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DIPARTIMENTO
DI INGEGNERIA
CIVILE E AMBIENTALE

CIVIL AND ENVIRONMENTAL ENGINEERING

DOCTORAL PROGRAM 2025-2026



Luca Valentini received his Master's degree in Physics from the University of Perugia and his PhD degree in Materials Science from the University of Napoli "Federico II". He is Associate Professor of Materials Science and Technology at the University of Perugia and chair of the courses of Applied Mechanics, Materials Technology and Laboratory of Materials at the University of Perugia. He is author of more than 160 publications in international journals with citation index in the fields of materials science, polymer physics and bionic composites. He is member of the Graphene Flagship and Associate Editor of Polymer and Composite materials topic of the journal Frontiers in Materials.



Antonella D'Alessandro is Associate Professor of Structural Design at the Department of Civil and Environmental Engineering of University of Perugia which she currently teaches Structural Design, Smart Materials for Construction Engineering, Rehabilitation of structures. Her main expertise is in the development and characterization of innovative multifunctional and sustainable structural materials (fiber-reinforced, self-sensing, recycled, high efficient, 3D printed) and the monitoring of the integrity of new and existing buildings, proved by the publication of more than 170 papers, and the participation of several national and international projects.



Andrea Meoni: Dr. Andrea Meoni is a Senior Postdoc at the Department of Civil and Environmental Engineering of the University of Perugia. Since his Master's degree, Dr. Meoni has been conducting research activities on smart cement-based materials for strain monitoring and crack detection in RC constructions. Then, during his PhD, he started experimenting with the development of smart bricks, which are piezoresistive brick-like sensors for SHM of masonry constructions, and on the development of numerical models, discretized according to the finite element method, to integrate SHM systems. To date, his research focuses on developing innovative approaches for structural health monitoring of reinforced concrete and masonry structures through the use of smart construction materials.

SMART MATERIALS FOR INTERACTIVE ENVIRONMENTS AND INTELLIGENT STRUCTURES

Instructors

Luca Valentini, Ph.D., Associate Professor, University of Perugia

Antonella D'Alessandro, Ph.D., Associate Professor, University of Perugia

Andrea Meoni, Ph.D., Assistant Professor, University of Perugia

Course description

This course is a broad introduction to the principles of functioning of functional nanomaterials, with their operation in a variety of sensor architectures and modalities, including pressure, strain, thermal, optical and bioelectric. Illustrative applications in practical engineering problems, such as monitoring civil engineering structural

bricks will be discussed.

Moreover, fundamentals of 3d printing of composites, including the characterization of the material, are introduced. Students are required to complete laboratory tests, or simulations, and a final project consists on the proposal of a smart monitoring network for a civil engineering problem using smart materials.

Course Schedule (18 hours, 3 CFU)

07/09/2026	9:00 - 13:00	Room 16
(professor Luca Valentini)		
08/09/2026	9:00 - 13:00	Room 16
(professor Luca Valentini)		
09/09/2026	8:30 - 11:30	Room 16
(professor Antonella D'Alessandro)		
10/09/2026	8:30 - 11:30	Room 16
(professor Antonella D'Alessandro)		
10/09/2026	11:30 - 13:30	Room 16
(professor Andrea Meoni)		

Location

Campus of Engineering
University of Perugia Via G. Duranti, 93 - Perugia

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