Department of Mathematics
University of Notre Dame

Chris Kapulkin - University of Western Ontario

TOPOLOGY SEMINAR

Guest Speaker: Chris Kapulkin

University of Western Ontario

Date: Tuesday, November 4, 2025
Time: 2:15 PM
Location: 258 Hurley Bldg
Zoom Link: NA

Lecture Title:
Topology, graphs, and data

Abstract

Discrete homotopy theory is an emerging area of mathematics that applies topological intuitions in discrete settings. It associates (discrete) homotopy and homology groups to graphs that detect combinatorial, rather than topological, "holes." It has found numerous applications, including to matroid theory, hyperplane arrangements, and network analysis. This talk will be an introduction to discrete homotopy theory, building towards two main points. The first is a theoretical result, joint with Daniel Carranza (Compos. Math. 2024) that associates to a graph a topological space whose homotopy and homology groups recover the discrete homotopy and homology groups of the graph. The second, joint with Nathan Kershaw (arXiv:2506.15020) is an application of the foregoing result to data analysis, showing that persistent discrete homology provides an alternative to standard techniques of topological data analysis that is better suited for noisy data.