

MAT 598, Topic: Graph Theory and Additive Combinatorics

Note: the syllabus and course schedule are subject to change. Any changes to the syllabus and/or course schedule will be relayed to the students in class and through e-mail.

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Office hours: TBA at WXL R 734, or by appointment.

Lectures

Time: M W 12:00 PM - 1:15 PM **Location:** WXLRA309

Course Information

Course objectives and material: This course introduces the results and techniques in graph theory and additive combinatorics, focusing on the connection between the two subjects. It follows from a graduate-level course developed by Prof. Yufei Zhao at MIT, and plenty of related materials can be found at <https://yufeizhao.com/gtac/>. In this course, we will explore the following topics: Turán problem, Szemerédi’s regularity method, pseudorandom graphs, spectral graph theory, graph limits, Fourier analysis in additive combinatorics, polynomial methods, Freiman’s theorem and the structure of sum sets, and sum-product phenomenon.

If there are any related topics that you are interested in discussing, feel free to let me know.

Textbook: Free online textbook at <https://yufeizhao.com/gtacbook/gtacbook.pdf>

Grading: There will be no graded homework or exams in this class, rather students will give a presentation in class or write a final project on a related topic to this course.

Prerequisites: While no background in graph theory is required, students should be comfortable with basic undergraduate-level algebra, analysis, and theorem-proving skills (MAT 300 level). Students with some combinatorics/algebra/analysis/theoretical computer science background are particularly welcome. If you need an override approval to register, feel free to email me.

Students with Disabilities and/or in need of Special Accommodations

Students who feel they will need disability accommodations in this class but have not registered with the Disability Resource Center (DRC) should contact DRC immediately. The DRC Tempe office is located on the first floor of the Matthews Center Building. DRC staff can also be reached at: (480) 965-1234 (V) or (480) 965-9000 (TTY). For additional information, visit: <https://eoss.asu.edu/drc>. Please also make an appointment with me to discuss your accommodation, if necessary.

Academic Integrity

Academic honesty is expected of all students in all examinations, papers, and laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see <http://provost.asu.edu/academic-integrity>.

Attendance Policy

You are expected to come prepared and actively participate in every lecture. In the event of an absence, you are responsible for all missed materials, assignments, and any additional announcements or schedule changes given in class. Class disruptions of ANY kind will NOT be tolerated and may result in your removal from the classroom. Please show courtesy to your fellow classmates and instructor.

Absences related to religious observances/practices: If you will be absent from class due to a religious observance or practice, it is your responsibility to inform the instructor during the first two weeks of class. Your instructor will work with you on alternative and reasonable arrangements for any time missed.

Absences related to university sanctioned events and activities: If you will be absent from class due to participation in a university sanctioned event/activity, it is your responsibility to inform the instructor during the first two weeks of class. Your instructor will work with you on alternative and reasonable arrangements for any time missed.

Policy against threatening behavior

All incidents and allegations of violent or threatening conduct by an ASU student (whether on-or off campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students. If either office determines that the behavior poses or has posed a serious threat to personal safety or to the welfare of the campus, the student will not be permitted to return to campus or reside in any ASU residence hall until an appropriate threat assessment has been completed and, if necessary, conditions for return are imposed. ASU PD, the Office of the Dean of Students, and other appropriate offices will coordinate the assessment in light of the relevant circumstances.

Title IX

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu>.

Policy on Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish discuss any concerns confidentially and privately.

Gender identity

The School of Mathematical and Statistical Sciences encourages faculty to address and refer to students by their preferred name and gender pronoun. If your preferred name is different than what appears on the class roster, or you would like to be addressed using a specific pronoun, please let your instructor know.

Copyrighted Materials

Students may not upload to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Conversely, the contents of this course, including lectures and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling or distributing course content or notes taken during the conduct of the course. Any recording of class sessions is authorized only for the use of students enrolled in this course during their enrollment in this course. Recordings and excerpts of recordings may not be distributed to others.