Mathematics 725, Spring 2020 (KU course #57126)
Graph Theory

Instructor: Jeremy Martin (you can call me "Jeremy")
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Office hours: Thursdays, 1:00–2:30pm, or by appointment

Meeting time: MWF 2:00–2:50pm, 152 Snow Hall.

Course description: Math 725 is an introduction to graph theory and related topics in combinatorics. The course material includes basics of directed and undirected graphs, trees, matchings, connectivity and network flows, colorings, and planarity. Depending on time and students' interests, we may cover additional topics such as the Tutte polynomial, matroids, Ramsey theory, random graphs, spectral graph theory (eigenvalues), random walks, electrical networks, rigidity theory, ...

Blackboard: Announcements, problem and solution sets, lecture notes, etc., will be posted on Blackboard. Please do not distribute any course materials without checking with me first.

E-mail: I will periodically send class information (announcements, problem hints, etc.) to all students' KU e-mail accounts. You are responsible for checking your e-mail regularly so as to receive this information.

Text: Reinhard Diestel, *Graph Theory* (Springer). Available electronically at low cost in various editions from the author's website. In addition, I will post lecture notes on additional topics not covered in Diestel.

Prerequisites: Math 290 (Elementary Linear Algebra) and at least one mathematics course numbered 450 or above. You do not need to know anything about graph theory beforehand, but you should be comfortable with basic linear algebra and with reading and writing proofs. Experience with combinatorics (e.g., Math 724) and/or computer programming is helpful, but not required.

Problem Sets: Problem sets will be due approximately every two weeks, **starting Friday, January 31**. I will post problems on Blackboard at least a week before the due date. I encourage collaboration on the problem sets, but you must write up your own solutions independently and acknowledge all collaborators. Problem sets will be worth a total of 50% of your grade.

Project: Each student will complete an independent project, which may include one or more of the following: reading a research article, writing and testing a computer program, making and testing a conjecture experimentally, writing an expository paper, giving a brief talk to the class, etc. (Details will be arranged later in the semester.) I will work with you individually to help you choose a suitable topic for your project. The project will be worth 25% of your grade.

LaTeX: All written work (problem sets and projects) must be typeset using LaTeX. To submit homework, you can either (1) email me the PDF file with a filename that includes your last name and the problem set number (e.g., "Tutte5.pdf"), or (2) register for a free account on Overleaf, create a project called something like "Noether Math 725", add me as a collaborator, and do all your work there.

Exam: The final exam is scheduled for **Thursday, May 14, 1:30–4:00pm.** It is worth 25% of your grade.

Blatant shill: Please attend the Combinatorics Seminar (Fridays, 3–4pm, Snow 306). Many of the talks will be accessible to Math 725 students.

Approximate time commitment: This is a 3-credit course, so I estimate that most students will need to spend about 6 (or more) hours per week outside of class to earn a decent grade. The problem sets are intended to be challenging, so leave yourself plenty of time for each problem set.

Makeup work: Your enrollment in this course is a commitment to hand in all work by its announced deadline. If, for some legitimate and unavoidable reason, you are unable to turn in an assignment on its due date or to attend the final exam, you must notify me *in advance* to make appropriate arrangements. KU policy states that no student is required to take more than two final exams on a single day; check the official final exam schedule and notify me if you have more than one other exam scheduled for May 14.

Incompletes: A grade of I is a rare occurrence and is reserved for cases in which a student has completed most of the course work at an acceptable level, but is prevented from completing the course due to *extraordinary* circumstances. If you think an I may be warranted, you must consult me *before* the final exam. A grade of I cannot be made up by taking the course again.

Dropping the course: Through February 10, you may drop a course and have it removed from your record. From February 11 through April 20, you may withdraw from a course (a grade of W will appear on your transcript). After April 20, dropping is not permitted. For complete details, consult the KU Registrar (151 Strong Hall; 785-864-4423).

Academic honesty and collaboration: You are required to abide by all KU policies on academic integrity. Cheating, plagiarism or other academic misconduct will result in a failing grade on the assignment in question, notification of the student's dean, and usually further disciplinary sanctions, possibly including a failing grade in the course. You are encouraged to collaborate with other students on problem sets. However, **each student must write up his or her own solutions and acknowledge all collaborators**. Copying someone else's work, or allowing someone else to copy yours, is considered to be a form of cheating. For more information, see KU's official policies on academic misconduct.

Students with disabilities: Student Access Services (22 Strong Hall, 864-4064) coordinates accommodations and services for all students who are eligible. If you have a disability for which you wish to request accommodations, please contact SAS as soon as possible. Please also contact me privately in regard to your needs in this course.

Religious holidays: If you plan to observe a religious holiday which conflicts in any way with the course schedule or requirements, contact me at the beginning of the semester to discuss alternative accommodations.

Intellectual property: All course materials prepared by the instructor, together with the content of all lectures and review sessions, are the intellectual property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. Upon reasonable request, I will usually grant permission to record lectures, on the condition that such recording is used only as a study aid by the student making the recording, and is not modified or distributed in any way. *Course materials posted online are exclusively for the use of students in Math 725, and must not be redistributed without the instructor's consent.*

Weapons policy: Individuals who choose to carry concealed handguns are solely responsible for doing so in a safe and secure manner and in strict conformity with state and federal laws and KU weapons policy. Safety measures outlined in the KU weapons policy specify that a concealed handgun:

- Must be under the constant control of the carrier.
- Must be out of view, concealed either on the body of the carrier, or backpack, purse, or bag that remains under the carrier's custody and control.
- Must be in a holster that covers the trigger area and secures any external hammer in an un-cocked position
- Must have the safety on, and have no round in the chamber.

Updated Tue 1/21/20