List of Talks

Talk Title	Presenter	E-mail
Identification Numbers and Check Digit Schemes	Joseph Kirtland	joe.kirtland[at]marist.edu
The Sound of Fractions	Roberta M. Eisenberg	uftmtc[at]me.com
Tessellations in Stained Glass and Quilts	Roberta M. Eisenberg	uftmtc[at]me.com
What is the Shape of the Universe?	David Seppala-Holtzman	dholtzman[at]sjny.edu
Is There a Better Way to Elect a President?	Steven J. Brams	steven.brams[at]nyu.edu
How to Excel in College	john loase	splurge47[at]aol.com
Statistics - The Essential 21st Century Course	john loase	splurge47[at]aol.com
How to think like a topologist	John McCleary	mccleary[at]vassar.edu
Overcoming Math Anxiety	Peter Arvanites	parvanit[at]sunyrockland.edu
Mathematics Wrapped in a Mystery Inside an Enigma	Johanna Franklin	johanna.n.franklin[at]hofstra.edu
Defining randomness algorithmically	Johanna Franklin	johanna.n.franklin[at]hofstra.edu
Playing to Win: The Math Behind Games	Ben Gaines	bgaines[at]iona.edu
An Introduction to the Game of Cycles	Ben Gaines	bgaines[at]iona.edu
The Mathematics of Medical Imaging: What is essential is invisible to the eyes	Angel Pineda	angel.pineda[at]manhattan.edu
Optimizing Compressed Sensing and Deep Learning in MRI Using Signal Detection	Angel Pineda	angel.pineda[at]manhattan.edu

An Introduction to Recursion	Ishan Agarwal	ia1020[at]nyu.edu
The Art Gallery Theorem	Ishan Agarwal	ia1020[at]nyu.edu

Detailed Talk Information

Title: Identification Numbers and Check Digit Schemes

Presenter: Joseph Kirtland

Affiliation: Marist College

E-Mail Address: joe.kirtland[at]marist.edu

Phone: 845-575-3000x2602

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Manhattan, Westchester County, Ramapo Catskill/Delaware (Sullivan/Ulster/Orange/Ro
Mid-Hudson (Dutchess/Putnam/Greene/Columbia/Ulster)

Intended Audience: High School Students, Undergraduate Math Majors

Audience Prerequisites: Intermediate Algebra, PreCalculus, Some Group Theory depending on the audience

Resources Required: Projector

Abstract: Identification numbers, such as credit card numbers, ISBNs, UPCs, and vehicle identification numbers, are used to identify individual items, specific products, people, accounts, and documents. Each time an identification number is transmitted, there is a chance that an error in the number will occur. To combat this problem, many identification number systems include a check digit and a mathematical calculation to determine if the number received was the number sent. This talk will present a variety of currently used check digit schemes. The schemes presented will range in complexity from ones using modulo arithmetic and permutations to ones that use group theory and dihedral groups

Return to Top

Title: The Sound of Fractions

Presenter: Roberta M. Eisenberg

Affiliation: Retired/NYC Public Schools; UFT Math Teachers Comm

E-Mail Address: uftmtc[at]me.com

Phone: 917-373-2991

In-Person or Virtual: In-Person

Travel Range: the Bronx, Queens, Long Island (Nassau/Suffolk), Westchester County

Intended Audience: Elementary School Students, Middle School Students, High School Students

Audience Prerequisites: None

Resources Required: Projector for Computer

Abstract: Investigate the connection between the digits in the decimal representation of a fraction and music, musical themes suggested by infinitely repeating decimals, and also very interesting fractions with their unexpected decimals.

Return to Top

Title: Tessellations in Stained Glass and Quilts

Presenter: Roberta M. Eisenberg

Affiliation: Retired/NYC Public Schools; UFT Math Teachers Comm

E-Mail Address: uftmtc[at]me.com

Phone: 917-373-2991

In-Person or Virtual: In-Person

Travel Range: the Bronx, Queens, Long Island (Nassau/Suffolk), Westchester County

Intended Audience: Elementary School Students, Middle School Students, High School Students

Audience Prerequisites: None, Very basic geometry

Resources Required: Computer projector

Abstract: Explore the 3 regular and 8 semi-regular tessellations and how, once you know about them, you will see them everywhere from stained glass and quilts to buildings and other works of art. Suggestions and some patterns will be given for projects to do on your own.

Return to Top

Title: What is the Shape of the Universe?

Presenter: David Seppala-Holtzman

Affiliation: St. Joseph's College

E-Mail Address: dholtzman[at]sjny.edu

Phone: 718-461-1747

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Brooklyn, Queens

Intended Audience: High School Students, Undergraduate Math Majors

Audience Prerequisites: None

Resources Required: Computer (Windows) with a projector and screen

Abstract: Beginning with some background on spheres and disks in different dimensions, we proceed to argue that the universe is a hyper-sphere.

Return to Top

Title: Is There a Better Way to Elect a President?

Presenter: Steven J. Brams

Affiliation: New York University

E-Mail Address: steven.brams[at]nyu.edu

Phone: 212-998-8510

In-Person or Virtual: In-Person

Travel Range: Anywhere

Intended Audience: General Undergraduate Students, Undergraduate Math Majors, Mathematics Faculty

Audience Prerequisites: PreCalculus

Resources Required: Computer and projector

Abstract: My answer to the question in the title of the talk is "yes." I discuss and compare alternative voting systems, including approval voting, ranked choice voting, and the Borda count. I conclude that approval voting is the simplest and most practical; also, it is theoretically most robust than other voting systems, satisfying such properties as monontonicity and independence from irrelevant alternatives. Moreover, it sidesteps Arrow's Impossibility Theorem. In addition, I consider alternatives to the Electoral College. For background, see my book, "Mathematics and Democracy: Designing Better Voting and Fair-Division Procedures" (Princeton University Press, 2008).

Return to Top

Title: How to Excel in College

Presenter: john loase

Affiliation: Concordia College NY Ret.

E-Mail Address: splurge47[at]aol.com

Phone: 914 610-8651

In-Person or Virtual: In-Person

Travel Range: the Bronx, Westchester County

Intended Audience: High School Students

Audience Prerequisites: None

Resources Required: I have a Powerpoint lecture and need set up help

Abstract: The objective of the talk is to tell the truth in terms of the low college graduation rate in America and inspire students to pursue excellence in high school preparation.

Return to Top

Title: Statistics - The Essential 21st Century Course

Presenter: john loase

Affiliation: Concordia College NY Ret.

E-Mail Address: splurge47[at]aol.com

Phone: 914 610-8651

In-Person or Virtual: In-Person

Travel Range: the Bronx, Westchester County

Intended Audience: High School Students

Audience Prerequisites: None

Resources Required: none

Abstract: Statistics is essential for one's personal and professional future. This talk gives personal evidence for the necessity of enabling Statistics to guide major decisions.

Return to Top

Title: How to think like a topologist

Presenter: John McCleary

Affiliation: Vassar College

E-Mail Address: mccleary[at]vassar.edu

Phone: 845-380-1777

In-Person or Virtual: In-Person

Travel Range: the Bronx, Brooklyn, Manhattan, Staten Island, Queens, Westchester County, Ramapo Catskill/Delaware (Sullivan/Ulster/Orange/Rockland/Delaware), Mid-Hudson (Dutchess/Putnan

Intended Audience: General Undergraduate Students, Undergraduate Math Majors, Mathematics Faculty

Audience Prerequisites: Geometry, Proofs-Based Course

Resources Required: Computer projector

Abstract: We present an unexpected proof of a geometric fact through the use of topological ideas.

Return to Top

Title: Overcoming Math Anxiety

Presenter: Peter Arvanites

Affiliation: Rockland Community College

E-Mail Address: parvanit[at]sunyrockland.edu

Phone: 845-574-4767

In-Person or Virtual: Either Virtual or In-Person

Travel Range: the Bronx, Staten Island, Long Island (Nassau/Suffolk), Westchester County, Ramapo Catskill/Delaware (Sullivan/Ulster/Orange/Rockland/Delaware), Mid-Hudson (Dutchess/Putnan

Intended Audience: Middle School Students, High School Students, General Undergraduate Students

Audience Prerequisites: None

Resources Required: None

Abstract: Many students at the middle school, high school, and college level experience math anxiety. The feelings associated with math anxiety prevent them from learning math effectively. The speaker will address the causes of math anxiety, strategies to decrease and even eliminate it, and its relationship to test anxiety. The discussion will enable students to successfully deal with both types of anxiety.

Return to Top

Title: Mathematics Wrapped in a Mystery Inside an Enigma

Presenter: Johanna Franklin

Affiliation: Hofstra University

E-Mail Address: johanna.n.franklin[at]hofstra.edu

Phone: (516) 463-5739

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Anywhere

Intended Audience: High School Students, General Undergraduate Students, Undergraduate Math Majors

Audience Prerequisites: Intermediate Algebra

Resources Required: I would like to use slides; I can bring my own laptop or use a local computer.

Abstract: The Enigma machine was used by the German military to encipher their communications during World War II. I'll talk about the mathematics that made the Germans believe the Enigma was secure, the practical and mathematical reasons they should not have, and how the Allies were able to crack it by exploiting its weaknesses.

Return to Top

Title: Defining randomness algorithmically

Presenter: Johanna Franklin

Affiliation: Hofstra University

E-Mail Address: johanna.n.franklin[at]hofstra.edu

Phone: (516) 463-5739

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Anywhere

Intended Audience: General Undergraduate Students, Undergraduate Math Majors, Mathematics Faculty

Audience Prerequisites: None

Resources Required: I would like to use slides; I can bring my own laptop or use a local computer.

Abstract: When shown a binary sequence, most people can intuitively describe it as "random" or "not random." However, as mathematicians, we want a precise mathematical definition of randomness. In this talk, I will characterize randomness with concepts from computability theory using three different intuitive approaches as starting points. If time permits, I will discuss different formalizations within each approach that result in different kinds of randomness and how well these formalizations fit our intuitions about other properties a random sequence should have.

Return to Top

Title: Playing to Win: The Math Behind Games

Presenter: Ben Gaines

Affiliation: Iona College

E-Mail Address: bgaines[at]iona.edu

Phone: 9146332272

In-Person or Virtual: In-Person

Travel Range: Anywhere

Intended Audience: Middle School Students, High School Students, General Undergraduate Students

Audience Prerequisites: None

Resources Required: Computer hook-up to projector, roughly 10 m&m's (or equivalent small "piece") per audience member.

Abstract: In this talk, I introduce the audience to combinatorial games, and how mathematical ideas can be used to come up with a winning strategy. We focus on two game varieties that are easy to describe and easy to play: Subtraction games, and Nim. There is a lot of time built in for audience members to try to play the games, and get used to how they work, so they can appreciate the discussion of the winning strategy and how it can always lead to victory.

Return to Top

Title: An Introduction to the Game of Cycles

Presenter: Ben Gaines

Affiliation: Iona College

E-Mail Address: bgaines[at]iona.edu

Phone: 9146332272

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Anywhere

Intended Audience: General Undergraduate Students, Undergraduate Math Majors, Mathematics Faculty

Audience Prerequisites: None, Some Graph Theory will help, but all terminology will be defined.

Resources Required: Computer hook-up to projector.

Abstract: A combinatorial game is a two player game that has a well-defined ruleset and no element of chance. This means that if both players play optimally, the winner can be determined before the game even begins. The Game of Cycles is a new combinatorial game played on any simple connected planar graph, introduced by Su (2020). In this talk I will introduce the basics of combinatorial game theory, the rules for the Game of Cycles in particular, and discuss results about which player has a winning strategy on various classes of gameboard.

Return to Top

Title: The Mathematics of Medical Imaging: What is essential is invisible to the eyes

Presenter: Angel Pineda

Affiliation: Manhattan College

E-Mail Address: angel.pineda[at]manhattan.edu

Phone: 714 457 5160

In-Person or Virtual: Either Virtual or In-Person

Travel Range: the Bronx, Brooklyn, Manhattan, Staten Island, Queens

Intended Audience: High School Students, General Undergraduate Students, Undergraduate Math Majors, Mathematics Faculty

Audience Prerequisites: None

Resources Required: Projector and speakers

Abstract: A story of how medicine, engineering, the natural sciences and mathematics came together to see what is essential for diagnosing disease. Medical imaging began in 1895 when Wilhelm Roentgen took the first x-ray image of his wife's hand. Since Roentgen's discovery that electromagnetic waves could be used to see inside the human body there have been many exciting discoveries in medical imaging including how to image using many x-ray projections (CT scans), using sound (ultrasound), using magnetic spins (MRI) and more recently using near-infrared light (optical tomography). These are just a few examples of the way modern science tries to see inside the body. Mathematics, as the language of quantitative science, has been a partner in the development of these imaging techniques. In this talk, we will give an overview of the past, present and future of medical imaging and its partnership with mathematics.

Return to Top

Title: Optimizing Compressed Sensing and Deep Learning in MRI Using Signal Detection

Presenter: Angel Pineda

Affiliation: Manhattan College

E-Mail Address: angel.pineda[at]manhattan.edu

Phone: 714 457 6150

In-Person or Virtual: Either Virtual or In-Person

Travel Range: the Bronx, Brooklyn, Manhattan, Staten Island, Queens

Intended Audience: Undergraduate Math Majors, Mathematics Faculty

Audience Prerequisites: Linear Algebra, Statistics, Calculus III

Resources Required: Projector

Abstract: Magnetic resonance imaging (MRI) is a versatile imaging modality that suffers from slow acquisition times. Accelerating MRI would benefit patients and improve public health both by reducing the time they need to be in the scanner and the cost of healthcare. Under-sampling the acquired data reduces the scan time but creates challenges for creating clinically useful images. Two recent methods for reconstructing images from under-sampled data are compressed sensing with constrained reconstruction and neural networks. The goal of this project is to optimize the performance of constrained reconstruction and deep learning on detecting subtle lesions. We develop and validate observer models for estimating ideal and human observer performance in conjunction with optimization of acquisition and reconstruction. We have found that commonly used metrics like mean squared error (MSE) and structural similarity (SSIM) over-estimate the benefits of regularization in constrained reconstruction. In neural network reconstructions, we have seen hallucination artifacts which are captured by MSE and SSIM but do not affect human observer performance in a signal-known-exactly task with varying backgrounds.

Return to Top

Title: An Introduction to Recursion

Presenter: Ishan Agarwal

Affiliation: New York University

E-Mail Address: ia1020[at]nyu.edu

Phone: 2016476401

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Anywhere

Intended Audience: High School Students, General Undergraduate Students, Undergraduate Math Majors

Audience Prerequisites: Elementary Algebra, Proofs-Based Course

Resources Required: Projector for slides and/or a blackboard

Abstract: Recursion is a powerful idea that shows up not only in computer science but also in other fields. It forms the basis of many interesting structures and problem-solving approaches, a few of which we will see in this talk. We will look at how recursion can be used to define functions, mathematical objects, and data structures, as well as how it can be a powerful problem-solving tool, often allowing us to come up with clear and intelligible solutions to problems that are otherwise hard to attack. You can also expect to see some other fun instances of recursion, which might surprise you!

The bulk of the talk will be accessible to most undergraduates; very little programming background and only a modest amount of mathematical experience are assumed.

Return to Top

Title: The Art Gallery Theorem

Presenter: Ishan Agarwal

Affiliation: New York University

E-Mail Address: ia1020[at]nyu.edu

Phone: 2016476401

In-Person or Virtual: Either Virtual or In-Person

Travel Range: Anywhere

Intended Audience: High School Students, General Undergraduate Students, Undergraduate Math Majors

Audience Prerequisites: Elementary Algebra, Geometry, Proofs-Based Course

Resources Required: Projector for slides and/or a blackboard

Abstract: Imagine that you are the owner of an art gallery and that you need people to guard the priceless art within it. The art gallery is a polygon with n sides. Guards have the capacity to turn around fully and can see everything in their line of sight, but they are extremely lazy and refuse to move from their allocated post. What is the minimum number of guards that you need to watch over the entire art gallery?

We will discuss a surprisingly simple and elegant proof as an answer to this question and briefly look at a few fascinating extensions to the art gallery problem.

Return to Top