



College of Science and Mathematics

Department of Mathematics

## MATH TALKS 2017 – 2018

### Friday, September 15, 2017

SPEAKER: Ana-Maria Croicu, Kennesaw State University

TITLE: *“Optimal control applied to Anthrax transmission in animal populations”*

ABSTRACT:

### Friday, November 3, 2017

SPEAKER: Sean Ellermeyer, Kennesaw State University

TITLE: *“Lloyd Shapley, College Admissions and the Stability of Marriage”*

ABSTRACT: In this talk, I will present the paper “College Admissions and the Stability of Marriage” by David Gale and Lloyd Shapley. This short paper contains groundbreaking work on the problem of making efficient stable assignments – such as assignments of students to colleges and assignments of marriage partners. The algorithm developed in the paper later went on to find applicability in many other kinds of matching problems such as the assignment of medical interns to hospitals and the matching of kidney donors to recipients. The paper was published in *The American Mathematical Monthly* in 1962 and it has since received the second highest number of citations of all papers published in *The Monthly*. It was also cited by the Royal Swedish Academy of the Sciences when Shapley was awarded a Nobel Prize in Economics in 2012. To honor that occasion and to introduce a new generation to this paper, *The Monthly* published it again in 2013. The questions concerning stable and optimal assignments that are addressed in this paper are easily explained, even to one has no formal mathematical background, and the reasoning that Gale and Shapley use to answer these questions is very “common sense” and elegant. The paper is only 7 pages long so, if you have time, you may want to read it before the talk. My talk will be designed for students and I believe that it will be accessible (and hopefully also enjoyable) to everybody in its entirety.

### Friday, November 10, 2017

SPEAKER: Steven Edwards, Kennesaw State University

TITLE: *“Secrets of Pascal’s Triangle”*

ABSTRACT: Pascal’s Triangle is an arrangement of binomial coefficients, which have an endless number of interesting properties. Many of these properties are related to the structure of Pascal’s Triangle. This talk will begin with basics. We will continue with recent discoveries, such as how  $e$  and  $\pi$  can be calculated using Pascal’s Triangle. The Fibonacci numbers have several connections to Pascal’s Triangle, and we will also show recently discovered connections between Pascal’s triangle and the Delannoy numbers.

### Friday, January 26, 2018

SPEAKER: Tad Watanabe, Kennesaw State University

TITLE: *“Exploring fractions”*

ABSTRACT: Not many people are excited about fractions. In fact, many people seem to dislike fractions. In this Math Talk, we will explore a couple of curious patterns in fractions. This session will not require any advanced mathematics beyond high school algebra. You just need to be willing to tackle a couple of problems.

### Friday, March 2, 2018

SPEAKER: Jonathan Lewin, Kennesaw State University

TITLE: *“Banach-Tarski Paradox”*

ABSTRACT: The Banach-Tarski paradox describes a way in which mathematicians, unlike scientists, can have free ice cream. However, in order to get something for nothing, mathematicians have to believe that they are immortal or, alternatively, they have to believe in God. This talk is about the pros and cons of our belief as mathematicians that we are immortal.

**Friday, March 16, 2018**

SPEAKER: Jonathan Lewin, Kennesaw State University

TITLE: *“Using a Computer Screen as a Whiteboard”*

ABSTRACT: [Link to pdf abstract](#)

**Friday, April 13, 2018**

SPEAKER: Dhruba Adhikari, Kennesaw State University

TITLE: *“Subdifferentials and Maximal Monotonicity”*

ABSTRACT: Subdifferentials of proper, closed and convex functions are linked with the solvability of optimization problems with constraints. The notion of directional derivatives of proper, closed and convex functions defined on finite-dimensional spaces will lead to the consideration of set-valued operators called subdifferentials, which yield an important subclass of maximal monotone operators. The talk will begin with a gentle introduction to monotone operators and subdifferentiability of proper, closed and convex functions. In order to show the plentitude of monotone operators, some examples from ordinary and partial differential equations will be discussed. In particular, the Laplace operator and p-Laplace operators that arise from modeling diffusion processes will be shown to be the subdifferentials of some convex functionals on relevant function spaces. If time permits, the existence of nontrivial solutions of operator equations involving maximal monotone operators in infinite dimensional spaces will be presented.