

Title: Spectral Graph Theory

Description: This course will provide an introduction to spectral graph theory, which studies how the combinatorics of graphs are related to the algebra of associated graph matrices, most notably through the eigenvalues and eigenvectors of these matrices. This class is intended for a broad and interdisciplinary audience; the only prerequisites are a familiarity with linear algebra and sufficient mathematical maturity. Topics are likely to include the following:

- optimization and the Courant-Fischer theorem
- sparsest cuts and expander graphs
- random walks on graphs
- the spectrum of Cayley graphs
- association schemes, error correcting codes, and symmetry reduction
- graphs of polytopes
- the Colin de Verdiere invariant

Some references for the course material:

[Spectral and Algebraic Graph Theory - Daniel Spielman](#)

[Graph Partitioning, Expanders, and Spectral Methods - Luca](#)

[Trevisan Spectral Graph Theory - Fan Chung](#)

[Algebraic Graph Theory - Chris Godsil and Gordon Royle](#)