

COURSE SYLLABUS - SPRING 2020

MATH 569X / 469X INTRODUCTION TO DISCRETE MATHEMATICS (3 credits)

Time: Tue Thu 12:40 PM - 2:00 PM

Place: Black 1028

Instructor: Bernard Lidický, 422 Carver Hall, lidicky@iastate.edu

Web page: <http://lidicky.name/569X/>

Office hours: TBA

Brief description of goals and objectives

As the title suggest, the main topic of the class will be discrete mathematics. We will cover topics from graph theory, combinatorics, discrete optimization, and discrete geometry. The content may slightly vary depending on experience and interest of students attending the class.

Prerequisites

Official: (MATH 317 or MATH 207) and (MATH 304 or MATH 314)

Suggested: Knowledge of proofs and basic definitions from graph theory, combinatorics, and linear algebra are expected.

Textbook

Textbook for the class will be Invitation to Discrete Mathematics by Matoušek and Nešetřil. The course will go beyond the book on certain topics. Notes will be provided by the instructor.

Programming experience

The course will utilize Sage for programming exercises. This is a Python based system. Previous experience with similar systems is a plus but not required. A brief introduction will be part of the course.

Topics to be covered

Combinatorial counting, binomial theorem, estimates of factorial, inclusion-exclusion principle, permutations without fixed points, double counting, graphs, subgraphs, graph score,

connectivity, triangle-free graphs, graph isomorphism, planar graphs, points in general position, H -polytope, V -polytope, cyclic polytope, Farkas lemma, linear programming and duality.

Learning Outcomes

- Knowledge of classical topics in discrete mathematics.
- Ability to use computer for research in discrete mathematics.
- Ability to work in small groups.

Classroom style

The classes will be often done by working in groups through worksheets. The worksheets will also serve as notes.

Study habits

This course does require considerable work. You should be devoting time to reading the notes, thinking about the proofs, ideas, concepts, and techniques, talking with some of your classmates about them, doing all the assigned homework problems. It is expected that you will read the book - not everything you should learn and know will be discussed in class. Regular attendance and participation in class activities are the prerequisites for success.

Online resources

The class has a webpage TBA and a page in Canvas. The webpage contains basic information about the class and class log, which serves as a tentative schedule of the course as well as list of what was done in class.

Homework assignments

There will be homework assignments. Your work on any assignments should be well-presented in good English, and not written carelessly. While you can discuss the assignments with classmates, the work you hand in should be your own write-up and not copied from someone else. The homework assignments will be 60% of your final grade. The homework assignments will utilize peer review on Canvas. Assignments will include theoretical exercises as well as problems, where computer assistance is needed. The programming component will happen in Sage.

Exams

There will be exams worth 40% of your final grade. Depending on the enrollment, exam(s) may be replaced by presentations.

569x or 469x

The class is dual listed and can be taken as an upper level undergraduate class Math 469x or as a graduate class Math 569x. The time spent in the classroom during instruction and

group work will be identical. The major difference will be in homework assignments and exams. Homework assignments and exams will have some more challenging questions that will be required for 569x but optional for 469x. For example if an assignment contains one challenging question out of 6 questions, students enrolled in 569x will be graded on all 6 questions while students in 469x will be graded on best 5 out of 6; there is no penalty for students enrolled in 469x and attempting to solve all questions.

If exam(s) will be replaced by presentations, a range of topics to choose from for 569x will be offered by the instructor. There will be an additional list with more accessible topics available to 469x only. Students in 469x will have the option to choose from both lists.

Classroom etiquette

Communication devices must remain switched off during the class periods. Laptops, iPads or phones during the class are allowed only for textbook reading, taking notes and when instructor assigns work that require the use of laptop.

Attendance

Although attendance will not be taken, it is mandatory. Office hours are for those of you who need additional help beyond that given in the class; they are not substitutes for class.

Academic dishonesty

The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office. <http://www.dso.iastate.edu/ja/academic/misconduct.html> Note that reporting of cheating is mandatory.

Accessibility Statement

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every 2 semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.