



 POLITECNICO DI MILANO

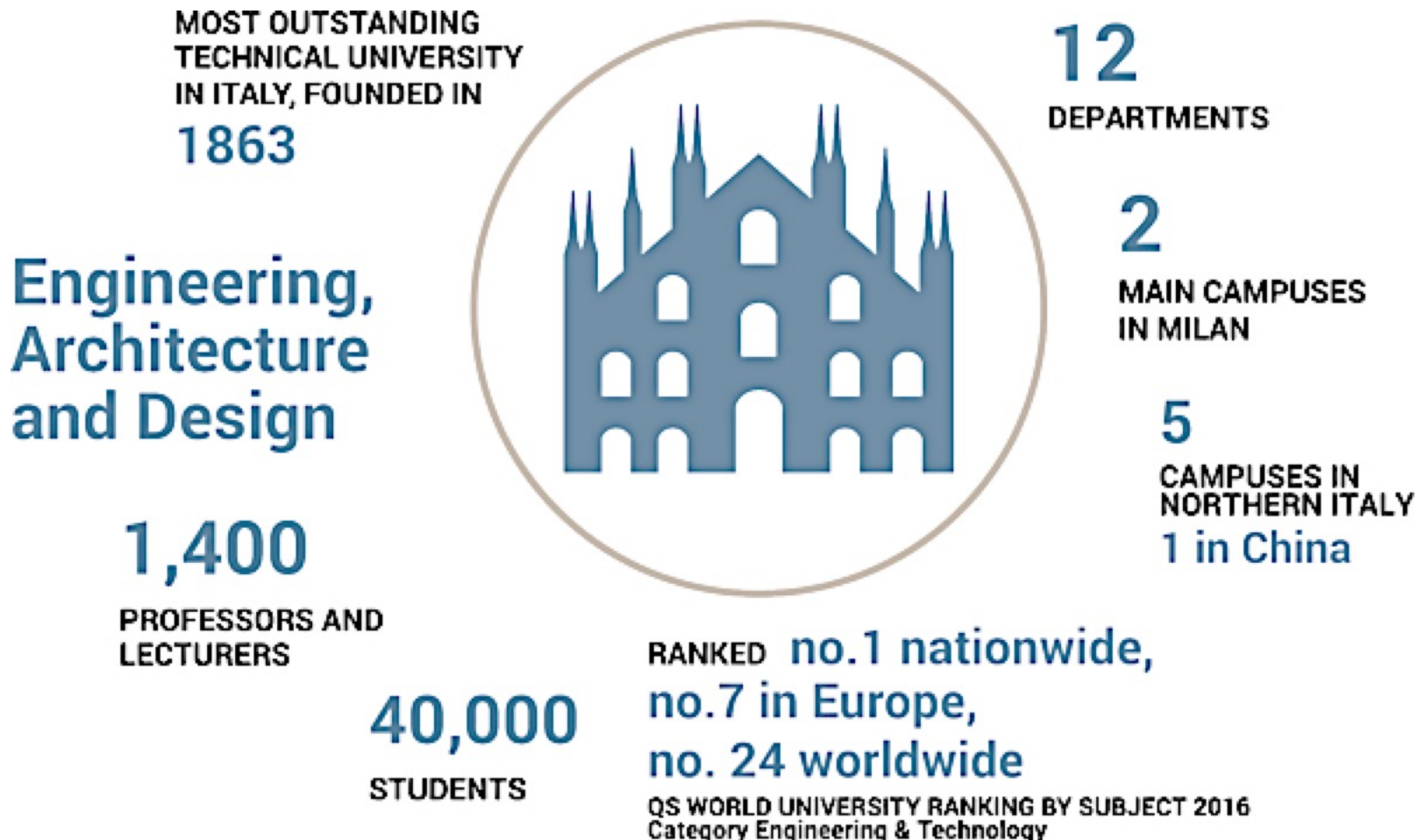


an introduction to the
GRADUATE SCHOOL
IN ARCHITECTURAL AND LANDSCAPE HERITAGE
Alberto Grimoldi, director

Center for Restoration and Conservation, Lebanese University
Tripoli - September 24, 2017

POLITECNICO

The Politecnico di Milano (Polytechnic University of Milan) is the largest technical university in Italy, with 42,000 students, 1,400 professors and lecturers, 1,200 staff



HISTORY

1863 The Politecnico was founded on 29 November with the name of *Istituto Tecnico Superiore* ("Higher Technical Institute"). Only Civil and Industrial Engineering were taught.

1865 Architecture, the second main line of study at Politecnico, was introduced in cooperation with the Academy of fine arts .

1989 SSBAP was founded as a post graduate program in architectural preservation

2000 A faculty of design was created new programs of graphic & visual, fashion and interior design



SCIENTIFIC RESEARCH

RESEARCH STRUCTURES

Politecnico di Milano is organized into several structures, responsible for planning of the research strategies:

12	DEPARTMENTS
5	LARGE INFRASTRUCTURES
30	INTERDEPARTMENTAL LABORATORIES
239	DEPARTMENTAL LABORATORIES
25	JRC - JOINT RESEARCH CENTRES
3	CLUSTERS



2 main campuses in Milan city
5 satellite campuses

The central offices and headquarters are located in the historical campus of Città Studi in Milan since 1927.



SCIENTIFIC RESEARCH

12 DEPARTMENTS:

1. AEROSPACE SCIENCE AND TECHNOLOGY (DAER)
2. ARCHITECTURE AND URBAN STUDIES (DASTU)
3. ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING (DABC)
4. CHEMISTRY, MATERIALS AND CHEMICAL ENGINEERING (DCMC)
5. CIVIL AND ENVIRONMENTAL ENGINEERING (DICA)
6. DESIGN (DESIGN)
7. ELECTRONICS, INFORMATION AND BIOENGINEERING (DEIB)
8. ENERGY (DENG)
9. MANAGEMENT, ECONOMICS AND INDUSTRIAL ENGINEERING (DIG)
10. MATHEMATICS (DMAT)
11. MECHANICAL ENGINEERING (DMEC)
12. PHYSICS (DFIS)

SCIENTIFIC RESEARCH

SECTORS

Research at Politecnico di Milano cover 202 of 339 keywords defined by the European Research Council (ERC), as follows:

122 / 167	PE - Physical Sciences and Engineering
35 / 101	LS - Life Sciences
45 / 71	SH - Social Sciences and Humanities

The field of **cultural heritage and conservation** falls within the SH.
More than one department operates in this field, e.g.:

SH5_10 CULTURAL HERITAGE, CULTURAL IDENTITIES AND MEMORIES

SH5_6 HISTORY OF ART AND ARCHITECTURE

SH5_7 MUSEUMS, EXHIBITIONS, CONSERVATION AND RESTORATION

SH6_2 ARCHAEOLOGY, ARCHAEOOMETRY, LANDSCAPE ARCHAEOLOGY

SCIENTIFIC RESEARCH

RESEARCH ON CULTURAL HERITAGE FOCUSES ON **7 AREAS**:

1. HISTORICAL RESEARCH

census and database archiving. Digital technologies for the census and cataloguing of assets; archival research and document delivery for the knowledge of artefacts and their history; analysis and synthesis of sources.

2. CONSERVATION CULTURE AND PRACTICE

Defining criteria for preservation and conservation; complex interventions planning; guidelines and protocols for knowledge and conservation; Cultural Heritage legislation.

3. SURVEY AND REPRESENTATION

Surveying and graphical representation; laser scanner and point cloud indexing; Geographic Information System (GIS); 3D reconstruction and virtual restoration of Heritage; mapping of different phenomena.

4. MATERIALS AND ARCHITECTURAL STRUCTURES

Study of materials, structure and building techniques; criticality analysis; plant adaptation to standards; materials and techniques for conservation.

5. DIAGNOSTIC AND MONITORING

Materials and structures characterization; development and implementation of diagnostic methods; study of chemical, physical and environmental change over time.

6. MANAGEMENT AND PROMOTION

Study and development of innovative management models; methods for enhancing and promoting sustainable and integrated plans for Heritage conservation.

7. COMMUNICATION AND INFORMATION SYSTEMS

Dissemination and transfer of results and technological innovation; optimization and development of communication techniques for Cultural Heritage; multimedia products for knowledge and conservation.

SCIENTIFIC RESEARCH

THE RESEARCH ON CULTURAL HERITAGE INVOLVES 10 LABORATORIES IN 7 DEPARTMENTS:

GEOSPATIAL INFORMATION & CONTENT MODELING: ARCHITECTURAL HERITAGE AND BUILT ENVIRONMENT, URBANATL@S, DATA SURVEYING

Department ABC - Architecture, Built Environment and Construction Engineering
<http://www.icet-rilevamento.lecco.polimi.it/>

Responsible [prof. Raffaella Brumana](#)

Laser scanner and Photogrammetry data surveying and modeling, Object recognition and reconstruction (ORR), segmentation algorithms, UAV multisensor-multispectral platform implementation, 3D content modeling, HBIM, SBIM-GIS, spatial Data Infrastructure Inspire and EU Copernicus compliant, open source Geoportail implementation, multitemporal open AT@s, cartographic heritage georeferencing and publishing, volunteered information, living lab communities; high precision geodetic network, static and dynamic Architectural and Built Environment monitoring.

HYPERMEDIA OPEN CENTER LABORATORY - HOC-LAB

Department DEIB - Electronic, Information and Bioengineering
<http://hoc.elet.polimi.it>

Responsible [prof. Paolo Paolini](#)

HOC-LAB is a multidisciplinary laboratory of multimedia and multichannel communication. HOC develops methodologies (design, usability...), tools and applications/services, primarily in fields of cultural heritage and eLearning, for thousands of users and in real contexts (cultural institutions, schools ...).

LABORATORIO DI ANALISI E DIAGNOSTICA DEL COSTRUITO - LADC

Department DASTU - Architecture and Urban Studies
<http://www.diagnosticacostruito.polimi.it/>

Responsible [prof. Alberto Grimaldi](#)

LADC activity research is focuses on the techniques used for the study of historical and architectural heritage and on the tools for the conservation and preservation. The history of the use and degradation is investigated through archival and documentary research and tools from contemporary archaeology. The non-destructive and micro-destructive diagnostic has been developed towards the building physics and the indoor climate control. Another research line investigates the historical finishing treatments and protection of stone materials, particularly oxalate films.

LABORATORY FOR DIAGNOSTIC AND INVESTIGATION ON BUILT HERITAGE MATERIALS

Department DICA - Civil and Environmental Engineering
<http://www.dica.polimi.it/laboratori/labmateriali/>

Responsible [arch. Cristina Tedeschi](#)

On site and laboratory diagnostic investigations on construction materials and Cultural Heritage. Geometrical, degradation and structural damage survey. Stratigraphy, sampling and characterization of materials, moisture evaluation through non-destructive and semi-destructive tests, laboratory durability tests.

COMPUTER VISION AND REVERSE ENGINEERING LAB

Department MECC - Mechanical Engineering

Responsible [prof. Gabriele Guidi](#)

The laboratory is specialized in the whole Reverse Engineering pipeline, ranging from 3D devices calibration and characterization, 3D acquisition and processing, redrawing of CAD models based on acquired 3D data, for study, research and industrial applications. It is provided with equipment for 3D capturing objects such as industrial components and structures, Cultural Heritage objects and sites, covering a wide range of geometries, sizes and materials.

IMAGING SPECTROSCOPY FOR CULTURAL HERITAGE - ARTIS

Department FISI - Physics Department
https://www.fisi.polimi.it/ricerca/struttura_di_ricerca/laboratori/49431

Responsible [prof. Rinaldo Cubeddu](#), [prof. Gianluca Valentini](#)

The research activities at the ArtIS laboratory is focused on the development and engineering of optical and molecular spectroscopy in portable instrumentation for analysis and on site monitoring of art works and physico-chemical characterization of organic and inorganic materials. The main techniques include: lifetime imaging of optical fluorescence, multispectral imaging of optical fluorescence and reflectance in the spectral range of visible, Raman spectroscopy and XRF spectroscopy.

CONCRETE DURABILITY - MCD

Department CMIC - Chemistry, Materials and Chemical Engineering "G. Natta"
<http://mcd.chem.polimi.it>

Responsible [prof. Luca Bertolini](#)

The laboratory carries out research and consultancy activity on the characterisation of cementitious materials and on the durability of reinforced and prestressed concrete structures. In particular, it performs experimental tests for evaluating the resistance to deterioration and executes surveys aimed at the definition of repair strategies for existing structures, from diagnosis to intervention methods.

MATERIALS AND METHODS FOR CULTURAL HERITAGE LABORATORY - MAMECH

Department CMIC - Chemistry, Materials and Chemical Engineering "G. Natta"
<http://midar.chem.polimi.it>

Responsible [prof. Lucia Toniolo](#)

The Laboratory activities are focused on the knowledge and conservation of materials belonging to architectural, historic and artistic Heritage. It deals in particular: materials characterization with micro and non-invasive methods; study of alteration and degradation mechanisms; study of restoration methodologies in support of the conservation site; monitoring of surfaces.

TESTING MATERIAL LABORATORY, SECTOR DIAGNOSTICS AND MONITORING OF BUILDINGS AND CULTURAL HERITAGE

Department Interdepartmental laboratory
<http://www.lpm.polimi.it>

Responsible [arch. Claudia Tiraboschi](#), [Marco Cucchi](#)

On site diagnostic investigations on wall structures of historical buildings: non-destructive (ultrasonic, sonic, radar, thermographic, etc.,) and semi-destructive tests (flat jacks, coring and endoscopies, resistograph, surface hardness, moisture measurements, wall sections survey and sample taking for laboratory tests and stratigraphic essays, tear tests); static and dynamic monitoring. Geometrical, degradation and structural damage survey.

TECHNIQUES FOR THE CONSERVATION AND MANAGEMENT OF ARCHITECTURAL HERITAGE - TECMARCH

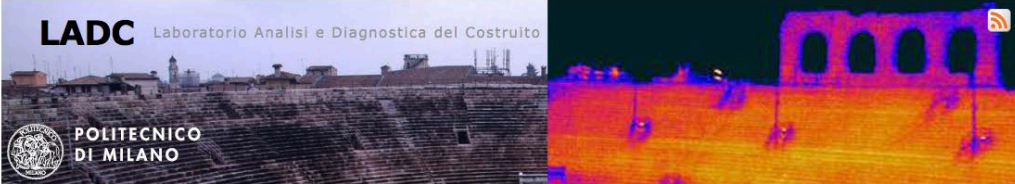
Department DASTU - Architecture and Urban Studies

Responsible [prof. Susanna Bortolotto](#), [prof. Raffaella Simonelli](#)

The Laboratory deals in investigations focalised to conservation and promotion projects for architecture, historic urban contexts, landscape and archaeological areas (study of direct and indirect sources, metric survey, diagnostic analysis, study of buildings' materiality, identification of degradation and instability phenomena, definition of project methods and criteria, data management by means of Geographic Information Systems).

SCIENTIFIC RESEARCH

LAB. of ANALYSIS AND BUILDING DIAGNOSTICS / CLIMATE AND ENERGY FOR CULTURAL ENERGY



LADC Laboratorio Analisi e Diagnostica del Costruito

POLITECNICO DI MILANO

Home Mission Publications Projects EU Project Thesis Analysis and Diagnostic Events Links Contacts

Cerca OK

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- [Chiesa dei Santi Pietro e Paolo, Grottolengo](#)
- [Chiesa della Beata Vergine Maria, Medole](#)
- [Chiesa di San Michele, Rovato](#)
- [Palazzo della Ragione, Bergamo](#)
- [Chiesa della Disciplina, Verolanuova](#)

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- [analisi](#)
- [badalini](#)
- [beni](#)
- [culturali](#)
- [brescia](#)
- [Cofani](#)
- [conservazione](#)
- [consulenza](#)
- [Corradini](#)
- [Cremona](#)
- [degrado](#)
- [Del](#)
- [Curto](#)
- [diagnosi](#)
- [diagnostica](#)
- [dottorato](#)
- [edifici](#)
- [edifici storici](#)
- [gas](#)
- [Grimoldi](#)
- [illuminazione](#)
- [indagini](#)
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- [Landi](#)
- [La](#)
- [Rinascente](#)
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- [rilievo](#)
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- [struttura](#)
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Home

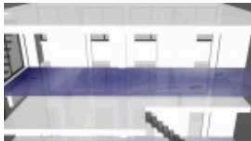
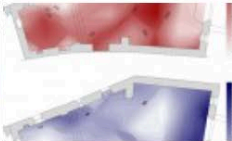
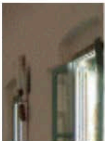

The **C.E.C.H. Laboratory** (Climate and Energy for Cultural Heritage) is a cooperation platform between the Department of Architecture and Urban Studies (DASTU) and the Department of Energy of Politecnico di Milano. The specific competences of different laboratories and research groups working in the two departments (**Laboratorio di analisi e diagnostica del costruito, AIRLAB research group and Laboratorio di Fisica Tecnica e Impianti per i Beni Culturali**) have been combined in order to improve expertise and to promote innovative research in the topics of preventive conservation, indoor climate monitoring and energy efficiency in the field of cultural heritage. The cooperation may include agreements on specific projects with other departments of Politecnico di Milano (Department of Architecture, Built environment and Construction engineering – ABC, Department of Civil and Environmental Engineering – DICA).

Historic structures involve considering specific objectives and restrictions which limit considerably the range of possible interventions; the aim of CECH Laboratory is to develop innovative solutions for measuring the energy potential of heritage structures, fostering minimum-impact but effective interventions for indoor climate control.

In detail, the competences of CECH Laboratory include:

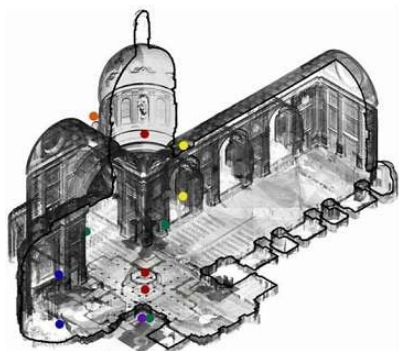
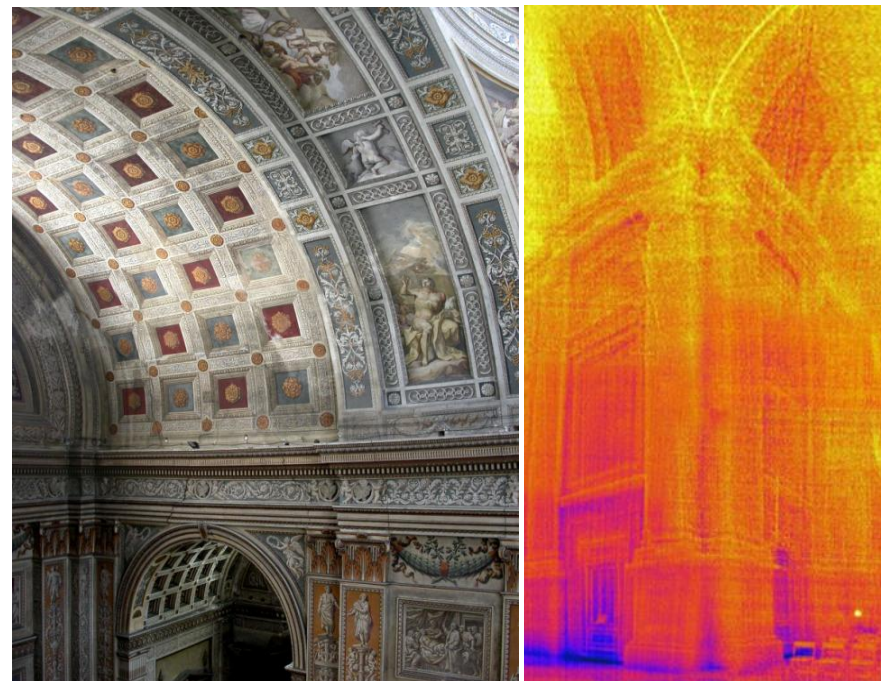
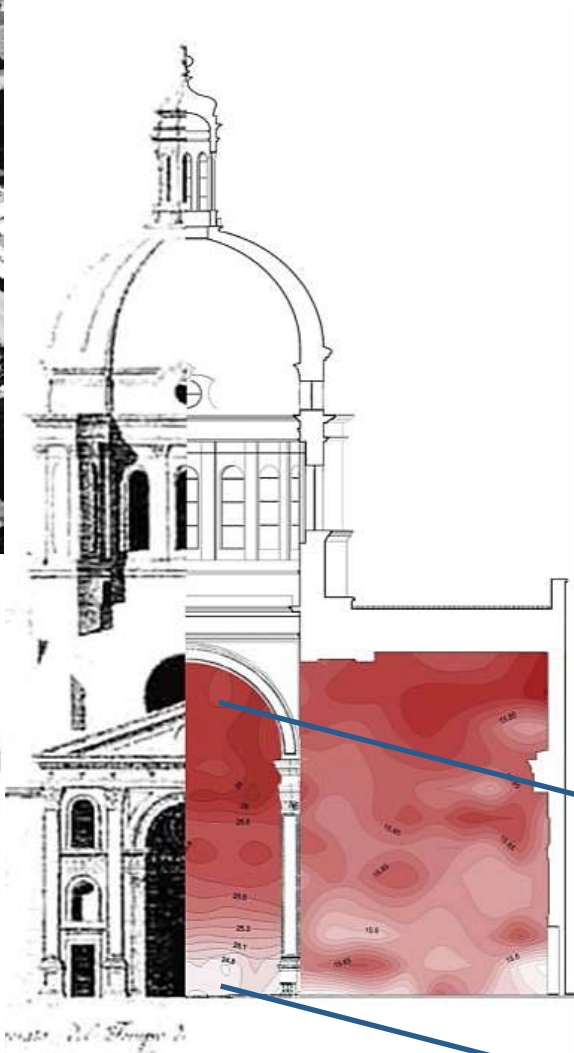
1. the analysis and characterization of hygrothermal properties of historic materials, structures and buildings, aiming at their own preservation as well as at the preventive conservation of cultural heritage and museum objects.
2. measuring of the air flow rate, air infiltrations and air permeability of the building envelop, including measuring contaminants and pollutants and analysis of the indoor air quality.
3. monitoring, assessment and optimization of the building-structure interface and of the building-Heating, Ventilation, Air-Conditioning (HVAC) interface, with specific attention paid to transmittance and thermal capacity measures, retrofit of existing systems and natural ventilation, testing of innovative materials and solutions for energy efficiency.

Current projects

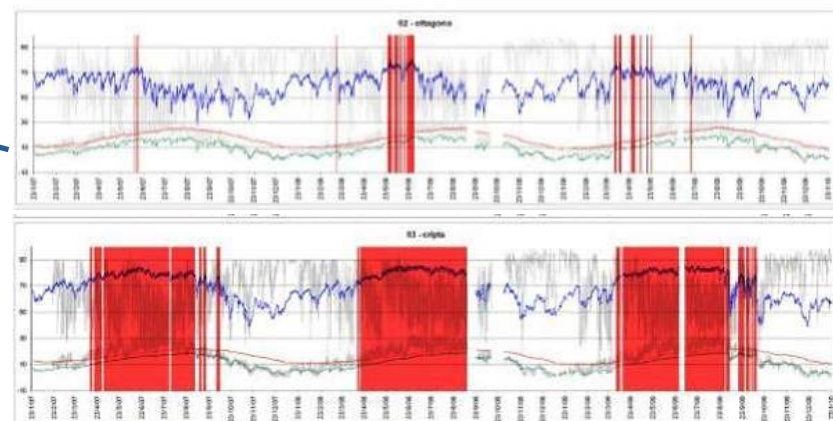
 <p>"Collegi" buildings, Giancarlo maggio 23, 2016 Current Projects</p>	 <p>San Nicolao, Bellano maggio 22, 2016 Current Projects</p>	 <p>Palazzo Pallavicino, Cremona maggio 23, 2012 Current Projects</p>	
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SCIENTIFIC RESEARCH

LAB. of ANALYSIS AND BUILDING DIAGNOSTICS / CLIMATE AND ENERGY FOR CULTURAL ENERGY



1,2,3	TIBURIO
4,5	PRESBITERIO
6,7	CAPPELLA DI SAN LONGINO
8,9,10	NAVATA, TRANSETTO, SACRESTIA
11	ESTERNO



EDUCATION

Education at Politecnico is divided into 4 Schools:

2 Schools on Engineering

1 Schools on Architecture, Urban Planning and Construction Engineering

1 School on Design

- engineering (30,000 students)
- architecture (6,800 students)
- design (3,800 students)



EDUCATION

3rd level

Dottorato Di Ricerca
Ph.D.



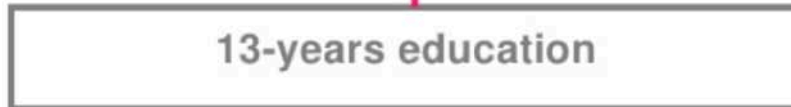
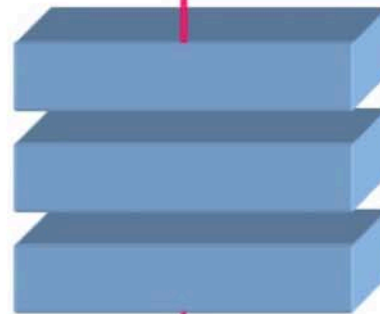
2nd Level


Laurea Magistrale
Master of Science



1st level

Laurea
Bachelor






**POLITECNICO
MILANO 1863**

SCUOLA DI SPECIALIZZAZIONE IN BENI ARCHITETTONICI E DEL PAESAGGIO GRADUATE SCHOOL IN ARCHITECTURAL AND LANDSCAPE HERITAGE

[Home](#) [Statute, Manifest and Courses](#) [How to apply](#) [Study](#) [Lab](#) [Contact us](#) [Links](#)



English

Search

Tag

- Bohemia Cultural Heritage
- Czech Republic Digital Era
- GEORES2017 monuments
- mortar preservation public
- housing Research residential
- heritage


structures

survey techniques Tirol

Categories

- Weekly Schedule
- Classes Schedule
- Annual Schedule
- Events
- Contest calls
- Thesis Archive
- Study Trips
- Courses contents

Home



The **Graduate School in Architectural and Landscape Heritage** trains high specialized professionals in the study, protection, restoration, management and valorization of cultural, architectural heritage and landscape. The School was founded at Politecnico di Milano in 1989 (formerly School of Specialization in Restoration of Monuments) and today offers a teaching framework integrated by seminars, internships and study trips. With a faculty of more than 40 teachers from the academic and professional field and thanks to European partnerships, the School trains specialists in restoration and conservation with an international profile.

The head of the School is prof. **Alberto Grimoldi**.

The postgraduate degree is obtained after two years of attendance and the defense of a dissertation consisting in a restoration project.

POLITECNICO DI MILANO

EDUCATION at S.S.B.A.P.

COURSE AREA	Statute minimum credits	Minimun credits to acquire
Restauro (Architectural conservation and landscape)	12	18
Storia (History of architecture)	6	8
Disegno rilievo ambiente (Survey + Environment)	6	12
Materiali e tecnologie (Materials and technologies)	6	12
Strutture (Building structures)	8	12
Economia e diritto (Economy and law for CH)	6	6
Impianti allestimento museografia (Building HVAC + museums)	6	8
Metodologie archeologiche (Archaeology)	6	6
Totali	56	82

FACULTY

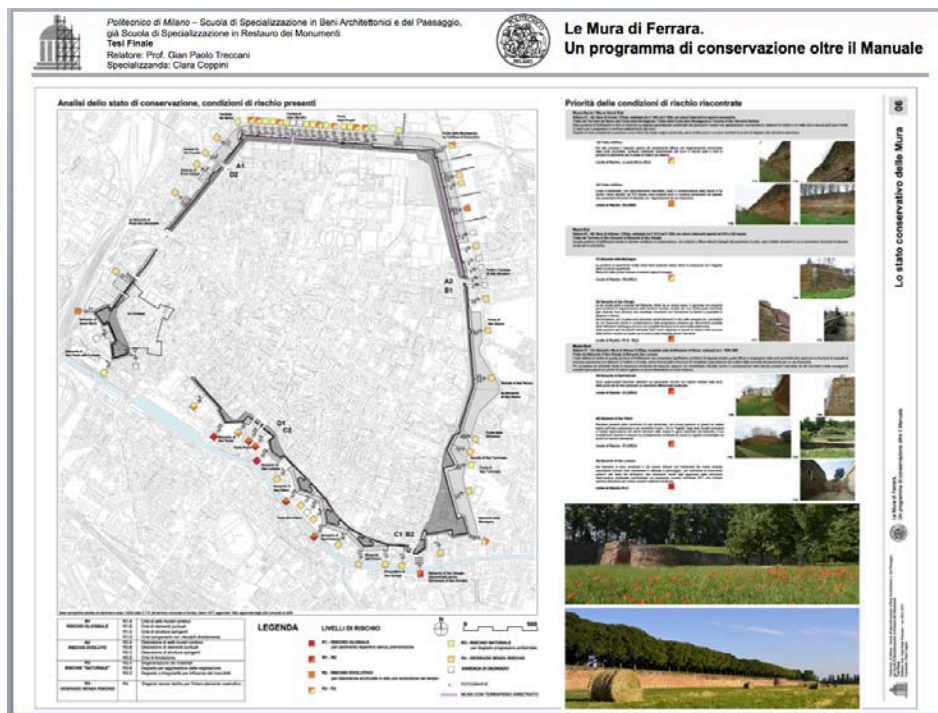
- Professors and lectures from PoliMi
- Invited professors from other universities
- Outstanding professionals in the conservation field from both private and public sector
- Researchers from C.N.R./National Research Council

EDUCATION at S.S.B.A.P.

CLASSES



ON SITE WORKSHOPS



FINAL THESIS

STUDY TRIPS



NEWS 2017-18

- **SCHOLARSHIPS**
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 - private sector
 - alumni
- **INTERNATIONAL OUTLOOK** - students exchange incoming/outgoing
 - workshops on site in Italy and abroad