



**POLITECNICO**  
MILANO 1863

DIPARTIMENTO DI ARCHITETTURA,  
INGEGNERIA DELLE COSTRUZIONI  
E AMBIENTE COSTRUITO

**MASTER**  
I and II level

# **MATERIAL BALANCE DESIGN**

DIGITAL TECHNIQUES AND CIRCULAR INNOVATIONS IN ARCHITECTURE

MATERIALBALANCE



RESEARCH



MASTER

# MATERIAL BALANCE DESIGN

DIGITAL TECHNIQUES AND CIRCULAR INNOVATIONS IN ARCHITECTURE

Considering the growing interest and the increasingly recurring demand for figures capable of managing complex projects, we are pleased to offer the I edition of the Master Material Balance Design, Digital Techniques and Circular innovations in Architecture Level I and II. The Master aims to train professionals to become unique and anticipatory figures in the evolving context of architecture. It will develop skills in digital techniques and strategies for circular innovation that are increasingly in demand in the national and international construction market that needs regeneration.

The Master's program is in blended mode with online theoretical sessions and in-person practical sessions at the ABC Department's Maba. SAPERLab. The academic sessions aim to acquire basic technical-scientific knowledge that will be further applied during the practical sessions. The most advanced and sustainable methodologies of design, fabrication, and prototyping of architectural components will be explored. The course concludes with individual thesis that anticipate future scenarios for experimentation on architectural design, also developed through the internship experience.

# EDUCATIONAL OBJECTIVES

The Master “Material Balance Design. Digital Techniques and Circular Innovations in Architecture” proposes to train new professionals capable of facing and managing multidisciplinary projects through the synergy between digital technologies’ potential and environmental balance needs. The course represents an opportunity to acquire knowledge based on a new “material balance” from concept design to construction details, to design the transformation of our future environment with a renewed awareness. Students will actively contribute to the study and creation of new principles, tools, processes, and innovative products that rethink the contemporary role of the designer.

## EMPLOYMENT OPPORTUNITIES

The Master aims to produce a professional figure capable of managing with transversal skills different activities concerning new technologies for design and construction, combining digital technologies and principles of the circular economy. Prestigious institutional and industrial partners will support the Master.

### **Occupational sectors:**

- architectural firms
- engineering companies
- manufacturing industries of bio-based components and materials
- robotics companies
- cutting-edge start-ups

### **Profile expertise:**

- cutting-edge technology consultant
- architectural entrepreneur
- expert in digital technologies
- expert in circular innovations
- computational designer
- bio-based materials strategy specialist
- expert in innovative facades
- project manager

## **THEORETICAL BACKGROUND**

### **WHAT IS MATERIAL BALANCE?**

Focus on the research for a new approach that aims to rebalance our relationship with the environment

## **ALGORITHMIC DESIGN**

allows to optimize material use and the design process linking it to the specific site requirements and design needs. The module covers:

- PERFORMANCE-BASED DESIGN
- GENERAL TOPIC
- SUSTAINABLE ACOUSTIC MATERIALS
- THERMIC SIMULATIONS MATERIALS
- LIGHT FILTERING MATERIALS

## **EXECUTIVE DESIGN DEVELOPMENT**

FACADE TECHNOLOGIES

## **PUBLIC SPACE EXPERIMENTAL DEMONSTRATOR**

yearly installation built in  
POLIMI campus

## **DIGITAL FABRICATION**

as a computer-controlled digital production process, capable to produce solid and three-dimensional shapes starting from digital drawings. Deep analysis and study of innovative manufacturing techniques.

- GENERAL TOPIC
- ARCHITECTURAL DEMONSTRATOR
- ROBOTIC MANUFACTURING
- WOOD TECHNOLOGIES
- BESPOKE TEXTILE TECHNOLOGIES

## **CIRCULAR MATERIALS SCOUTING**

Research of materials and products that are wholly or partially derived from plants and vegetables

- GENERAL TOPIC
- BIO-BASED MATERIALS
- NATURE BASE SOLUTION

## **FUTURE SCENARIOS**

tools to anticipate trends in architecture

## **MATERIAL BALANCE PROTOCOL**

# STUDY PLAN

The course will be held from **November 2022** till **November 2023**. Until **June 2023** the classes will be held **every Monday remotely (6:00 p.m. - 10:00 p.m.)** and **one weekend per month in-person (Thursday, Friday, and Saturday (9:00 a.m. - 6:00 p.m.))** at Politecnico di Milano - Leonardo campus and/or remotely.



The training concludes with in-depth activities:

**Workshop.** Design exercise integrated on themes identified during the training process

**Internship.** To be carried out at one of the partner/sponsor companies.

**Final exam.** Public discussion of the final paper based on the contents of the Master's program and the activities carried out as part of the internship

**60 CFU**

**300** hours of **classroom training**

**600** hours of **formative internship**

**600** hours of **in-depth activities** (individual study, workshops, technical visits, group activities)









# COMMITTEE

## Director:

Prof.ssa Ingrid Maria Paoletti

## Technical Director:

Prof. Massimiliano Nastri

## Members of the master's Scientific Committee:

Prof. Massimiliano Bocciarelli

Prof. Stefano Capolongo

Prof. Emilio Faroldi

Prof.ssa Laura Elisabetta Malighetti

Prof. Francesco Pittau

Prof.ssa Tiziana Poli

Prof.ssa Valentina Rognoli

Prof.ssa Cinzia Maria Luisa Talamo

Prof.ssa Maria Pilar Vettori

Prof.ssa Alessandra Zanelli

## Partners:

**mad** architects

**BOLLINGER+GROHMANN**

**RIMOND** 

 **MATEREA**  
Automate the non-standard

 **Versy**

# ADMISSION REQUIREMENTS AND MODALITIES

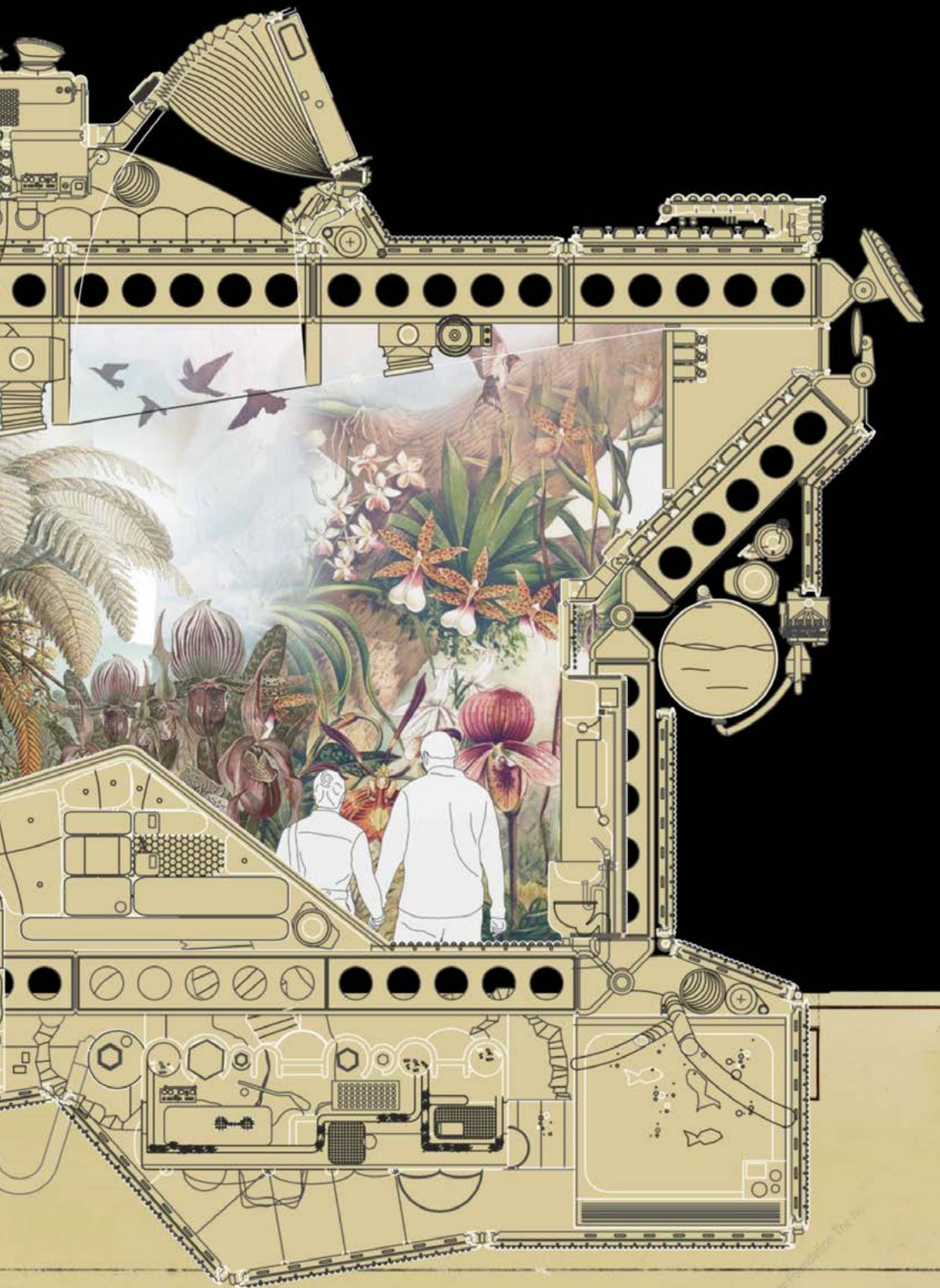
Candidates with a Bachelor's and/or Master's degree in Engineering, Architecture, and related disciplines are admitted to the Master's program. Any other degree courses will be evaluated during the interview process. The equivalent degrees in their respective curricula will be considered valid for foreign candidates.

## **FEES AND CONTRIBUTIONS**

The total cost of the University Master's Degree is € 7,500.00 (V.A.T. exempt according to art. 10, Presidential Decree No. 633 of 26/10/1972, as amended), to be paid in three installments. This amount includes the registration fee to Politecnico di Milano of € 500.00.

## **TITLE AND MODE OF PARTICIPATION**

At the end of the course, the participants will obtain the title of University Master's Degree Level I or II in "Material Balance Design. Digital Techniques and Circular Innovation in Architecture" upon passing the final exam.



FOR INFORMATION:  
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[materialbalance.polimi.it](http://materialbalance.polimi.it)



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