



A.D. 1308

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DIPARTIMENTO  
DI INGEGNERIA  
CIVILE E AMBIENTALE

# CIVIL AND ENVIRONMENTAL ENGINEERING

## DOCTORAL PROGRAM 2023-2024



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*.



Filippo Ubertini received his Master's degree in Civil Engineering from the University of Perugia and his PhD degree in Civil Engineering from the University of Pavia. He is Professor of Structural Design at the University of Perugia and chair of the courses of Advanced Structural Design and Structures for Industrial Design at the University of Perugia. Author of more than 75 papers published in high impact international journals, his research is mainly focused on structural health monitoring, with emphasis on smart materials and applications to earthquake engineering and cultural heritage structures. He is a member of the editorial boards of: *Sensors*, *Advances in Civil Engineering*, *Shock and Vibration*, *Mathematical Problems in Engineering* and *Engineering Research Express*.



Antonella D'Alessandro is Assistant Professor of Structural Design at the Department of Civil and Environmental Engineering of University of Perugia where she currently teaches Structures Design, Smart materials for Construction Engineering, Rehabilitation of structures. Her main expertizes are in the development and characterization of innovative multifunctional and sustainable structural materials (fiber-reinforced, self-sensing, recycled, high efficient), and the monitoring of the integrity of existing buildings, proved by the publication of more than 100 papers among national, international journals and conferences, and the participation of several national and international

# SMART MATERIALS FOR INTERACTIVE ENVIRONMENTS AND INTELLIGENT STRUCTURES

## Instructors

Luca Valentini, Ph. D., Associate Professor

Filippo Ubertini, Ph. D., Full Professor

Antonella D'Alessandro, 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 components using smart concretes and smart bricks will be discussed. Moreover, fundamentals of 3d printing of composites, including the characterization of the material, are introduced. Students are required to complete a 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 (5 CFU)

Day 1, July 4th, 8:30-13:30 ROOM 15

Day 2, July 8th, 8:30-12:30 ROOM 15

Day 3, July 10th, 8:30-13:30 ROOM 15

Day 4, July 11th, 8:30-12:30 ROOM 15

Day 5, July 12th, 8:30-13:30 ROOM 15

Day 6, July 15th, 8:30-12:30 ROOM 15

## Location

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

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