# Course Syllabus

## MATH 8420 - Advanced Graph Theory

## Spring semester, 2026

**Course Website**. The majority of the course material can be found at samspiro.org including course notes, homework assignments, and an anonymous feedback form.

**Textbook**
This course will use my own custom notes that I'm writing for this course which are available at samspiro.org. Amongst textbooks, our treatment will most closely match that of *Modern Graph Theory* by Bollobas.

**Class Time and Location**: Tuesday/Thursday 9:30am to 10:45am; Classroom South, Room 508.

**Instructor:** Dr. Sam Spiro

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| Email: | sspiro@gsu.edu. |
| Office: | 25 Park Place, Room 1319. |
| Office Hours: | Tuesday 10:45-11:45 and by appointment. |


**Course Content**
This course will cover various portions of the following topics:

- Extremal combinatorics (Turán problems, Dirac Problems, Ramsey theory).
- Structural graph theory (colorings, matchings, connectivity).
- Methods (probabilistic, linear algebra, regularity).
- Bonus topics (hypergraphs, random graphs, planar graphs, spectral graph theory).

The exact content we cover will be based on the interests of the students. If no input is given, then we will cover all of extremal combinatorics together with introductory material from structural graph theory and methods as time permits.

**Prerequisite Policy**
This course assumes you have taken MATH 6420 or its equivalent.

**Course Evaluation**
Your course grade will be determined as follows:

- **Homework (70%)**
  - There will be weekly homework assignments due each Thursday at noon starting in week 2.
  - Homeworks should be dropped off to the mailbox of the TA **Aram Mathivanan**. All grading and extension requests for homeworks should be made directly to the TA at amathivanan1@student.gsu.edu.
  - The homeworks will be posted to the course websites, with "???" indicating that the assignment has not yet been finalized (in case you want to get a head start on what is likely to be the next assignment).
  - I am intending for the homework to be challenging enough that you won't necessarily be able to do all of it every week, but that you should be able to do most of it most weeks.
  - If you find the homework too challenging, please come see me during office hours (Note: I will not reply to emails about homework problems). If you find the homework too easy, you are encouraged to try some of the unassigned exercises in the notes.

- **Final Presentation (30%)** In lieu of a final exam, each student will give a brief presentation on a math paper related to graph theory during the usual final exam slot.
  - Each student must choose and get approval for their paper choice by **March 5th**. Students who are not sure what to talk about are encouraged to talk with me during office hours about potential topics.
  - An initial (very rough) draft of slides should be sent to me for comments by **April 9th**.
  - Students can either present alone for 20 minutes, or with a partner for a total of 30 minutes.
  - It's not required, but I highly recommend watching this YouTube video on how to give good talks to help guide your presentation.

  We will have our final in person at SStime I don't know; ultimately I might change to be take home, but I can decide that closer to the exam.

**Technology**
You can use whatever devices you'd like during class as long as you do not use them in the front row so that students who might be distracted by your screens can sit in front of you.

**Accommodations**
Students who wish to request an accommodation may do so by registering with the Access and Accommodation Center (AACE). Students may only be accommodated if the instructor receives an email with the notification of approved accommodations from AACE. Note: Accommodations are not retroactive and will be applicable following the date in which they are received.

**Academic Integrity Policy**
Cheating/plagiarism will not be tolerated on any work. Academic dishonesty on the final exam may result in an **F** for the course. A first occurrence will result in a grade of 0 on the assignment for all concerned parties as well as an Academic Dishonesty form being filed with the Dean's Office. A second occurrence will result in a grade of **F** for the course for the concerned parties and a second Academic Dishonesty form being filed. (See also the University's policy on Academic Honesty at **http://codeofconduct.gsu.edu/**.)

**Copyright and Honesty Clause**
All content created in this course, including videos, handouts, etc., may be used only by students enrolled in the course for purposes relating to the course. The selling, sharing, publishing, presenting, or distributing of instructor-prepared course lecture notes, videos, audio recordings, or any other instructor-produced materials from any course for any commercial or non-commercial purpose is strictly prohibited, unless explicit written permission is granted in advance by the course instructor. This includes posting any materials on websites such as Chegg, Course Hero, OneClass, Stuvia, StuDocu, and other similar sites. Unauthorized sale or commercial or non-commercial distribution of such material is a violation of the instructor's intellectual property and the privacy rights of students attending the class, and is prohibited. Failure to abide by these limitations constitutes a violation of the Policy on Academic Honesty and will be treated accordingly.

**Students Conduct Guidelines**
Appropriate conduct is expected from all students. Arrive on time to classroom, and do not leave the classroom early. If you must leave early for some reason, please inform me prior to class. Text messaging, instant messaging, emailing, etc. during class is strictly prohibited and is grounds for dismissal. If you are using your cell phone or computer or another device for tasks that are not math related, or talking, or otherwise disrupting students, you will be asked to leave. After the third incident you will be administratively removed from the class (as per the Student Handbook).