

**CO 642/442 - GRAPH THEORY**  
**COURSE OUTLINE FOR FALL 2020**

**Instructor:** Luke Postle

This course is an introduction to classical graph theory with a bias toward graph coloring.

Topics include:

- **Coloring:** Brooks' Theorem, Vizing's Theorem, Thomassen's 5 List Coloring Theorem
- **Graph Minors:** Mader's Theorem, Tree-width, Hadwiger's Conjecture.
- **Nowhere-zero Flows:** Duality with colouring, Seymour's Six Flow Theorem and/or Thomassen's Three Flow Theorem.
- **Extremal Graph Theory:** Turán's Theorem, Erdős-Stone Theorem, Ramsey's Theorem
- **Probabilistic Method:** Lower bounds for Ramsey numbers, graphs with large girth and chromatic number

**Suggested reading:** Graph Theory, Fifth Edition, Reinhard Diestel. Available on-line. (This is also the textbook for the class).

**Prerequisites.** The course will be mostly self-contained, but it is designed as a second course in graph theory, and so it skips a number of important topics. It is assumed that students are familiar with matching (see Sections 2.1 and 2.2 of Diestel), Euler tours (Section 1.8 of Diestel), connectivity (Section 3.1, 3.2, and 3.3 of Diestel), and planar graphs (Sections 4.2, 4.3, 4.4 and 4.6 of Diestel). Students who have no prior exposure to graph theory should also read Sections 1.1-1.7 of Diestel.