

MASTER  
PARAMETRIC DESIGN  
IN ARCHITECTURE

The master is taught in the School of Architecture of the Vallès (ETSAV), offering:

- Residence of international students.
- Equipment and facilities of the latest technology necessary for this training
- Model workshop.
- Digital laboratories and technology centre CRITT
- Collaboration with FAB-lab workshops Barcelona network



L'escola metropolitana  
d'arquitectura

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UNIVERSITAT POLITÈCNICA DE CATALUNYA  
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Escola Tècnica Superior d'Arquitectura  
del Vallès

UPC VALLÈS

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SC UPC, 2015 // Imatge coberta: "Almond pavilion", CODA // coda-studio.com // Autor: Anobis Rajzer

MASTER  
PARAMETRIC  
DESIGN IN  
ARCHITECTURE

This master, trains professionals in advanced architectural creation, focused on efficiency in buildings and environmental commitment.

# MASTER PARAMETRIC DESIGN IN ARCHITECTURE

The emergence of ICT has supposed a paradigm shift for architecture. Parametric design, digital manufacturing, 3D printing and prototyping are revolutionizing the scene of the XXI century architecture and opening doors to new models of sectoral development and new multidisciplinary professional profiles able to meet the challenges of this socio-economic change.

The architectural project is a complex process that should allow linking knowledge management with design in an operative way. We call parameters to all categories of information that affect decision-making in the development of a project. This is the goal of parametric architecture: go beyond geometry and form to design a system with all variables / categories involved in the process. This is the potential of current software tools: Grasshopper, Rhinoceros, Revit, Dynamo, etc; which allow to change the design process transforming architects in builders of systems and not just models.

**60**  
...ECTS in two postgraduate courses (form and production).

**25**  
...places that guarantee a personalized and continuous attention by experts in their field.

**100%**  
...of the classes are taught in English, establishing international networks of knowledge.

## Structure and syllabus

The Master is organized into two four-month postgraduate courses, 16/18 weeks each, which can be taken together to obtain the Master, or separately. For the Master's degree it is also compulsory to register for the Master Thesis (6ECTS). Each biannual post-graduate course is structured in a thematic module of 27 ECTS.

### Digital Design and Fabrication:

Design process in general, and particularly in architecture, is a complex process that involves a combination of knowledge, skills, experiences, practices, etc. In recent decades it emerges clearly and unstoppable trend, the so-called digital design, which adds to all the aforementioned factors the use of digital tools. All these techniques converge in parametric design. Already vividly present in the first half of the twentieth century in the automotive sector (geometric design) finally impact on architectural design which represents a new step that has led to a new type of Architecture.

### Performative Parametric Design:

At the end of this second postgraduate course the students will be able to offer skills on handling parametric tools applied to architectural design in all its aspects. Skills that could hardly be obtained through independent courses just based on using parametric software and hardware.

### Faculty

The teachers of the master will be diverse and will come mainly from the faculty who currently teaches in the Schools of Architecture at the UPC, mainly in the ETSAV. At the same time, other parametric-design professionals will be incorporated in a more general concept beyond architecture. It is intended, as it has already been shown previously, to impart a general architectural formation using parametric design, expressly avoiding partial and exclusive approaches to parametric software or digital fabrication.

### Competences

Once the students have qualified the 60 ECTS of MaPDArch they will:

- Be fluent in Parametrics and Algorithmics.
- Acquire both a solid theoretical and technical framework and a strong set of practical parametric design skills.
- Understand digital design paradigm shift, the impact in our society and its state of the art technology.
- Become a professional in the use of software and hardware.
- Be able to lead cutting-edge architectural performance driven design teams understanding the integration of efficiency at design processes.
- Develop a critical attitude in the design itself, so that the knowledge gained will serve for a better, more sustainable and comfortable architecture.
- Improve the competitiveness of professionals in architectural design, based on novelty, change and evolution.
- Achieve and shape a work niche, a new form of enterprise, taking advantage of the entrepreneurial nature of future professionals in parametric design.

## To whom it is addressed?

**60  
ECTS**

To professionals with competence in the field of architectural design, building or town planning and also to other professionals who want to reorient or supplement their skills or start their own business project.

Virtually all of these specialties are likely to use parametric design, and at any stage of the project: Global design. Draft. Basic project. Project execution. Construction system. Design and structural analysis. Facilities. Services. Natural conditioning. Product life cycle.

## What you will take?

The Master consists of one academic year:

### 1<sup>st</sup> four-month course

M1. Digital design and fabrication	<b>27</b>
Parametric geometry <i>Theoretical lectures on mathematical modeling of shapes and objects, with architectural examples.</i>	<b>6</b>
Digital fabrication <i>Knowledge and use of tools, both theoretical (softw.) and practical (hard.) that have allowed the emergence of this type of architectural design.</i>	<b>6</b>
Architect. in the 21st Century. From Sing to Algorithm? <i>Knowing the historical process that has led to a type of architecture has become the paradigm of modernity in the early twenty-first century.</i>	<b>6</b>
Workshop: STUDIO 1_ Informations and systems <i>Learn how to approach architectural design in order to get some projects that have added the parametric design. Negotiation skills.</i>	<b>9</b>

### 2<sup>nd</sup> four-month course

M2. Performative parametric design	<b>27</b>
Parametric Design and BIM. <i>Application of existing BIM architectural software in parametric design.</i>	<b>6</b>
Algorithmics in Technology in Architecture. <i>Project development on construction designs, structural facilities or applying knowledge acquired in the course.</i>	<b>6</b>
Parametric Design in Planning and Landscape <i>Analysis and staging of various parameters, from the point of view of what they report us about the city or territory.</i>	<b>6</b>
Workshop: STUDIO 2_ Postproduction and building <i>Learn how to approach architectural design in order to get some projects that have added the parametric design. Negotiation skills.</i>	<b>9</b>
M3. Master thesis	<b>6</b>