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Math 61
Introduction to Discrete Structures

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Prerequisites: For Participation in the PreCollege Summer Institute, students should have completed Algebra II, and have provided additional evidence of mathematical interest and maturity.

Instructor: Tyler Arant   **E-mail:** tylerarant@math.ucla.edu

Instruction dates: Monday, July 14th – Friday, August 1st

A complete schedule of classes, including a day-by-day topic breakdown is available here.

Structure of the Summer Institute: Days for the Summer Institute will be divided into AM and PM sessions. AM sessions are based on the model used by Math Circles (including the Olga Radko Endowed Math Circle). Students work in small groups, with the assistance of assistant instructors, on problem-sheets that are designed around the main topic of each class. Math Circle sessions last approximately 2 hours. After a break, students then perform synthesis activities – presenting and summarizing solutions, explaining their own solutions, and exploring extensions and applications of the math circle activity. In the afternoon, students attend a lecture that further discusses the day's topic, followed by another problem solving session, where they will complete a problem set that is designed to further clarify and reinforce understanding of the topic. Additional planned activities are listed on the online schedule.

Time commitment: The Discrete Math PreCollege Summer Institute is an intensive introduction to discrete math, and more generally to the tools and principles of higher mathematics. It is essential that students

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attend every day of the Summer Institute. They should also be prepared to spend up to 1-2 hours everyday, on their own time, reviewing their lecture notes, completing problem sets, and thoroughly engaging with the mathematics they learn each day in the Institute. Because of the compressed nature of the institute, there is very limited leeway for students to miss class. Permission will not be given for planned activities that lead to students missing class. A student who misses more than 2 days of class for any reason will have to meet with the instructional team to make a plan for how to get caught up with the materials covered in class. Even then, there is no guarantee that a student who misses more than 2 days of class will be allowed to continue in the Institute.

Course expectations: It is not enough in college-level mathematics courses like Math 61, to know the right formula. (In fact very few questions you will encounter can be readily answered by knowing the right formula). Our goal is to guide you to develop your problem-solving muscles, and to be able to make progress on problems and questions that may seem initially opaque. Beyond this, we will be teaching you how to properly structure, write or present your mathematical responses. A problem is not solved unless the answer can be explained to someone else. You may find the adjustment to these expectations daunting – every mathematician has struggled in their subject at some point. I, and the rest of the instructional team, are here to guide you through the transition. We expect you to ask lots of questions, and to be candid with us when you don't understand something. In return, you can expect us to take every question seriously, and to do our best to ensure that even during moments of struggle, the class remains productive and fun for you.

Grading: (provisional). Students may take the class either for a letter grade, or on a P/NP (pass/no pass basis). Students must do work earning a a C-grade or above to receive a P grade. Note that some colleges,

including UCLA, will not accept allow classes that are taken on a P/NP basis to be counted toward a major. Grades will be calculated on the following basis:

25% Participation in math circle activities (completion of problem sheets, participation in group activities)

15% Individually completed problems sets

20% Midterm

10% Math Fair project and presentation.

30% Final exam

The **Final exam**: is cumulative, and covers the entire body of the course. You must take the final as scheduled to pass the class.

Midterms: If a student attempts the midterm, but their final exam score is higher than their midterm score, then the final exam score will be automatically used to replace the midterm score. A student must attempt the midterm to make use of this alternate grading scheme. The exception is that if a student misses the midterm for a reason outside of their control (e.g. a medical absence for which evidence is provided), their midterm score will again automatically be replaced by their final exam score.

Math Fair: The culminating event of the Discrete Math Institute is the Math Fair. Students will spend one and a half days preparing for the fair, working in groups of 2-3. Many of these presentations will be created around the team's favorite problem from the Institute, describing its formulation, solution and possible extensions and/or applications. Other topics may be suggested by the instructional team, or by the students themselves.

All the information above is subject to possible changes, announced either in the classroom or via email. It is a student's responsibility to be

aware of such changes.

Academic integrity: Students are expected to adhere to the same standards of academic integrity as regularly enrolled UCLA students. Please consult the university student conduct code. In particular, attempting to submit work that is not your individual work (or, in the case of the Math Circle and Math Fair activities, work that was not done with your team mates), is counted as a violation of the academic integrity code. Use of any generative AI tool in the preparation of your work is regarded as a form of unauthorized collaboration.