

21-228 Discrete Mathematics  
Spring 2024      MWF 10:00-10:50      Hammerschlag B103  
Professor Bohman

This course introduces three of the fundamental areas of discrete mathematics: enumeration, graph theory and discrete probability. The introduction to enumeration includes recurrence relations, generating functions, and the principle of inclusion and exclusion. The introduction to graph theory includes topics such as Hamilton cycles, planar graphs, Euler's Theorem, matchings, and trees. The course also includes an introduction to graph Ramsey theory and, if time permits, a brief introduction to computational complexity.

- **Suggested texts:**

- *Discrete Mathematics, Elementary and Beyond*, Lovász, Pelikán and Vesztergombi.
- *Invitation to Discrete Mathematics, second edition*, Matoušek and Nešetřil.

- **Prerequisites:** Concepts of Mathematics (21-127 or 21-128).

- **Teaching Assistants:** Nathaniel Bannister and Yuelin Li.

- **Office hours:**

- Professor Bohman: Wednesday 3:00-5:00 or by arrangement.
  - \* office: Wean 8208
  - \* email: [tbohman@math.cmu.edu](mailto:tbohman@math.cmu.edu)
- Nathaniel Bannister: Tuesday 1:00-3:00
  - \* office: Wean 7114
  - \* email: [nathanib@andrew.cmu.edu](mailto:nathanib@andrew.cmu.edu)
- Yuelin Li: Thursday 12:00-1:00
  - \* office: Wean 6215
  - \* email: [yuelinli@andrew.cmu.edu](mailto:yuelinli@andrew.cmu.edu)

- **Homeworks:** Eight homework assignments will be given during the semester. These will usually be due at the beginning of lecture on Fridays. Since genuine mathematical understanding is best achieved through the personal exploration of the material that comes with working problems, homeworks are regarded as important. Discussion of the homeworks with other students is permitted, but collaboration on the writing of the assignments is not (i.e. you are NOT permitted to see the actual pages another student is handing in). Homeworks will be submitted through Gradescope.

- **Tests:** There will be tests on 2/16, 3/22 and 4/19 and a comprehensive final exam.

If circumstances such as illness prevent you from taking a test or exam at the scheduled time, please discuss the problem with me *before* the test or exam if possible.

- **Grades:** The final exam will account for 30% of the course grade. Homework and class participation will give 15% of the grade. The remaining 55% of the course grade will be given by the average of your best two test scores. The lowest test grade will be dropped.
- **Web Page:** <http://www.math.cmu.edu/~tbohman/21-228/discrete.html>  
Homeworks, review sheets, and other course materials will be posted on both the course web page and on Canvas. Announcements will be posted on Canvas.
- **Homework Policy.** Homework is due at the beginning of class on the due date. Late homeworks will be accepted at the beginning of the following lecture and will receive half credit.
- **Accommodations for students with disabilities.** If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at [access@andrew.cmu.edu](mailto:access@andrew.cmu.edu).
- **Wellness.** As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. CMU services are available, and treatment does work. You can learn more about confidential mental health services available on campus at: <http://www.cmu.edu/counseling/>. Support is always available (24/7) from Counseling and Psychological Services: 412-268-2922.
- **Learning Objectives.** Student should further develop their understanding of mathematical notation and mathematical statements. Students should also deepen their ability to assess and write mathematical proofs. They should gain an understanding of various methods for counting discrete mathematical objects, the basic theory of graphs, and the basic theory of discrete probability spaces.