Math 430: Graph Theory (3 credits, Spring 2016)

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Lecture: MWF 4-4:50pm 214 Minard Hall
Lecturer Office Hours: 3-3:50pm
Textbook: *Introduction to Graph Theory (2nd ed.)*, Doug West.

Course Description: Graph Theory is the study of formal mathematical structures called *graphs*, where we have objects (vertices) and pairs of objects may have a relation (called edges). Many systems in the real world can be modelled and studied as graphs. A contemporary example is Facebook, where users are related if they are friends. The original Google PageRank algorithm relies on studying a graph of all websites, where there's a directed relation if one site links to another site. Electronic devices on a computer network can be modelled as a graph. Power stations connected by power wires on the electricity grid can be modelled as a graph. Houses where packages need to be delivered connected by the road system can be modelled as a graph. Many questions of practical interest about these systems can rephrased as problems in graph theory.

Course Objective: In this class, we will cover a few introductory topics in graph theory. Some topics will have direct, obvious applications to some of the previously mentioned models. Topics related to walks/paths are relevant for delivery models. Questions about connectedness, and how many vertices can be removed from a graph while keeping it connected are important for redundancy in power grids/computer networks. Some topics will have more complex applications, such as trees relating to searching and sorting algorithms, and perfect matchings corresponding to assignment problems. And some topics will be of more mathematical interest than practical interest, like classifying which graphs can be drawn in the plane without having any edges cross.

Grading: Weeklyish homework 60%, take-home midterm 20%, take-home final 20%

Special Needs: Any students with disabilities or other special needs, or who need special accomodations in this course are invited to share their concerns or requests with the instructor and contact the Disability Services Office as soon as possible.

Academic Honesty: The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occured in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty .