

MTH 481 – Discrete Mathematics I (Fall 2019)

Course Information

Instructor: Nathan Grieve (Office: C315 WH; email: grievena@msu.edu).

Lectures: MWF 1:50 PM – 2:40 PM in A124 WH.

Office Hours: MF 3:00 PM – 3:45 PM and by appointment.

Course Webpage: Available through Desire to Learn (D2L).

Course Textbooks: *Combinatorics and graph theory*, 2nd ed., J. M. Harris, J. L. Hirst, M. J. Mossinghoff. (This book is published by Springer and is available electronically free of charge through the MSU library.)

Combinatorics: The art of counting, B. Sagan. (This is a book project that is in preparation. A preliminary electronic version will be posted on the course D2L website.)

Discrete Mathematics and Its Applications, K. H. Rosen (This is a more elementary text. Any edition is fine and only a few chapters are relevant.)

Content: This is a first course in Discrete Mathematics. Some specific topics of interest include: Binomial and multinomial theorems. Graphs and trees. Generating functions and counting techniques. Selected topics in computer algebra. Each of these topics will be covered in some detail. The exact depth, order and schedule in which they are touched upon is subject to change as the semester progresses. More specific references to the course textbooks will be announced on the course D2L webpage.

Prerequisites: MTH 309 or permission of the Department.

Attendance: Students are encouraged to attend lectures regularly.

Homework: There will be weekly homework assignments that are usually due sometime during Monday's lecture. **Late homework will not be accepted.** The lowest two homework scores will be dropped when computing the final homework grade. While students are encouraged to work collaboratively with their peers, the final writing of homework assignments should be an individual effort. Students should also clearly indicate all (if any) homework collaborators on their assignments.

Exams: There will be **two in class exams**. (Tentatively scheduled for Friday 18 October 2019 and Monday 25 November 2019.) The Office of the Register has scheduled the **final exam** for Wednesday 11 December 2019 from 17:45—19:45 in A124. There will be no make-up exams except in extreme situations.

Quizzes: There will be **three** short in class quizzes throughout the semester. The dates will be announced at a later time. The lowest quiz score will be dropped. There will be no make-up quizzes except in extreme situations.

Grade breakdown: (i) Homework: 20%; (ii) Quizzes 5%; (iii) Midterm Exams: 20% each; (iv) Final Exam: 35%. Depending on the overall mark distribution, course marks may be curved to obtain the composite numerical scores.

Grade conversion: The conversion between the final percent grade and the four-point grade system is governed by: 4.0 (at least 90%); 3.5 (at least 85% and less than 90%); 3.0 (at least 80% and less than 85%); 2.5 (at least 75% and less than 80%); 2.0 (at least 70% and less than 75%).

Other Comments

- All changes to the syllabus, scheduling of exams etc., will be announced during class and documented on the D2L website.
- To assist with learning of the course material, students may find it helpful to read relevant portions of the course textbook prior to attending the lectures.
- This is a proof-writing based course. In general, full marks will be awarded for complete, clearly written, logical and well-justified solutions.

Outline of lecture plan (tentative)

In some sense, the course will be divided into two parts. This is partly explained below. As time allows, we will be able to explore other sections of the course textbooks.

Combinatorics and Counting

E.g., selected sections from:

Harris-Hirst-Mossinghoff: *Combinatorics and Graph Theory*

Chapter 2: Combinatorics

- 2.1 Some essential problems
- 2.2 Binomial coefficients
- 2.3 Multinomial coefficients
- 2.4 The Pigeonhole Principle
- 2.5 The principle of inclusion and exclusion
- 2.6 Generating functions

Concepts in Graph Theory

E.g., selected topics from:

Harris-Hirst-Mossinghoff: *Combinatorics and Graph Theory*

Chapter 1: Graph Theory

- 1.1 Introductory concepts
- 1.2 Distance in graphs
- 1.3 Trees
- 1.4 Paths and cycles
- 1.5 Planarity
- 1.6 Colorings
- 1.7 Matchings