École des Ponts
ParisTech
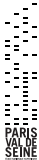
**Enter the world
of data-driven architecture**

DESIGN by DATA

Advanced Master® in Computational Design, Digital Manufacturing, & Building Technologies
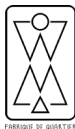
Navier
Architectured materials
and structures

PARIS
VAL DE
SEINE

Architecture & Research

gaîté
LYRIQUE
RÉVOLUTIONS NUMÉRIQUES
ÉTABLISSEMENT CULTUREL DE LA VILLE DE PARIS

PARIS
COLLEGE
OF ART

Art & Culture

VOLUMES .

FABRIQUE DE QUARTIER

Fablab & MakerSpace

HAL
robotics ltd
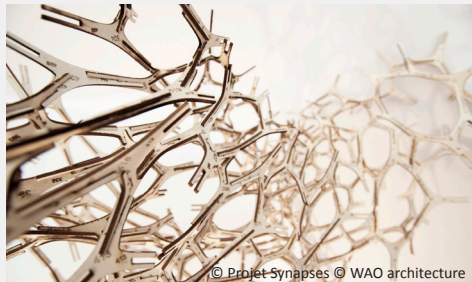
HDA
HUGH DUTTON ASSOCIÉS

XtreeE®
The large-scale 3d

Start-up & Design Office

CLIMATE RIBBON™ / Brickell City Centre - Hugh Dutton Associates © Erieta Attali

DESIGN by DATA
Advanced Master

© Projet Synapses © WAO architecture

Key Words

Architecture - Design - Engineering - Innovation - Digital Arts - Additive Manufacturing - Digital Culture - Robotics - 3D printing - BIM - Computation

"This Advanced Master represents a unique experience to explore the blurring boundaries between art, architecture and engineering."

Francesco Cingolani, Director of the Advanced Master.

Computational designer and co-founder of VOLUMES, a collaborative space in Paris including a coworking, a maker space and a foodlab. Francesco Cingolani teaches computational design and parametric architecture in different design and architecture schools and digital arts centres. He strives to push forward the idea of design as a process without boundaries, merging art, social sciences and collaborative cultures.

Philippe Morel, Head of the Scientific and Educational Committee.

Philippe Morel is an architect and theorist, cofounder of EZCT Architecture & Design Research (2000) and more recently (2015) of the Large-scale 3D printing corporation XtreeE (where he serves as Chairman). Associate Professor at the ENSA Paris-Malaquais where he directs the Master program within the Digital Knowledge department (cofounded with Pr. Christian Girard).

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*T*he DESIGN by DATA Advanced Master provides attendees with a cross-disciplinary culture of computational design and comprehensive knowledge of cutting-edge technologies in the fields of parametric architecture, robotics, digital manufacturing and 3D printing for the construction industry. The program is designed for a selected group of architects, engineers, designers and digital artists and offering a variety of courses, fabrication and prototyping workshops, conferences, digital talks and networking events. The program takes place in a number of locations in Paris and is a real opportunity to enter an international ecosystem of architectural innovation.
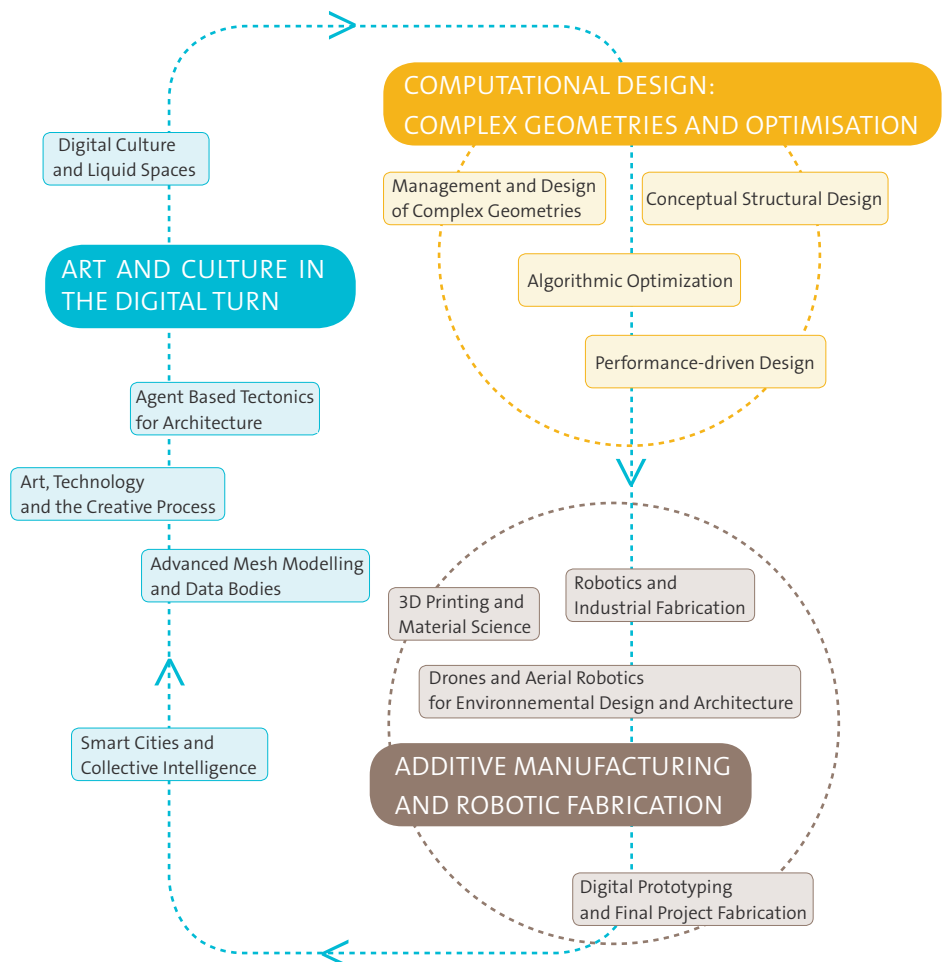
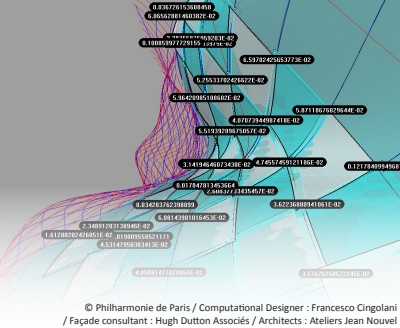## Innovation in a dynamic learning environment

DESIGN by DATA has three main goals:

- providing participants with a solid knowledge of innovative digital cultures and computational tools based on both technical skills and artistic sensibility.

- giving students a broad set of expertise to take advantage of new technologies in manufacturing and digital fabrication (CNC prototyping, 3D printing, industrial fabrication, aerial robotics, etc.).

- encouraging a process-oriented approach to design based on theory of genetic optmisation and the use of environnemental data in architecture.

Program syllabus

The program is 12 months long and is an «Executive» Part-time course (one week a month) with the possibility to work full-time in the fablabs and coworking spaces partners of the program. It includes 366 hours of teaching, a thesis and a viva. The professional thesis can address one of the following types of subjects: 1) a business subject (for companies), 2) a entrepreneurship / start-up project or, 3) a research subject.

Digital Culture and Liquid Spaces

COMPUTATIONAL DESIGN: COMPLEX GEOMETRIES AND OPTIMISATION

Management and Design of Complex Geometries

Conceptual Structural Design

ART AND CULTURE IN THE DIGITAL TURN

Algorithmic Optimization

Performance-driven Design

Agent Based Tectonics for Architecture

Art, Technology and the Creative Process

Advanced Mesh Modelling and Data Bodies

3D Printing and Material Science

Robotics and Industrial Fabrication

Drones and Aerial Robotics for Environnemental Design and Architecture

Smart Cities and Collective Intelligence

ADDITIVE MANUFACTURING AND ROBOTIC FABRICATION

Digital Prototyping and Final Project Fabrication

Program STRENGTHS

- **INNOVATION:** the digital revolution is changing our way of using and thinking about objects and spaces: enter the world of non-standard design and evolutive architecture.

- **TRANS-DISCIPLINARITY:** learn how to use computation and data to drive your design in architecture, urbanism, engineering and the digital arts.

- **LEARN BY DOING:** an augmented learning process based on ongoing alternation between theory, design applications and prototyping.

- **NETWORK THINKING:** embrace collaborative cultures and join an international network of architectural innovation. Enter both the coolest creative hubs in Paris and one of the most prestigious engineering schools in the world.

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DATA VISUALIZATION WITH GH/RHINO
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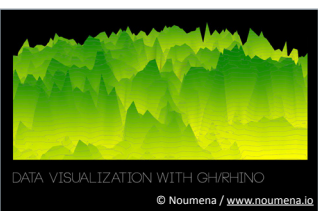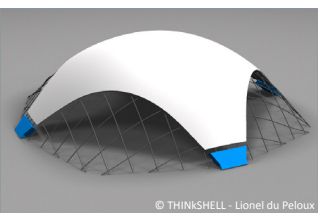
What you will learn

At the end of the training, graduates will:

- have the know-how to innovate their design workflow using a computational and collaborative approach towards architecture and engineering

- have a complete understanding of tools for digital design and robotic manufacturing

- design, manage and build non-standard objects and complex geometries

Your career prospects

The Advanced Master prepares graduates for a number of high-level positions in architectural design with a strong emphasis on digital innovation, computational robotics and manufacturing.

Graduates of the program may qualify for positions in architectural offices, urban design studios, construction firms specialized in complex geometry, robotics and digital fabrication, graphic design, art studios, consulting innovation firms, 3D printing platforms and software development companies.

© WoMa Fabrique de Quartier

© WoMa Fabrique de Quartier

©VOLUMES coworking, photographer Stefano Borghi

The fee for the Advanced Master includes:

- An access to digital fabrication machines (CNC, lasercut, 3D printers) in the fablabs partners of the program
- A student co-working membership at VOLUMES coworking

Careers

Holders of this Advanced Master will pursue the following careers, from amongst others

- Project Manager
- Computational Designer
- Façade consultant
- Structural engineer expert in complex geometry
- Chief Design Officer
- Interaction Designer
- Robot and Drone Designer

inFORMed Clay Matter research at digifabTURINg
© Co-de-iT + FabLabTorino in collaboration with Officine Arduino and COMAU

prototype by
© Co-de-iT + disguincio&co for D-Shape®

Profiles and qualifications required

Candidates must hold a 4/5-year higher education qualification: Bac+5, or Bac+4 with professional experience. A good knowledge of 3D modeling is required.

Admission

Candidates are eligible to enroll in the course after selection of their application by a jury (for more information, please visit: http://designbydata.enpc.fr).

Candidates are admitted after an interview that measures the pertinence of the program with their own qualifications and professional project.

Timetable

Applications: January to June.
Course begins: September.
Duration of course: from September to July (one week a month).

Places

20 to 40

Language

The program will be entirely taught through English

Validation

366 h of lectures — Thesis
75 ECTS* (30 ECTS for the thesis, 45 ECTS for the modules) * European Credit Transfer System

Key Players and Partners

Laboratoire Navier (École des Ponts ParisTech), Paris College of Art, and Ecole Nationale Supérieure d'Architecture Paris-Val de Seine. La Gaîté Lyrique, VOLUMES coworking, and WoMa fablab. HAL Robotics, HDA: Hugh Dutton Associés and XtreeE.

Stay in the loop

Visit our blog, http://designbydata.org to keep up to date with the program.

Faculty

- **Yasmine Abbas** (Architect, Doctor of Design, Chair of Design Management at Paris College of Art)
- **Olivier Baverel** (Architectural Engineer, professor at École des Ponts Paris Tech and at Grenoble Architecture School)
- **Justin Dirrenberger** (Engineer, Associate Professor at CNAM)
- **Cyril Douthe** (Engineer, Associate Professor Ecole des Ponts ParisTech)
- **Domenico Di Siena** (Urbanist, Co-founder of VOLUMES coworking)
- **Alessio Erioli** (Engineer and Computational Designer, Co-founder of Co-de-iT and Assistant Professor at University of Bologna)
- **Andrea Graziano** (Architect and Computational designer, Co-founder of Co-de-iT)
- **Minh Man Nguyen** (Architect and Engineer, assistant professor at architecture school of Paris Malaquais and co-founder of WAO architecture and WoMa fablab)
- **Romain Mesnil** (Engineer, PhD student at École des Ponts Paris Tech)
- **Sébastien Perrault** (Designer, Engineer, Entrepreneur)
- **Thibault Schwartz** (Architect and President of HAL robotics)
- **Aldo Sollazzo** (Architect, global summer school Coordinator at IAAC Barcelona and Director of NOUMENA BCN)
- **Eric Vernhes** (Artist and professor at Paris College of Arts)

Cost

€14,000 for students who pay for the course themselves.

€17,000 for students for whom the course is financed by a company or organisation.
These prices are subject to change

Teaching venues

The program will be taught at the following venues:
École des Ponts ParisTech (Champs-sur-Marne)
Other venues in Paris:
La Gaîté Lyrique, Paris College of Art, VOLUMES coworking, WoMa fablab

Contacts

▶ http://designbydata.enpc.fr

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