Math 378: Discrete Mathematics, Spring 2026

Instructor: Kevin Milans (`milans@math.wvu.edu`)
Class Meetings: MWF 2:30pm-3:20pm, ARM 315
Office Hours: M,Thurs 1:00pm-2:00pm and by appointment, in Armstrong Hall 408H
Class Journal: `https://milans.us/teaching/sp26/math378/`

Welcome: Welcome to Math 378: Discrete Mathematics. Roughly speaking, Discrete Mathematics is the branch of mathematics that deals with objects that can be in one of only a handful of configurations. For example, the value of a bit in a computer is either a zero or one. Two computers in a network are either joined by a link or they are not. In a system with many bits or a network with many computers, there are exponentially many possibilities. A central goal of Discrete Mathematics is to recognize patterns that are common to all these configurations.

Due to the nature of the objects studied, it is often possible to test conjectures by looking at small examples. Checking how a mathematical argument applies to a small example is akin to tracing the execution of a computer program on small inputs. For this reason, Discrete Mathematics is an excellent branch of mathematics for improving core skills of logic and reasoning.

Deep learning of mathematics requires a significant investment of time. The good news is that you don't have to learn alone. I am more than happy to answer your questions during office hours and via email. You are encouraged to work with other students to master course material.

Learning Outcomes and Course Goals: Students will understand core principles from enumerative combinatorics (such as recurrence relations and generating functions) and elementary graph theory (such as matchings, colorings, and connectivity). Students will acquire the ability to apply these important concepts in a wide range of contexts in mathematics, computer science, and engineering.

Prerequisite: Math 303 or permission by instructor

Textbooks: *An Invitation to Combinatorics*, by S. Shahriari; *Invitation to Discrete Mathematics*, second ed., by J. Matoušek and J. Nešetřil

Homework: Homework is a crucial part of learning mathematics. Homework will generally be assigned weekly. Your homework is expected to be neat and conform to accepted standards for professional work-products. Handwriting must be clearly legible, and margins must be respected. Except for excused absences, late homework is not accepted. Your lowest two homework scores are dropped. Homeworks missed due to excused absences have the highest priority to serve as dropped homeworks.

In working on the homework problems, you may make use of the course textbook and discussions with fellow students and the instructor. Your written work must be entirely your own, which implies that *you must fully understand everything written down on your paper under your own name.* You may not obtain answers to homework exercises by using search engines, artificial intelligence, other textbooks, scholarly research articles, or other resources, because doing so would defeat the purpose of the homework.

Homework Workshops: Homework workshop sessions will be held once a week. The workshops are dedicated to working on the current homework assignment. Students are encouraged to make serious attempts to solve some problems before the weekly sessions. Students will discuss the problems, brainstorm ideas, and find solutions together. The instructor will be available for assistance and to offer hints. Attendance is optional but recommended.

Quizzes: A quiz corresponding to the latest homework will generally be administered weekly. In accordance with the make-up policy, your lowest two quiz scores are dropped. Quizzes missed due to excused absences have the highest priority to serve as dropped quizzes.

Tests: There will be 3 tests, each covering between 1/4 and 1/3 of the course material. You may use one 8.5 by 11 inch sheet of *handwritten* notes during each test. No other aids are permitted. The tests are scheduled for Wed. Feb 11, Wed. Mar. 11, and Wed. Apr. 15. In accordance with the make-up policy, your lowest test score will be replaced by your score on the final exam if doing so will help your grade.

Final Exam: The final exam is Monday May 4, 11am–1pm. All students must take the final exam during the scheduled exam period, unless specifically exempted by university rules. You may use one 8.5 by 11 inch sheet of *handwritten* notes during the final. No other aids are permitted. The final exam is cumulative.

Attendance: Attendance is expected and an important part of maximizing your chances for success.

Expected Classroom Behavior: Talking with your neighbors, reading material unrelated to the course, listening to audio entertainment on your headphones, texting, and cell phones are not permitted in class.

Grading Rubric: Course averages are converted to letter grades according to the scale on the right. The instructor reserves the right to lower these thresholds.

Homework	30%
Quizzes	20%
Tests	$10\% \cdot 3 = 30\%$
Final Exam	20%
Total	100%

A- to A+:	77.5–100	B- to B+:	67.5–77.49
C- to C+:	57.5–67.49	D- to D+:	47.5–57.49
F:	0-47.49		

Make-up Policy: Students with an excused absence may submit the corresponding homework to the instructor via email attachment on or before its due date. Excused absences that result in a missed homework or quiz are, to the extent possible, accommodated by dropping the assessment. Excused absences have the highest priority for dropping an assessment. In the event that a student's excused absences exhaust the provisions for dropping, make-up work may be required. Students must notify the instructor of excusable absences as soon as possible. If a quiz or test must be missed for an excused absence, then a student may arrange to take the quiz or test earlier than scheduled, provided that sufficient notice is given to the instructor (at least one week).

Regrade Policy: Regrades may be requested by submitting the original work with a written explanation of your request up to 1 week after the work is returned. Regrade requests are to be used to correct errors in grading. Regrade requests that challenge the amount of a deduction are usually not considered, since deductions for common mistakes are applied uniformly to all students. When regrading, the entire problem(s) in question will be reviewed, and all discovered errors in grading (including any that previously favored the student) will be corrected. The resulting grade may be higher than, equal to, or lower than the original.

Academic Integrity: You are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will, at a minimum, result in an academic penalty of a score of zero on the assignment or test in question. Additional disciplinary measures are possible. For more information, see the university's Student Conduct Code.