

Discrete Math Pre-Collegiate

Course Overview

Note to students

A major goal of this course is to change your mind about what math is. In this course, you will play and study some fun games, find ways to beat unsuspecting friends, and be able to explain why your strategy will lead to a win every time. You will also examine how networks of people are connected along with when, if, and how you might travel through the roads of a neighborhood without traveling along a road more than once. Eventually, you'll learn that the same mathematical tool can be used to track disease spread, design computer networks, or even plan flights. You'll examine structures with patterns, predict outcomes, and explain what it is about these structures that causes results to hold. There will be a lot of counting along the way. Finally, you'll get a chance to learn how to disguise messages and crack codes. All of these topics have fancy names, but we believe in being less formal in the beginning (can you tell?).

This kind of mathematics is modern. It's hip. It's now. It's fun! Maybe you thought you weren't "good at math". One goal is to show you that everyone is a math person. Part of the fun is in doing math together, sharing what you notice and what surprised you, inventing your own language, and teaching others. So, you'll be doing a lot of group work, convincing others, and sharing your own unique ways of doing things.

Note to parents

Discrete Mathematics is a contemporary form of mathematics with many real-world connections. The course includes five topics: the theory of two-player (impartial combinatorial) games, graph theory, iteration and recursion, counting (or combinatorics), and cryptography. However, it's best to think of these five topics as a way for us to help deepen students' thinking. These topics were selected because we felt they would be new, fun, and give students a good chance to prepare for college-level mathematics where math is as much about *why* things are true as it is about *what* is true. We partnered with university mathematicians and math educators as we wrote these materials in an effort to make sure the course addresses what students will need to be successful at the next level.

Topics of Study

1. Two-Player Games
2. Graph Theory
3. Iteration and Recursion
4. Sequences and Series
5. Combinatorics
6. Cryptography