



Discrete Math for Pre-College Students
<https://dmpc.sdsu.edu/>

Course description

DMPC is a pre-college level introduction to topics and concepts from discrete mathematics. We selected topics with potential to foster students' mathematical curiosity and advance their ways of thinking as described by the Common Core Standards for Mathematical Practice. These are the main topics of study.

Two-Player Impartial Games: How can students systematically explore a game, search for patterns, make conjectures, and construct & critique arguments?

Graph Theory (2 units): How can exploring situations that can be modeled with vertex-edge graphs leverage students' existing mathematical understanding and advance their ability to reason deductively, communicate ideas, and make connections?

Iteration and Recursion (2 units): How can students make use of structure and repeated processes to make use of structure and repeated processes to make use of

Cryptography: How can students use mathematical tools strategically to create and analyze algorithms for encrypting information?

Counting: How can students reason abstractly and quantitatively to attend to the sets of outcomes in counting situations, maintaining the meaning of quantities, not just how to compute them?

Who should take this course?

DMPC was designed for high school seniors who:

- Are undecided about pursuing a STEM discipline at the college or university level
- Are possibly considering computer science as a college major
- Have passed Integrated Math Courses 1 - 3
- May have taken pre-calculus
- Might want to take something different than Calculus as a fourth year of mathematics

What does a typical day in this course look like?

Each day students engage in problem solving. They write, engage in sense-making, define and refine definitions, modeling, habitually asking "Why?" and reason at a variety of levels of formality. Typically, DMPC lessons are active. Students play games, talk with peers during problem-solving activities, present their thinking, use manipulatives, write and reflect on their work and the work of their peers. Many problems begin with a context and are eventually

decontextualized. Students primarily learn through problem-solving, but brief lectures and note-taking sessions help wrap-up lessons.

If a student is successful in DMPC, what class would you advise them to take next? What is the benefit (institutionally) of taking this course?

Most students will enroll in a precalculus course upon admission to an institution of higher education. The course will help them make a more informed decision about choosing STEM or Non-STEM fields of study. However, each institution has its own placement exams.

Is this course A-G approved?

The Discrete Math Project Collaborative maintains program status with UCOP and our course has “c” approval. This means districts can simply add our course to their course list when applying for district-level course approval. This can be done easily by adopting our course through UCOP's Course Management Portal.

What recommendations do you have for PD?

This curriculum does NOT teach itself! New teachers need PD. We have a cadre of developers and expert teachers, DMPC including curriculum writers, who know the curriculum and its associated pedagogical perspective. We recommend content-rich PD in the form of in-person workshops, on-site coaching and structured collaboration. PD should also train site administrators, teachers on special assignment and instructional coaches. We have found that teachers and district leaders also need to have substantial conversations about assessment. Pricing structures depend on: the level of services a district or school wishes to acquire, the number of teachers and whether or not they can attend PD sessions with other districts/teachers.

What materials would you recommend the district budget for?

One strength of DMPC materials are that they are modular, in the sense that units can be moved around. Another is that they are relatively “right”-tech, meaning that they don't require much expensive technology. Although, they can be expanded to make use of graphing calculators, spreadsheet programs and other internet-based resources. Materials will be made available online, but implementers will likely want to make copies for students and teachers. There are no subscription fees. The primary cost will likely be in professional development.

How can we start the implementation process for DMPC?

Begin by contacting our project director, Dr. Osvaldo Soto (osoto@sdsu.edu). He will be happy to field questions. We are currently forming an interest list for professional development workshops.

Where can I view samples of DMPC curriculum?

Go to <https://dmpc.sdsu.edu/curriculum/>

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