Graph Theory and Networks (MAD 5306)

Syllabus, Spring 2025

M,W,F   9:20–10:10   106 Love

Professor: Prof. Richard Bertram
Office Hours: M 10:10–11:00, W 10:10–12:00 or by appointment
Office: 114 Love
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Prerequisite: MAS3105 (Applied Linear Algebra) or some linear algebra course.

Textbook: Most of the topics in the course are from "A First Course in Network Science" by Filippo Menczer, Santo Fortunato, and Clayton A. Davis and "Networks, Crowds, and Markets" by David Easley and Jon Kleinberg. Another book I like is "Networks", second edition, by Mark Newman, though most lectures are based on the other two books. You can find them all on Amazon.

Course Topics: Graph theory, information networks, biological networks, social networks, technological networks, generic properties of real-world networks, random networks, network centrality, graph diffusion, epidemics.

Course Objective: This introductory course examines the properties of networks from a mathematical perspective. The main objective is to demonstrate how this is done. A second objective is to present examples of large-scale networks that we rely on every day (e.g., transportation networks, the internet and world wide web) or are part of our bodies (e.g., gene transcription and intracellular signaling networks). A third objective is to familiarize students with computer software that is useful in the analysis of networks.

Computer Software: Much of what is done in this class involves operations with matrices. Matlab is the perfect software package for handling matrices, and FSU students have free access to this. You should have this operational on your computer. We will also use the NetworkX Python package that is free and that you should download onto your computer.

Assignments: Periodic homework assignments will be given that you should work through

to gain expertise on the course topics. I will post these on my web site, as well as solutions to problems.

Student Presentations: Each graduate student will give a presentation during the last couple of weeks of the semester. Each presentation will be by a team of two students that I will select. This will be on a topic of his/her choice, and should be based on a research article(s) (not the textbook) that I have approved.

Exams: There will be two in-class exams and a 2–hr cumulative final exam, scheduled for Monday of final exam week at 7:30–9:30 AM (sorry!!!).

Grading: Each in-class exam will make up 20% of the grade, and the final exam will make up an additional 40%. The presentation will make up 20% of the grade. The final letter grade is determined according to the following scale:

90.1–$100\% = $ **A**, 88–$90\% = $ **A**$^-$
84.1–$87.9\% = $ **B**$^+$, 80.1-$84\% = $ **B**, 78-$80\% = $ **B**$^-$
74.1–$77.9\% = $ **C**$^+$, 68.1-$74\% = $ **C**, 66.1-$68\% = $ **C**$^-$
58-$66\% = $ **D**, 0–$57.9\% = $ **F**

Attendance/Makeup Policy: I will not take attendance, but you are expected to come to class. This is particularly true during the graduate student presentations that will take place near the end of the semester. If you miss a class, you are still responsible for learning the material that you missed. If you miss a test because of an unexcused absence, you will receive a 0 on that test. If you miss a test because of an excused absence, I will use your score on the final exam as your score on that test. For an absence to be excused, you must notify me in advance and explain the reason for the absence.

Academic Honor Policy: The Florida State University Academic Honor Policy can be found at http://fda.fsu.edu/Academics/Academic-Honor-Policy. Cheating on a quiz or test will result in a grade of 0 for that test, and further actions may be taken in accordance with the FSU policy.

Students with Disabilities: Students with disabilities needing academic accomodations should register with and provide documentation to the Student Disability Resource Center (SDRC) and then bring a letter to me from SDRC indicating the academic accomodations that are required. This should be done within the first week of class.