

MATH 199 – The Interplay of Math and Games Young Scholars Program

WHEN DOES CLASS MEET: July 10-July 28, M-Tu-W-Th-Fr 10:00-11:45 and 1:00-2:30.

WHERE DOES THE CLASS MEET: In CSS room 0201.

WHO TEACHES IT: Dov Gordon. Office is AV Williams Building 3270, email is gordon at cs

OFFICE HOURS: I should be available most days at 2:30 (after class) and also during lunch.

DESCRIPTION: Many games have a mathematical component to them. We use this to teach mathematics in a MOTIVATED way. In particular we will introduce several games, PLAY THEM, and then investigate the underlying mathematics. Students will work in teams on projects involving developing strategies for new games.

MORE PRECISE DESCRIPTION:

1. (7/10 - 7/12) Take Away Games: For example, there are n stones on the table and players can take away 1,3, or 4 stones. The last player to remove a stone wins. If there are 100 stones on the table initially, and both players play perfectly, who wins? We will then cover more complex Take Away Games involving multiple piles. We will teach you how to WIN these games and learn modular arithmetic and some combinatorics.
2. (7/14-15) We will use modular arithmetic to learn about the Diffie-Hellman method for data encryption. We will motivate the problem by first looking at a few "insecure" encryption schemes.
3. (7/17 maybe 7/18) Question and Answer Games: For example, I have a number between 1 and 10000 and you want to determine it by asking questions. How many questions does it take? What if I'm allowed to LIE once? What if you're allowed questions in parallel?
4. (7/18) Crooked Casino. The casino guarantees that you will win 1 time in 10. You are allowed to bet whatever you like at each play. Can you come out ahead?
5. (7/19-7/20) The probabilities of poker. What are the odds of drawing 2 of a kind? A flush? Basic probabilities and combinatorics.
6. (7/21) Game Theory. We will look at the classic prisoner's dilemma. We will learn about Nash equilibrium and some other basic notions of game theory.
7. (7/24) Field Trip to the Spy Museum
8. (7/25) The Egg Game: you have two resilient eggs and a 100 story building. What can you learn? More than you'd think!
9. (7/26) Final Exam
10. (7/27) Guest lecturer
11. (7/28) Project Presentations.