



Karlstad Applied Analysis Seminar (2026)

Iannis Diamantis, Maastricht University, The Netherlands

8th of October 2026

When data has shape: Topology across the sciences

Abstract

Many modern datasets are high-dimensional, noisy and nonlinear, making their underlying structure difficult to capture with conventional summaries alone. In this talk I will explore how ideas from topology can provide a complementary way of looking at data: not only through numerical values, but through shape and structure.

Starting from symbolic representations of time series, I will introduce the basic ideas of Topological Data Analysis and persistent homology, and illustrate them through applications to financial markets, exchange-rate dynamics and consumer behaviour. I will then discuss recent work on compressing topological information into interpretable scalar summaries while retaining meaningful structural information.

Finally, I will turn from description to explanation and ask a more ambitious question: can topology be incorporated into causal inference? I will present a framework for defining treatment effects when the scientifically relevant outcome is itself geometric or topological, and discuss both its potential and its limitations.