SEMINAR

An introduction to topological data analysis with applications in experimental designs

Prof. Marco Guerra, *Consiglio Nazionale delle Ricerche (CNR) Genova,* **Prof. Roberto Fontana,** *Politecnico di Torino*

Chair: Prof. Enrico Ripamonti
University of Brescia

Wednesday, June 11th, 2025
11:30 AM - 3:30 PM
Room A2, C.da S. Chiara 50

Topological Data Analysis (TDA) is a branch of mathematics that has emerged around the turn of the millennium, thanks to the observation that it was possible to associate certain topological spaces to data, and consequently to create new data descriptors based on the classical invariants of algebraic topology (specifically, on homology theory). In the ensuing years, TDA has proven successful in complementing traditional data analysis tools, particularly in the more challenging settings (high dimension, unstructured or non-metric data, strong non-linearity, etc); it has now an established ecosystem of computational libraries, it is developing a rich interplay with machine learning thanks to the emergence of topological losses, and has motivated a renewed interest in representation theory, e.g. for the development of computable descriptors of multidimensional persistence. In this talk, authors will provide a brief and hands-on introduction to TDA, and showcase a few examples of its applications that may be of interest to a large audience.