NUMTA 2026 Special Stream on

Theoretical and Computational Methods for Graphs

(special stream dedicated to the memory of Professor Ezio Venturino)

Special Stream Organizers:

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Graph theory provides a unifying mathematical framework for describing relations and interactions within complex systems. Recent progress in both theoretical and computational aspects of graph-based methods has led to significant developments in numerical linear algebra, optimization, approximation theory, and data-driven modeling. Graphs naturally arise in the discretization of continuous problems, in the analysis of large datasets, and in the study of dynamical systems on networks. Consequently, the interplay between discrete structures and continuous models is becoming increasingly central in modern applied mathematics.

From a theoretical perspective, advances in spectral graph theory, random graph models, and graph limits have deepened our understanding of structural and asymptotic properties of networks. On the computational side, efficient algorithms for large-scale graph computations and numerical schemes for graph Laplacians have become essential tools in applied and computational mathematics.

This special stream brings together researchers working on the analytical, numerical, and algorithmic aspects of graph theory and its applications. The objective of the stream is to present a selection of recent theoretical and computational advances in the study of graphs, highlighting their connections to numerical analysis, optimization, and modeling of complex systems. The topics include but are not limited to: spectral and algebraic graph theory; numerical methods on graphs; graph Laplacians; approximation and interpolation on graphs; optimization and variational problems on networks; random and dynamic graphs; graph-based numerical linear algebra; and graph-theoretic approaches to data and model reduction.

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