

# BES-M

## Performance Modeling and Design

### Learning objectives

The BES-M track specializes the Building Engineer for Sustainability in the implementation and use of advanced modeling tools:

1. to assess the energy performance of buildings in dynamic conditions;
2. to evaluate and optimize systems based on the use of renewable energy sources;
3. to design building services that guarantee high standard of indoor environmental quality (thermal, acoustic, and visual comfort + indoor air quality);
4. to manage smart control of HVAC systems,
5. to design carbon neutral buildings, neighborhoods, districts and cities.

### Learning Outcomes

A Building Engineer for Sustainability, specialized in Performance Modeling and Design has skills in the design, analysis and assessment of building envelope and technical systems, and their interaction with users and the environment. They will be expert - not just users - of tools for verifying and certifying the energy and environmental impact of a building and of its management and optimization. In particular, they will be able to: assess the energy performance of new and existing buildings; assess the impact of retrofitting measures on existing buildings; design carbon neutral strategies for buildings, neighborhoods, districts and cities; design technical systems resilient to climate change; perform Life Cycle Analysis to assess CO<sub>2</sub>-eq emissions related to buildings' service life.

### Job Opportunities

With a growing focus on carbon neutrality targets, the graduate in the BES-M track have a wide range of career paths to choose from: engineering firms and companies, real estate companies, facility management companies, service companies offering consultancy in the field of sustainability and energy, manufacturers of HVAC systems. They collaborate with architects, engineers, contractors, and other project stakeholders to promote sustainable practices, adoption of low-carbon technologies and renewable energy systems, by ensuring the project adheres to relevant environmental regulations and green building standards.



## First Year

60 ECTS

48 ECTS

	ECTS
<b>Life cycle driven structural design</b>	<b>9</b>
<b>Integrated Sustainable Building Design</b>	<b>9</b>
<b>Applied Building Physics</b>	<b>9</b>
<b>Scientific Computing for Sustainable Building Engineering</b>	<b>6</b>
<b>Construction Materials, Innovation and Sustainability</b>	<b>6</b>
<b>Project and Construction Management</b>	<b>9</b>
or	
<b>Tecnica e Sicurezza dei Cantieri Edili</b>	<b>9</b>

12 ECTS

	ECTS
<b>Building Envelope and Modeling</b>	<b>6</b>
<b>Building Services and Renewables</b>	<b>6</b>

## Second Year

42 ECTS + 6 ECTS Internship + 12 ECTS Final MSc thesis

42 ECTS

	ECTS
<b>Energy Simulation for HVAC Design</b>	<b>6</b>
<b>Building Performance-based Design Lab</b>	<b>9</b>
<b>Assessment methodology for Carbon Neutrality</b>	<b>6</b>
<b>Zero-Energy and Low-Carbon Building Design Lab</b>	<b>9</b>
<b>Elective 1</b>	<b>6</b>
<b>Elective 2</b>	<b>6</b>



**POLITECNICO**  
MILANO 1863

SCUOLA DI ARCHITETTURA URBANISTICA  
INGEGNERIA DELLE COSTRUZIONI

**BUILDING ENGINEERING FOR  
SUSTAINABILITY**