CO 444/644 Algebraic Graph Theory

Instructor: Jane Gao

This course is an introduction to algebraic graph theory with a reading component of research papers.

Topics include
- **Transitive graphs**: vertex-transitive graphs, edge-transitive graphs, arc-transitive graphs.
- **Homomorphisms**: cores, counting homomorphisms
- **Spectral graph theory**: eigenvalues and eigenvectors of the adjacency matrix, Perron-Frobenius Theorem, Courant-Fisher Theorem, eigenvalue interlacing, strongly regular graphs.
- **Research papers**: spectral techniques for graph partitioning, eigenvalues of random graphs, spectral techniques for SAT problems.

Topics may include

- **Graph Laplacian:** Laplacian matrix, conductance, eigenvalues, random walks.

Textbooks and reading material.

- Algebraic graph theory, Chris Godsil and Gordon Royle

- The research papers to be read will be announced later

Prerequisites.

MATH239/249, PMATH336/346/347, basic knowledge in linear algebra, in particular, properties of real symmetric matrices.