

Graph Theory
(Math 453/553, CPT_S 453/553)
3 Credits
Fall 2018

Meeting Times: MWF 2:10-3:00 PM

Location: SPRK 335

Text: Bang-Jensen and Gutin, *Digraphs – Theory, Algorithms, and Applications* (PDF available in the Dropbox folder)

Instructor: Prof. Matt Hudelson

Office Hours: TBA (in the Math Learning Center)

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Prerequisites: Math 220 (introductory linear algebra) or equivalent. Since this is an upper level mathematics course, we will examine results and their proofs, so some familiarity with proof techniques (a la Math 301, e.g.) would be encouraged.

Course management: This course will be managed through Blackboard (learn.wsu.edu) and a Dropbox folder will be used to house documents (such as the textbook and course notes).

Anticipated Coverage

Weeks 1-3	Chapter 1: Basic Terminology, Notation, and Results
Weeks 4,5	Chapter 2: Distances
Weeks 6,7	Chapter 3: Intro to Flows
Weeks 8,9	Chapter 4: Classes of Digraphs
Weeks 10-15	Selections from Chapter 5 (Hamiltonicity), Chapter 7 (Connectivity), Chapter 8 (Orientations), and Chapter 10 (Cycle Structure)

Learning goals: To gain skills...

1. ... with the basic concepts of graph theory, emphasizing directed graphs (also showing that results concerning undirected graphs can be deduced as consequences.) Progress toward this learning goal will be assessed through homework assignments.
2. ... in reasoning mathematically. Progress toward this learning goal will be assessed through homework assignments and the end-of-semester project.
3. ... in communicating mathematical ideas effectively. Progress toward this learning goal will be assessed through homework assignments and the end-of-semester project.
4. ... in locating, compiling, analyzing, and communicating information in an academic setting. Progress toward this learning goal will be assessed through the end-of-semester project.

Course overview: This course is intended as an intensive introduction to **graphs**. Intuitively, a “graph” is a collection of “vertices” (thought of as dots) joined by “edges” (thought of as line segments or curve segments.) Here, we will emphasize **directed graphs** (vertices are joined by “arcs,” analogous to arrows) and deduce results concerning undirected graphs as special cases. With this intuition, we are trying to make an abstract picture of relationships among discrete objects. Armed with the definitions and foundational results in chapter 1, we explore several applications in detail in chapters 2 through 4 and then briefly look at other applications in the other chapters.

We will be spending considerable time in chapter 1, developing the definitions, vocabulary, and easy-to-prove theorems contained therein. Since the definitions do not require elaborate mathematical background, the study of graph theory is an excellent venue for practicing proof writing and techniques.

Since this is a conjoint course, we must distinguish math 453 from math 553. Those wanting credit for math 553 should expect to turn in a higher number of well-reasoned and well-written exercises. My strategy is to have math 453 students choose all but one problems to turn in from a homework set, while math 553 students will have to accurately complete the entire assignment for full credit. For each hour of lecture, students should expect to have a minimum of two hours of work outside class.

All students will be required to write a 5 to 10 page narrative project, including references (please, not all Wikipedia) on any topic related to the course, to be turned in during closed week. Also, math 553 students are expected to prepare a 15-minute lecture (in power point form or the equivalent) on their project topic. Given the large and geographically diverse enrollment in this course, these lectures will not be presented. There will be no in-class or final exams.

If a “beyond your control” situation arises where you must miss class for three or more consecutive class meetings or you are prevented from completing more than one assignment, please consult with me so that appropriate adjustments (such as prorating grades) can be made. I will award an incomplete only if you are prevented from completing the end-of-semester project under circumstances beyond your control.

Grading:

The periodic homework sets will count for 75% of the final grade and the project (plus oral presentation for 553 students) will count for 25%. As every student now has access to Office 365, I will require that assignments be typeset (perhaps using LaTeX or equation editor in Word; drawings may be done by hand and scanned) and submitted electronically through Blackboard 5:00 PM on the due date. I will award points for each problem set and take the average of these when computing final grades. Final grades will be awarded on the following scale:

Interval (in percent)	Grade
[90,100]	A
[87,90)	A–
[83,87)	B+
[80,83)	B
[77,80)	B–
[73,77)	C+
[70,73)	C
[67,70)	C–
[63,67)	D+
[60,63)	D
[0,60)	F

I will allow for multiple attempts on a homework set, so there’s no need to panic if you receive a low score initially.

Attendance will not be formally taken and will not comprise any portion of the course grade.

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417; website: <http://accesscenter.wsu.edu>, email address: Access.Center@wsu.edu) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

Academic Integrity: Academic integrity is the cornerstone of higher education. As such, all members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship. Academic integrity will be strongly enforced in this course. Students who violate WSU's Academic Integrity Policy (identified in Washington Administrative Code (WAC) 504-26-010(3) and -404) will receive zero credit for the assignment, will not have the option to withdraw from the course pending an appeal, and will be reported to the Office of Student Conduct.

Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards of Conduct for Students, WAC 504-26-010(3). You need to read and understand all of the definitions of cheating:

<http://app.leg.wa.gov/WAC/default.aspx?cite=504-26-010> . If you have any questions about what is and is not allowed in this course, you should ask the course instructor before proceeding.

If you wish to appeal a faculty member's decision relating to academic integrity, please use the form available at conduct.wsu.edu .

Classroom Safety: Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the "Alert, Assess, Act" protocol for all types of emergencies and the "Run, Hide, Fight" response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able). Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI's [Run, Hide, Fight](#) video and visit the [WSU safety portal](#).