



A.D. 1308

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DIPARTIMENTO
DI INGEGNERIA
CIVILE E AMBIENTALE

CIVIL AND ENVIRONMENTAL ENGINEERING

DOCTORAL PROGRAM 2025-2026



Eng. Laura Ierimonti is a post-doctoral researcher at the University of Tuscia and Adjunct Professor in Seismic Resistant Structures (University of Perugia) and Structural Design (University of Tuscia). She holds the National Scientific Qualification as Associate Professor (2022) and has international research experience through visiting periods at TU

Braunschweig and Northeastern University. Author of over sixty Q1 publications, she conducts research on Bayesian inference for model-based structural health monitoring with applications to bridges and cultural heritage structures. She is the Principal Investigator of a FIS project (FIS-2024-00113) funded with €1,156,088.00, confirming the high scientific quality and innovation of her work. She has received several recognitions, including the University of Perugia award for her master's thesis (2014), the BBVII Fellowship from Northeastern University (2016), and the Best Paper Award at IOMAC 2019.



Dr. Chiara Pepi is a Researcher in Structural Mechanics (SSD CEAR 06/A) at the Department of Civil and Environmental Engineering, University of Perugia, Italy. She holds a joint international PhD (summa cum laude) in Civil and Environmental Engineering from the Universities of Florence, Pisa, and Perugia, and the Technische Universität Braunschweig (Germany).

Her research focuses on probabilistic and Bayesian methods for structural identification and uncertainty quantification, including Bayesian inference, Approximate Bayesian Computation, finite element model updating, surrogate modeling, and stochastic characterization of materials. She applies these methods to inverse problems in structural engineering, with applications to dynamic identification and damage detection of existing structures. Her work further extends to multiscale stochastic modeling of construction materials - including bio-based composites and natural fiber reinforcement systems for structural strengthening - and to the probabilistic analysis of nanomaterials, with particular focus on size effects and random defects in single-layer graphene sheets.

Location

Room 16, Campus of Engineering

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

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For more info Mrs. Teresa Nocera, Ph.D. Program Secretariat (teresa.nocera@unipg.it)
Prof. Dr. Silvia Meniconi, Ph.D. Program Coordinator (silvia.meniconi@unipg.it)

PROBABILITY THEORY, UNCERTAINTY QUANTIFICATION AND BAYESIAN-BASED METHODS FOR DATA ANALYSIS: BASIC CONCEPTS AND APPLICATIONS

Instructors

Professor Laura Ierimonti
Post-doctoral Researcher Unipg/Unitus

Professor Chiara Pepi
Researcher Unipg

Course description

Module 1

The course focuses on the use of probabilistic methods and techniques to analyze complex systems and problems. The course covers topics such as probability theory, statistical methods, random processes, and uncertainty quantification, as well as their applications in various fields. The main topics covered by the course will be definitions of probability, random variables, conditional distributions, random vectors, discrete and continuous probability distributions, Bayesian inference, Bayesian model updating, Bayesian computational tools, data sampling.

Module 2

Building on the probabilistic foundations of Module A, this module develops the computational tools required to apply Bayesian inference to real-world engineering problems, where analytical solutions are unavailable. Topics are organized in four thematic blocks: from Analytical to Computational Bayes; Surrogate Models for Expensive Likelihoods; Markov Chain Monte Carlo Methods; Likelihood-free inference for simulator-based models.

In addition, the course will include classroom exercises using Matlab to provide hands-on learning opportunities for students.

Course Schedule (30 hours, 5 CFU)

Module 1

Monday	08/06/2026	9:30 - 13:30, 14:30 - 16:30
Tuesday	09/06/2026	9:30 - 13:30, 14:30 - 16:30

Module 2

Wednesday	10/06/2026	9:30 - 13:30, 14:30 - 16:30
Thursday	11/06/2026	9:30 - 13:30, 14:30 - 16:30

Final exam

Friday	12/06/2026	9:00 - 13:00
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