



UNIVERSITY OF DELAWARE

DATA SCIENCE
INSTITUTE

Data Science Seminar Series



Optimal Transport and Topology in Data Science

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10:00am
311 Pearson Hall

The optimal transport problem seeks the cost-minimizing plan for moving materials to building sites. First formulated precisely by Gaspard Monge in the 1700s, optimal transport has since developed into its own sophisticated subfield of pure mathematics. Recent advances in theory and algorithm design have transformed optimal transport into a viable tool for analyzing large datasets. In this talk, I will describe a way to compare general abstract metric spaces using ideas from optimal transport. This provides a unified framework for analyzing complex data, which I will demonstrate with an application to feature matching of anatomical surfaces. Along the way, I will formulate several natural inverse problems in geometry and graph theory whose solutions are obtained via tools from the rapidly-developing field of topological data analysis.

Tom Needham is a Ross Assistant Professor at The Ohio State University, where he works in the field of Topological and Geometrical Data Analysis. His research involves applications of algebraic topology to data science, topics in mathematical signal processing such as compressive sensing and Riemannian approaches to statistical shape analysis. Before coming to Ohio State, he received his Phd in Mathematics from University of Georgia in 2016.
