit Mandelbrot , The Fractal Geometry of Nature

Vicente Guallart (2009) Geologics

Alejandro Bahamon, Tree Houses, Living a dream

Neil Gershenfeld (1999) When things start to think, Publisher: Coronet Books

David Gissen, William McDonough (2003) Big & Green Toward Sustainable Architecture in the 21st Century, Publisher: Princeton Architectural Press

Reiser+Umemoto (2006) Atlas of Novel Tectonics

David Greenberg, Treehouses in Paradise: Fantasy Designs for the 21st-Century

The Self Sufficient Housing (2005) 1st advanced Architecture Contest, Publisher: Actar

Felix Guattari (2000) The Three Ecologies

Phyllis Richardson XS ecológico Grandes Ideas para pequeños edificios

Neil Gershenfeld (2005) FAB: The Coming Revolution on Your Desktop--From Personal Computers to Personal Fabrication. Publisher: Basic Books

Jeremy Rifkin (2002) The Hydrogen Economy, Publisher: Polity Press

Gregory Bateson (2000) Steps to an Ecology of Mind

(part of book chapters on line:

[http://books.google.es/books?id=HewJbnQmn1gC&pg=PA21&lpg=PA21&dq=GREGORY+BATESON+HOW+MUCH+DO+YOU+KNOW%3F&source=bl&ots=uJquU2lvJp&sig=vNhHON4TPVnyYVkk8u1jyrnQoyQ&hl=es&ei=UoXDSfjkEZmzjAfw-bSUCw&sa=X&oi=book\\_result&resnum=1&ct=result#PPA24,M2](http://books.google.es/books?id=HewJbnQmn1gC&pg=PA21&lpg=PA21&dq=GREGORY+BATESON+HOW+MUCH+DO+YOU+KNOW%3F&source=bl&ots=uJquU2lvJp&sig=vNhHON4TPVnyYVkk8u1jyrnQoyQ&hl=es&ei=UoXDSfjkEZmzjAfw-bSUCw&sa=X&oi=book_result&resnum=1&ct=result#PPA24,M2))





### Websites:

<http://www.math.yale.edu/mandelbrot/>

<http://www.javaview.de/vgp/tutor/lsystem/PaLSystem.html>

[http://www.biologie.uni-hamburg.de/b-online/e28\\_3/lsys.html](http://www.biologie.uni-hamburg.de/b-online/e28_3/lsys.html)

<http://www.archinode.com/bienal.html>

<http://www.freespiritspheres.com/>

### Videos:

<http://www.youtube.com/watch?v=IdBbH2fcEYM> ( fab tree hab)

<http://bigthink.com/mitchelljoachim/the-fab-tree-hab-finding-home-in-living-organisms>

<http://www.youtube.com/watch?v=npW8rJdhHQ0> (free spirit spheres)

### Tree House References:

MIT, Team H.E.D. [Human Ecology Design] The Fab Tree Hab  
Baumraum, Pre-fabricated tree house, (based on biomimicry)

Tom Chudleigh , Free Spirit Sphere

Andrew Maynard, Styx tree houses

Richard Reames, Tree branches housing

Tham + Videgard Hansson Arkitekter, Tree glass hotel suites

StudioLukaszkos, 4treehouse

BaumRaum, Palm-Fiction

New Zealand Yellow Pages, Tree house restaurant

Takashi Kobayashi, Nescafé tree house

### Faculty: Areti Markopoulou, Luis Fraguada

Guest Tutor: Michel Rojkind

Advisor: Gerard Passola (Ecologist, Biologist)

