



THE MATHEMATICAL ASSOCIATION OF AMERICA

The MAA Metropolitan New York Section
2016 Annual Meeting

SUNDAY, MAY 1, 2016

Vaughn College of Aeronautics and Technology

VaughnCollege

of aeronautics and technology

May 1, 2016

Dear MAA-Metro NY Conference Participants,

As the organizers of the Annual Meeting of the New York Metropolitan Section of the Mathematical Association of America, we would like to welcome all the participants to Vaughn College of Aeronautics and Technology. The highlights of this year's conference include the two invited talks and a panel on teaching. The contributed papers and posters include presentations that cover both pedagogical and research topics. There are also several presentations being made by students. Please support the presenters by attending one or more of the sessions and by browsing through the posters in the afternoon. We hope you will enjoy the conference.

We want to express our gratitude to our President, Dr. DeVivo; our Vice President of Academic Affairs, Dr. LaVergne; to the invited speakers: Dr. Gilbert Strang from MIT, Michael Starbird from The University of Texas at Austin, Dr. Sheldon Gordon from Farmingdale State College (SUNY), and Dr. Matthew Leingang from New York University; and the Chair of the Metropolitan New York Section of the MAA, Dr. Elena Goloubeva. We also appreciate the contribution of those presenting at today's conference.

We look forward to a motivating, inspiring, and enlightening conference.

Best regards,

The Local Organizing Committee

8601 23rd Avenue, Flushing, NY 11369 ■ 718.429.6600 ■ www.vaughn.edu

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WELCOME
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THE MAA ANNUAL MEETING OF THE
METROPOLITAN NEW YORK SECTION

MAY 1, 2016

VaughnCollege
of aeronautics and technology

AGENDA



8:30-12:15 PM	Registration	Main Lobby
8:30-12:00 PM	Refreshments	W155a-b
3:15-5:15 PM		Main Lobby
8:30-3:30 PM	Book Exhibits	Main Lobby 2 nd floor
9:15-9:35 AM	Welcome Dr. Sharon B. DeVivo, President Vaughn College of Aeronautics and Technology Dr. Paul LaVergne, Vice President of Academic Affairs Vaughn College of Aeronautics and Technology Dr. Elena V. Goloubeva, Chair of the Metropolitan New York Section of the MAA Webb Institute	W155a-b
9:35-10:35 AM	Invited Speaker <i>Geometric Gems</i> Dr. Michael Starbird, The University of Texas at Austin	W155a-b
10:35-10:45 AM	Break	
10:45-12:20 PM	Enrichment Strategies in Teaching Moderators: Dr. David Seppala-Holtzman, St. Joseph's University Dr. Alan Tucker, Stony Brook University <i>Mathematics, Technology and Inspiration</i> Dr. Gilbert Strang, MIT <i>Inquiry Based Learning: Math and Beyond</i> Dr. Michael Starbird, University of Texas at Austin <i>Meeting Our Students Halfway</i> Dr. Sheldon Gordon, Farmingdale State College, SUNY <i>Lecturing with Slides: Considered Harmful?</i> Dr. Matthew Leingang, New York University	W155a-b
12:20-1:30 PM	Lunch Vaughn Robotics Team Presentation	Hangar
12:20-1:30 PM	Take a Flight Simulator for Ride/Play with Air Traffic Control	W165/170
3:30-5:00PM	Simulators	

1:30-1:55 PM	Business Meeting and Awards Ceremony	W155a-b
2:00-3:00 PM	Invited Speaker <i>Compressing Matrix Images Using Singular Values</i> Dr. Gilbert Strang, MIT	W155a-b
3:15-4:15 PM	Metro NExT: Teaching with Projects and Technology Moderators: Dr. Johann Thiel, New York City College of Technology Dr. Mutiara Sondjaja, New York University Dr. Barbara Gonzalez, Hofstra University Dr. Andrew Parker, New York City College of Technology, CUNY Dr. Brian Winkel, SIMIODE	E101
3:15-4:15 PM	Vaughn College Session Moderator: Dr. Hossein Rahemi, Vaughn College of Aeronautics and Technology	E103
3:15-5:15 PM	Contributed Papers Sessions Research Session Pedagogy Session Miscellaneous Session Faculty/Student Session Student Session	E205 E105 E201 E203 E102
3:15-4:15 PM	Contributed Poster Session	Main Lobby
4:20-4:40 PM	Vendor Presentations Using Technology to Engage Today's Calculus Student	E101

Internet login: *username: meeting password: metrony2016*

MAA METRO NEW YORK CONFERENCE ORGANIZERS

Elena Goloubeva (Chair), Emad Alfar, Armen Baderian, Nadia Benalki, Vindya Bhat, Loucas Chrysafi, Johanna Franklin, Raymond Greenwell, Chia-Ling Lin, Janet Liou-Mark, Abraham Mantell, David Seppala-Holtzman, Satyanand Singh, Mutiara Sondjaja, Johann Thiel, and Alan Tucker

LOCAL CONFERENCE ORGANIZING COMMITTEE

VAUGHN COLLEGE OF AERONAUTICS AND TECHNOLOGY

Paul LaVergne, Andrew Grossfield, Raymond Addabbo, Ernie Shepelsky, Andrea O'Neil, and Christine Chan

**CONTRIBUTED PAPER AND POSTER SESSIONS
ORGANIZING COMMITTEE**

Emad Alfar, Nassau Community College (Co-chair)
Chia-ling Lin, Nassau Community College (Co-chair)

IN MEMORY OF JACK WINN

Sheldon Gordon

It is with deep regret that we write to inform the mathematics community of the passing of Jack Winn. Jack Winn was a long-time chair of the mathematics department at Farmingdale State College in New York.

In addition, Jack Winn was extremely active in the Metropolitan New York Section of MAA. He started as Treasurer of the Section in 1994. He became Chair of the Section, and served as Chair from 2001 to 2003. In 2005, he became Governor of the Section, and until 2008 he represented the Section on the national level.

In both of the roles, as a department chair and an active member of the section Jack was amazingly influential in many ways that will certainly live long after him in terms of the positive impact he had on so many others' lives.

Over the last quarter century, Farmingdale underwent a total change in its mission from a two-year agricultural and technical college into a four-year college of technology with programs in the applied sciences and technologies relevant to the new Long Island economy. A major aspect of this addressed the need in most fields for considerably more (albeit different) quantitative skills than are traditional. Fortunately, throughout most of that period, the math department was under Jack's extraordinarily capable leadership. The words that come to mind to describe Jack's leadership are vision, encouragement, persuasiveness, and persistence bordering on tenacity. And all of these characteristics were essential.

Under Jack's vision, all mathematics courses – developmental mathematics, college algebra, precalculus, calculus, and post calculus courses – were transformed to reflect "reform curricula" with the full cooperation of all members of the mathematics department and he gained the solid support of all the partner disciplines for these changes. Jack strongly encouraged and backed any suggested innovative approach and, when needed, he was certainly capable of applying some gentle, yet effective, persuasion.

! All math courses featured conceptual understanding and realistic applications via modeling to balance the underlying theory and algebraic techniques.

! Routine use of technology was integrated into all math offerings.

! Writing and communication skills became important dimensions of most courses.

This philosophy transformed the entire mathematics program into one that directly supports the mathematical needs of most of our other departments. Simultaneously, the courses not only better prepared students for courses in other disciplines, but also are far better attuned to the abilities and interests of our students, the majority of whom would be considered poor math students in traditional skills-oriented courses. In turn, these courses provide the other disciplines with a quantitative foundation on which to build the use of mathematics in their own courses.

As Farmingdale faced the challenge of totally redesigning its academic programs, Alan Tucker invited Jack to assume a leadership role in a project he was organizing under the NSF's Math Across the Disciplines initiative. The Long Island Consortium for Interconnected Learning (LICIL) project was intended to build connections between mathematics and other quantitative disciplines by promoting both a greater degree of realistic applications in mathematics courses and a greater degree of mathematical sophistication in the courses in the physical, life, and social sciences, business, technology, and the humanities.

The project provided the framework for involving large numbers of faculty in the development and implementation of many curricula changes in this spirit. The most significant legacy of LICIL was the fundamental changes in approach and student-centered and multidisciplinary-centered attitudes toward teaching on the part of both faculty and the administration. Under Jack's direction and encouragement, all math faculty worked collaboratively with faculty from areas as diverse as physics, chemistry, biology, economics, business, fine art, sociology, and linguistics

In addition:

! Prior to Farmingdale's being granted a baccalaureate program in applied mathematics, Jack and Alan Tucker created a unique dual-enrollment program with the Department of Applied Mathematics at SUNY Stony Brook. Any applied mathematics student at Farmingdale was automatically enrolled at Stony Brook as well. The students completed two to three years of mathematics courses at Farmingdale and then were guaranteed transfer status to Stony Brook to complete the bachelor's degree and so received two degrees, one from Farmingdale and another from Stony Brook.

! Under Jack's encouragement, the math department received several grants to examine the implications of hand-held computer algebra systems on the entire curriculum from introductory algebra through upper division offerings. The math faculty have worked with colleagues from the other quantitative disciplines to develop comprehensive strategies to either implement such technology or to modify the content of courses to reflect the readily available technology when it is not actually used by the students.

! Jack spearheaded the development of an Emerging Scholar Program (ESP) based on Uri Treisman's program at UC Berkeley that serves all students in precalculus, calculus I and calculus II who opt to participate. The students work on non-routine problems under the supervision of undergraduate teaching assistants in a workshop setting.

! In the process of making all these changes, Farmingdale's mathematics program was named a national model as a program linking mathematics to other disciplines by the MAA in its Models of Quantitative Literacy volume and in its Undergraduate Mathematics for the Life Sciences: Processes, Models, Assessment, and Directions volume, and by AMATYC in its Crossroads in Mathematics: Programs Reflecting the Standards volume.

! Jack also spearheaded the development of a Center for Applied Mathematical Sciences (CAMS) in which the mathematics faculty work with representatives of local business, industry, and government to identify mathematical problems that arise in their operations. In turn, individual and small groups of students at all curriculum levels (including introductory statistics and precalculus) work under the supervision of the math faculty to solve these problems for the originating company or agency.

! Jack anticipated the need to develop mathematics courses that will support new baccalaureate program in the biosciences and in applied economics. Both fields are rapidly changing to reflect a much greater level of quantitative study, but traditional mathematics courses do not provide the right foundation. Jack helped Farmingdale to organize and host a special invited workshop on economics on behalf of the MAA's CRAFTY committee as part of its Curriculum Foundations project in which the economists developed recommendations to the mathematics community on the current mathematical needs of their field. Their report calls for math courses that emphasize conceptual understanding and mathematical model/problem solving starting at the precalculus level. Jack was also responsible for Farmingdale being awarded a major NSF grant to develop a new joint mathematics program with the biosciences.

To put Jack's accomplishments into perspective, at virtually every school I've heard of, the math department is invariably the whipping boy for the administration that blames them for being heedless of the needs of the students and for unacceptably high DFW rates. At Farmingdale, in contrast, the math department has been held up as the positive role model for all other departments to emulate.

The legacy that Jack leaves behind is not just the incredible impact he had on the faculty, the students, the administration, the institution at Farmingdale and on the Metropolitan New York Section of MAA. More significantly, his positive accomplishments should serve as a model for all MAA officers and department heads in providing vision, leadership, encouragement, and support to improve mathematics education across their own institutions.

INVITED SPEAKERS



GEOMETRIC GEMS

Dr. Michael Starbird

The University of Texas at Austin

Abstract: Plain plane (and solid) geometry contains some of the most beautiful proofs ever—some dating from ancient times and some created by living mathematicians. This talk will include some of my favorites from an incredibly clever way to see that a plane intersects a cone in an ellipse to a method for computing areas under challenging curves developed by a living mathematician, Momikan Mnatsakanian; and many more. Geometry provides many treats!

Biography: Michael Starbird is a University Distinguished Teaching Professor of Mathematics at The University of Texas at Austin. He has been at UT his whole career except for leaves, including to the Institute for Advanced Study in Princeton, New Jersey and the Jet Propulsion Laboratory in Pasadena, California. He has received more than fifteen teaching awards including the Mathematical Association of America's 2007 national teaching award, the Minnie Stevens Piper Professor statewide award, the UT Regents' Outstanding Teaching Award, and most of the UT-wide teaching awards. He has given hundreds of lectures and dozens of workshops on effective teaching and effective thinking. He has produced DVD courses for The Teaching Company in the Great Courses Series on calculus, statistics, probability, geometry, and the joy of thinking. He co-authored, with Edward Burger, the textbook "The Heart of Mathematics: An Invitation to Effective Thinking" and has co-authored two Inquiry Based Learning textbooks. He produced an edX MOOC (Massive Open Online Course) titled "Effective Thinking Through Mathematics." His recent book with co-author Edward Burger is "The 5 Elements of Effective Thinking."

COMPRESSING MATRIX IMAGES USING SINGULAR VALUES

DR. GILBERT STRANG

Massachusetts Institute of Technology (MIT)



Abstract: How would you compress an image of a flag with three parallel stripes? (Spanish or French flag, many others too). Each little square in the image has a color and all those little pixels produce a big matrix. For both flags, the rank of that matrix is one!! So the matrix is a column vector times a row vector.

Spanish has rows $\begin{bmatrix} \text{red} \\ \text{yellow} \\ \text{red} \end{bmatrix}$, and French has columns $[\text{blue} \ \text{white} \ \text{red}]$.

The Singular Value Decomposition separates EVERY matrix A into a sum of columns times rows - in order of importance. If the rank is r , we have r easy matrices (all rank one), and we keep the first ones (as many as we need for a good picture). This idea applies all over mathematics:

- r orthonormal column vectors in U and r orthonormal row vectors in V^T
- those are perfect bases for the column space and row space of A
- A times each column of u equals a number σ times the corresponding row v^T

I would like to explain where the columns u and rows v and numbers σ come from. In the end, A equals U times a diagonal matrix times V^T . Fantastic!

Biography: Gilbert Strang was an undergraduate at MIT and a Rhodes Scholar at Balliol College, Oxford. His Ph.D. was from UCLA and since then he has taught at MIT. He is a Professor of Mathematics at MIT, an Honorary Fellow of Balliol College, and a member of the National Academy of Sciences. Professor Strang has published eleven books:

- Differential Equations and Linear Algebra (2014)
- Introduction to Linear Algebra (1993,1998,2003,2009)
- Linear Algebra and Its Applications (1976,1980,1988,2005)
- An Analysis of the Finite Element Method, with George Fix (1973, 2008)
- Introduction to Applied Mathematics (1986) • Calculus (1991) • Wavelets and Filter Banks, with Truong Nguyen (1996)
- Linear Algebra, Geodesy, and GPS, with Kai Borre (1997)
- Computational Science and Engineering (2007)
- Essays in Linear Algebra (2012)
- Algorithms for Global Positioning, with Kai Borre (2012)

He was the President of SIAM during 1999 and 2000, and Chair of the Joint Policy Board for Mathematics. He received the von Neumann Medal of the US Association for Computational Mechanics, and the Henrici Prize for applied analysis. The first Su Buchin Prize from the International Congress of Industrial and Applied Mathematics, and the Haimo Prize from the Mathematical Association of America, was awarded for his contributions to teaching around the world. His home page is math.mit.edu/~gs/ and his video lectures on linear algebra and on computational science and engineering are on ocw.mit.edu.

PANELISTS

10:45 – 12:20 PM



ENRICHMENT STRATEGIES IN TEACHING

Mathematics, Technology and Inspiration

Dr. Gilbert Strang, MIT

Gilbert Strang will speak about his experience with video lectures on linear algebra on MIT's Open Course Ware at ocw.mit.edu (and also some short calculus videos, easy to do with a camera and a friend). These have changed his life. But we don't know exactly how to use them with a regular class -- before the class meets, or maybe after the class for review ? The idea is always to speak to the audience - somehow make it interesting, and bring them into it. The important part is not the technology!

Inquiry Based Learning: Math and Beyond

Dr. Michael Starbird, The University of Texas at Austin

Methods of instruction called Inquiry Based Learning emphasize what the students are doing. Students prove theorems on their own and present their results to their peers. Expected outcomes for students include their developing theorem-proving skills and the ability to tell whether a proof is correct or flawed. But beyond those mathematical skills, an Inquiry Based Learning experience frequently helps students to learn self-reliance, independent thinking, creativity, and willingness to make mistakes. Those habits can change lives permanently in every area of their experience.

Meeting Our Students Halfway

Dr. Sheldon Gordon, Farmingdale State College, SUNY

Today's students do not come to sit at our feet to glean whatever pearls of wisdom we choose to drop into their laps, as Plato and Aristotle did in the Greek marketplace. They are typically required to take some math course or other for reasons they do not usually understand and probably resent. If we are to grab their interest, motivate them, and help them succeed in our courses, we have to reach out and meet them halfway by providing material that is clearly useful to them in an environment that supports their learning of the mathematics.



Biography: Shelly Gordon is a SUNY Distinguished Teaching Professor of Mathematics at Farmingdale State College. He has been deeply involved in efforts to improve the teaching and learning of mathematics at all levels, particularly college algebra, precalculus, calculus, statistics and probability by changing the focus of the courses and the use of technology. He is the author of over 200 articles, a dozen books, and many hundreds of software programs for mathematics education. He has served on many MAA national committees.

Lecturing with Slides: Considered Harmful?

Dr. Matthew Leingang, New York University

Perhaps in counterpoint to others on the panel, I would like to offer a defense of the good lecture, and some advice on how to give one. In untrained hands, PowerPoint can create devastatingly bad slide decks. But as mathematicians, we can leverage LaTeX and beamer to create beautiful, illustrative presentations. I will share some of my favorite beamer practices, including overlay specifications and multiple document modes.

Biography: Matthew Leingang is Clinical Professor of Mathematics and Vice Chair for Undergraduate Studies at the Courant Institute of Mathematical Sciences of New York University. He holds a Ph.D. from Harvard and wrote his thesis in symplectic geometry. Over the past fifteen years, he has held positions at Rutgers University and Harvard prior to his current appointment. He is active in MAA MetroNY and the SIGMAA for Web Education. He is the author of an electronic calculus text to be published by John Wiley and Sons.



METRO NEW EXPERIENCES IN TEACHING (NE_xT)

3:15 – 4:15 PM



Organizers: Dr. Johanna Franklin, Hofstra University
Dr. Tia Sondjaja, New York University
Dr. Johann Thiel, New York City College of Technology, CUNY
Dr. Vindya Bhat, New York University

The Metropolitan New York Section of the MAA is pleased to introduce a special program aimed at supporting new and rising Ph.D.'s in mathematics or mathematics education. Metro NE_xT (New Experiences in Teaching) will be a local version of the highly successful national MAA program Project NE_xT. Like Project NE_xT, Metro NE_xT's goal is to support new and pre-tenured faculty who are interested in improving the teaching and learning of undergraduate mathematics.

Metro NE_xT aims to provide mathematicians in the metropolitan New York area who have recently entered the profession with practical information about, and concrete suggestions for, implementing more effective pedagogical and professional strategies, ranging from new teaching methods to writing grant proposals and balancing teaching and research responsibilities. Metro NE_xT events will also provide opportunities for its fellows to meet other young professionals, socialize, and network. Furthermore Metro NE_xT fellows will be invited to participate in some future Project NE_xT events including those at the Joint Meetings and at Mathfest.

Metro NE_xT is open to all Metropolitan New York MAA Section faculty members holding a Ph.D. in mathematics or mathematics education and having full-time, pre-tenure status at a post-secondary institution. Metro NE_xT is also open to all graduate mathematics or mathematics education students in their final two years of doctoral study.

TEACHING WITH PROJECTS AND TECHNOLOGY

Location: E101

Abstract: In this interactive panel session, we will learn from three panelists about innovative ways in which we can incorporate projects and technology in our math courses. The presentations will be followed by discussion and Q&A with the audience.

Barbara Gonzalez (Hofstra University) *will talk about incorporating real-life projects into mathematics classes.*

Andrew Parker (New York City College of Technology, CUNY) *will present several ways that technology has enabled a more active role for students in the classroom and beyond, in a wide range of classes from developmental math through calculus. Tablets and WeBWorK are used to foster communication about problem solving methods between students. His current work involves extending this level of communication beyond the classroom by connecting students via our college's OpenLab.*

Brian Winkel (SIMIODE) *will share a history and examples of a personal evolution for modeling projects developed over 45 years at SIMIODE (Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations; simiode.org). Currently we are building a community of teachers and learners to support colleagues who wish to teach differential equations using modeling, technology, and projects.*

VAUGHN COLLEGE SESSION

3:15 – 4:15 PM

VAUGHN COLLEGE SESSION

Location: E103

President: Hossein Rahemi

3:15 p.m. **Multiphysics Simulation using high resolution FSI Modeling to Support Safety and Reliability of HFIR at ORNL**

Amir Elzawawy, Vaughn College of Aeronautics and Technology

During the summer of 2015 as a participant in the DOE Visiting Faculty Program at Oak Ridge National Laboratory, Dr. Amir Elzawawy played an integral role in investigating the fluid-structure interaction between the flow of cooling water and the fuel-plate of the High Flux Isotope Reactor (HFIR). "Using 3-D computer simulations he was part of a project that modeled the dynamics between the coolant flow and the fuel plates, he also developed a multi-step solution approach to improve the solution convergence rate." Dr. Elzawawy who is an assistant professor of engineering and technology will discuss this research as well as next steps.

3:45 p.m. **Ask an Engineer**

Andrew Grossfield, PhD, PE

In order to provoke and maintain the interest in mathematics of the robotics and drone designers of the future, Grossfield will entertain questions from the "walk in" attendees on the ways engineers envision, manage and use mathematics. In addition he will show his colorful and effective slides which are designed to convey mathematical ideas and concepts. The ideas appropriately presented may attract k-12 students to the mathematics of STEM studies. Dr. Grossfield is licensed as a professional engineer and is an ASEE Math Division Distinguished Educator. His writings and pictures may be found by searching for his name under authors at: www.asee.org/search/proceedings

CONTRIBUTED PAPER AND POSTER SESSIONS

3:15 – 5:15 PM



RESEARCH SESSION

Location: E205

President: Loucas Chrysafi

3:15 p.m. **A Model of Dendritic Cell Therapy**

Elizabeth Zollinger, St. Joseph's College

In this talk I describe modifications made to a model of the immune response to a cancer vaccine. We modify an existing model, eliminating a time delay by introducing new state variables based on our interpretation of the biological literature. The aim of the modification was to make the model more realistic and more mathematically tractable. In the talk, I introduce the new system and explain the parameter fitting process required to have a model representative of the current data.

3:35 p.m. **An Excursion into "Prime Generating Formulas"**

Jay L. Schiffman, Rowan University

This paper explores some interesting polynomials which initially generate long strings of prime number outputs for whole number inputs, but eventually fail at worst by the constant term. Two of these polynomials are attributed to Leonhard Euler for the first forty inputs and E.B. Escott for the first eighty inputs respectively ($p(n) = n^2 + n + 41$ and $p(n) = n^2 - 79 \cdot n + 1601$). We conclude by proving that the formula $f(n) = \sqrt{24 \cdot n + 1}$ generates all the primes apart from 2 and 3 although it yields numerous composites as well as a plethora of irrationals.

3:55 p.m. When Four Colors Do Not Suffice for a Planar Graph

James A. Tilley

I have proved that a graph-coloring problem for planar near-triangulations with a face of size 4 (which I call a-graphs because they are “almost” triangulated) is equivalent to the 4-color problem for planar graphs. My investigations strongly suggest that the a-graph coloring problem is solvable solely by means of color exchanges throughout Kempe chains (Kempe exchanges) for any a-graph other than the one obtained by deleting an edge in the icosahedron, indicating that both Kempe exchanges and the icosahedron play a central role in the 4-color problem. The full article is posted at <http://arxiv.org/abs/1511.06872>.

4:15 p.m. Randomness and Harmonic Means in Lattice Paths

Marc Zucker, Nassau Community College

Lattice paths hold lots of secrets, such as the Catalan Numbers. What about an average Lattice Path? What does it look like? How many twists and turns does it have? Or, put differently, how many changes exist in a random string of a given number of 0s and 1s? We take a look at these questions and whether we can generalize our findings to larger dimensions.

4:35 p.m. A Theorem on Triangular Perfect Squares

James E. Carpenter, Iona College

The sum of the first n positive integers is given by $n(n + 1)/2$. The question arose if this sum can be a perfect square. This presentation will explore examples and prove if $n(n + 1)/2 = a \cdot b$ is a perfect square, then both a and b are perfect squares, where $n = a$ and $(n + 1)/2 = b$ if n is odd and $n/2 = a$ and $n + 1 = b$ if n is even.

PEDAGOGY SESSION

Location: E105

Presider: Satyanand Singh

3:15 p.m. The Mathematical Analysis of Cancer Risk in a Statistics Class

Alexander Atwood, Suffolk County Community College

In January of 2015, Tomasetti and Vogelstein published in Science Magazine a revolutionary, provocative and rigorous statistical analysis which strongly suggests that the accumulation of random mutations during division in healthy stem cells can explain two-thirds of cancers. Their mathematical analysis is a wonderful subject for exploration by students in an Introductory Statistics Class. Mathematics faculty will be able to directly use the information in this presentation to design a stimulating classroom activity about the risk for cancer.

3:35 p.m. Urban Planning, Gentrification, and Proportional Reasoning at Play

Forest Fisher and Jared Warner, Guttman Community College

We present a board game designed to help remedial math students at a community college build proportional reasoning while simultaneously engaging with the social issue of gentrification in New York City. This talk will feature our game and its rules of play, a discussion of our experience using it in the classroom, and recommended resources for designing your own math board games.

3:55 p.m. Please Execute My Dear Aunt Sally – Alternative Mnemonics for Order of Operations

David B. Sher, Nassau Community College

Please excuse my dear aunt Sally is the classic way we teach students to remember the order of operations but even to my 55-year-old ears it sounds archaic, to our students it must sound truly ancient. My paper would suggest more colloquial mnemonics for the order of operations for algebra, logic and set theory.

4:15 p.m. Promote Communication with Students by Using Text Phone in a Multi-Variable Calculus Classroom

Myungchul Kim, Suffolk County Community College

The use of classroom response systems can help student learning, engagement and perception during the class. They provide each student a chance to think about and respond to a question before hearing other students’ answer. Also, it can enlighten the instructor to sources of student difficulties. In this talk, I’m going to introduce how prepare clicker problems in the LECTURETOOL and how to communicate with students effectively by using a text phone as a clicker when teaching multi-variable calculus.

4:35 p.m. A Model Calculus Module

Satyanand Singh, New York City College of Technology
Boyan Kostadinov, New York City College of Technology

In this presentation we will illustrate the genesis of a calculus 1 module. Our model module engages and promote student learning. The module's creation intersects with technology, experimentation and mathematical gems as we elevate, entice and challenge our students in STEM disciplines. This model of learning is one component implemented by Peer Led Teams of students at New York City College of Technology and their creation is funded by the Department of Education MSEIP Grant #P120A150063.

4:55 p.m. Teaching Differential Equations Using a Modeling First Approach in SIMIODE

Brian Winkel, United States Military Academy

We present a community of teachers and students who use a modeling first approach to teaching and learning differential equations. The community is SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations (www.simiode.org). We share details about this modeling first approach for differential equations with examples from life science, chemistry, physics, and engineering and we offer a view of the SIMIODE community with its resources, exchanges, projects, modeling scenarios, publication opportunities, and support for teachers and students.

MISCELLANEOUS SESSION

Location: E201

President: Ida Klikovac

3:15 p.m. Shortfall Risk in Long Term Hedging with Short-term Future Contracts on Multi-Commodity Case

Carynne Litcher and Chunhui Yu, Farmingdale State College

Study the hedging strategies to reduce shortfall risk in long-term multi-commodity contracts and introduce new strategies in order to minimize average risk.

3:35 p.m. Girls Exploring Mathematics, Using Outreach to Encourage Female Math Students

Meghan De Witt, St. Thomas Aquinas College

We discuss an outreach program that encourages female high school students to study math and related fields. By combining mathematical learning with creativity and constructing physical examples of mathematical objects, the students are encouraged to explore math beyond the typical classroom topics.

3:55 p.m. Explicit Matrix Representation of Quantum Entangled States

Frank Wang, LaGuardia Community College

In 1935, Einstein, Podolsky and Rosen presented a puzzling situation in quantum mechanics which was later known as the EPR paradox. They essentially crystalized a counterintuitive feature of quantum mechanics involving an entangled state, and Schrödinger called entanglement "not one but rather the characteristic trait of quantum mechanics." Entanglement can facilitate quantum computing and quantum teleportation, but such a phenomenon has often been misrepresented in a mysterious or even pseudoscientific fashion in the media. In this presentation, we consider two spin-1/2 systems, each can be represented as a vector in a two-dimensional complex vector space. The entangled states are vectors satisfying certain properties in the four-dimensional tensor product space. The famous Bell's Inequality and quantum teleportation can be understood through elementary matrix multiplications.

4:15 p.m. Comparison of the STEM's Calculus Education for Different Countries

Genady Ya. Grabarnik, St. John's University
Luiza Kim-Tyan, MIS&S, Moscow
Serge Yaskolko, South University

The recent study by MAA outlined main points for improving Calculus education. We approached this by expanding the study to multiple countries. We compare two countries with traditionally different education systems. We describe and analyze factual differences and similarities of content, pedagogy and evaluate an international comparison system developed by OECD, and plan our work on analysis of socio-economics factor and development culture independent comparison methods with a goal to improve or adjust Calculus education.

4:35 p.m. An Experiment with Module Based Instruction in Mathematics Class

Tanvir Prince and Nieves Angulo, Hostos Community College

The Hostos Community College, as part of the City University of New York, developed some modules in Linear Algebra to enhance the curriculum of the linear algebra and also introduce students to research environment early in their student's life. This is possible through a collaborative research grant with City College of New York. The presentation will discuss how this module is implemented in the classroom setting to improve critical thinking and creativity skills, hands-on, team oriented, and interdisciplinary learning via collaborative research projects.

4:55 p.m. Mathematics Drives Careers

Lisa Cook and Christine Brady, Suffolk County Community College

Strong mathematical skills are key to many professional opportunities. Many careers use advanced mathematical skills even if they do not seem math-focused on the surface. It is our job as educators to make our students aware of the numerous careers that are available to them upon graduation with a mathematics degree. At this presentation, we will share current data about mathematical occupations and how we effectively communicate this information to our students.

FACULTY/STUDENT SESSION

Location: E203

President: Janet Liou-Mark

3:15 p.m. The Effects of Gender and Participation in an Intermediate Algebra and Trigonometry Course with a Peer-Led Workshop Component

Janet Liou-Mark, New York City College of Technology (faculty)

Julia Rivera, New York City College of Technology (student)

Ricky Santana, New York City College of Technology (student)

Farjana Shati, New York City College of Technology (student)

Rushdha Rafeek, New York City College of Technology (student)

New York City College of Technology has adopted the Peer-Led Team Learning (PLTL) instructional model in a foundational mathematics course. This study will examine the course MAT 1275: Intermediate Algebra and Trigonometry over the span of three semesters to determine what factors contribute to the success of the students enrolled in this special section that has an additional peer-led workshop. The effects of gender and workshop participation will be investigated thoroughly. Results from this study will be presented.

3:35 p.m. Leveraging Negative Knowledge

Manyiu Tse, Molloy College (advisor)

Heather Forth, Molloy College (student)

Erica Kampel, Molloy College (student)

Mary-Kate Michels, Molloy College (student)

Making errors is very common in a math class, and students are often discouraged when they make a mistake, in contrast to being rewarded by their teachers when they get the answer correct. We present studies that show how "negative" knowledge can be leveraged to advance students' mathematical understanding, and to allow teachers to anticipate their errors and respond to them in a more productive manner. We demonstrate from our data taken from 7th and 12th grade math classes how errors can be classified and brought back into the classroom as learning opportunities in mathematical instruction.

3:55 p.m. Training Effective Mathematics Undergraduates for Peer-Led Team Learning Workshops

Janet Liou-Mark, New York City College of Technology (faculty)

Carlos Alvarez, New York City College of Technology (student)

Ronaldo Carhuaricra, New York City College of Technology (student)

Francois Mertil, New York City College of Technology (student)

Gary Zeng, New York City College of Technology (student)

Mei Zhu, New York City College of Technology (student)

Peer Leader Training has become a widespread tool in mathematics education. Having undergraduates, or peer leaders, empower their peers in mathematics-based workshops is becoming a ubiquitous best practice. The Peer-Led Team Learning instructional model emphasizes the importance of training the peer leaders to be the catalysts for creating a healthy collaborative workshop environment. Mathematics peer leaders are trained in a course where learning theories and facilitation techniques are presented. The training curriculum will be shared in this session. . This project is partially supported by NSF Math Science Partnership grant #1102729 and Department of Education MSEIP Grant #P120A150063.

4:15 p.m. Popularizing Mathematics
Manyiu Tse, Molloy College (advisor)
Caitlin Caiazza, Molloy College (student)
Matthew Cooley, Molloy College (student)
Samantha Novak, Molloy College (student)

The concept of popularization of mathematics can be described as an effort to bridge the gap between mathematics and public understanding of mathematics. The audience includes students of all skill levels, adults, professionals and researchers. We present past studies and discussions on the framework to classify and evaluate popularization of mathematics. Based on its literature, we show how social media and iPads can be used as popularization activities in the classroom. Lastly, we present how Hollywood through its movies has influenced the public's perception of mathematics.

4:35 p.m. Spectral Characteristics of Heartbeat Sounds during Diastolic Pause
Irina Neymotin, Farmingdale State College (advisor)
Harold Chavez, Farmingdale State College (student)

The comparison of the different intensities and frequencies produced by signals of the heart during the relaxation period after exercise. Multiple signals of the heart were studied, each with a different relaxation method.

STUDENT SESSION

Location: E102

President: Johanna Franklin

3:15 p.m. The Use of Counter-Examples as a Pedagogical Strategy
Manyiu Tse, Molloy College (advisor)
Nicole Hein, Molloy College (student)
Runxiang Huang, Molloy College (student)
Magdalene Milonakis, Molloy College (student)

A counter-example is an example that disproves a given statement. It is often used by researchers to determine if a hypothesis is incorrect as well as engaged in discussion of conjectures and then proving or disproving them by counter-examples. We present evidence from past studies on how counter-examples can help advance students' mathematical understanding and enhance their critical thinking skills, and therefore create a more active and rich learning environment. We then demonstrate how counter-examples from Calculus can be incorporated into teaching practice.

3:35 p.m. Blind Blackjack: A Computer Programming Approach to Probability
Johanna Franklin, Hofstra University (advisor)
Robert Konoff, Schreiber High School (student)

This presentation will look at the idea behind Blind Blackjack, a variant where the player does not know the cards they are dealt after the two original ones. The code will be described in addition to an example of a potential player's hand. It will also assess the overall results for the possible player hands and card the dealer has face up. Lastly, it will explain further research into making Blind Blackjack more realistic.

3:55 p.m. Meta-Problems
Manyiu Tse, Molloy College (advisor)
Thomas Evans, Molloy College (student)
William Hudson, Molloy College (student)
Matthew Vento, Molloy College (student)

A meta-problem in mathematics is a problem that gives off clean solutions (for example, integer solutions). Meta problems are a useful resource for teachers, as they are easier to grade and allow students to focus more on the concept than the calculation. We present three such meta-problems: Pythagorean Theorem, Law of Cosines, and "clean" cubics. We show how number theory is applied to generate the clean solutions, and how coding can be used to create the clean solutions for these problems.

4:15 p.m. Relations between Two 2 x 2 Matrices that Determine a Finite Product of Those Two Matrices

Alice Medvedev, CCNY (advisor)
Nicholas Ng, CCNY (student)

Given a set S of two square matrices with real entries, we want to study certain relations that these matrices must satisfy in order for a product of matrices from S to be equivalent to another product of matrices from S . I will discuss the problem for commuting matrices and non-commuting matrices. I will then state some propositions in order to discuss the possible representations of products of matrices from a set containing one idempotent matrix and one nilpotent matrix.

4:35 p.m. Modeling Crowd Behavior and Crowd Crush

David Seppala-Holtzman, St. Joseph's College (advisor)
Franky Rodriguez, St. Joseph's College (student)
Glenda Ascencio, St. Joseph's College (student)

Overcrowding of people has led to hundreds of deaths in the past decade through what is known as crowd crush. People are asphyxiated by the pressure of the crowd and the crowd itself may also become trapped in an exit that is too small. We built a simulation that models human behaviors in a closed space using an automata approach. Using the simulation, we observe the effects as the density of humans grows. We can also observe the effects of increasing the number of exits as well as the size of each exit.

CONTRIBUTED POSTER SESSION

Location: Main Lobby

Fractional Calculus

Satyanand Singh, New York City College of Technology (faculty advisor)
Yen Pham, New York City College of Technology (student)

The poster presentation will cover topic about the general definition of fractional derivatives, fractional derivatives of some fundamental functions such as sine, cosine, exponential and power functions. The emerging scholars program at New York City College of Technology funded this study.

Dynamics of a New Holling Type IV Predator-prey Model

Lynn Scow, Vassar College (faculty advisor)
Bibi Sulaman, Vassar College (student)

We conducted various qualitative analyses on the new Holling Type IV predator-prey model to analyze what types of scenarios it could describe in ecological populations. We found values of two parameters that indicate at what point the model predicts there will be a drastic change in the behavior of the system, and ranges of values in which the system would be in equilibrium. These findings consequently inspired further questions about other possible implications of this model.

Applications of Wiener and Randic Indices to Alkanes

Sanju Vaidya, Mercy College (faculty advisor)
Geetha Surendran, Mercy College (faculty advisor)
Charles Li, Mercy College (faculty advisor)
Persius Darko Mensah, Mercy College (student)
Rolando Arias, Mercy College (student)
Denny Grullon, Mercy College (student)
David Mancini, Mercy College (student)

The Wiener Index is the oldest topological index related to molecular branching. It was introduced by Harry Wiener in 1947. Milan Randic was another major contributor to the development of mathematical chemistry, particularly molecular descriptors based on graph theory. In this project we developed mathematical models, quantitative structure property relationship models for alkanes using the Wiener and Randic indices. Our models correlated these indices with density and molar refraction of the alkanes.

Perfect Power at Different Heights

Satyanand Singh, New York City College of Technology (faculty advisor)

Justin James Meyer, New York City College of Technology (student)

The poster presentation will demonstrate how to find numbers of the form $\left(\frac{n}{p_i}\right)^{\frac{1}{p_i}} \in \mathbb{Z}$. The poster presentation will cover cases concerning specific primes, general cases concerning a specific amount of primes, and the general case concerning m amount of primes where $m \in \mathbb{Z}$. The Bachelor's Research Scholars Program (BRSP) of New York City College of Technology funded this study.

Hausdorff Dimension of Limits Sets of Hyperbolic Groups Acting on The Upper Half Plane

Thea Pignataro, The City College of New York (faculty advisor)

Maria Sanchez, The City College of New York (student)

Eitan Pearl, The City College of New York (student)

This project aims to understand and compute the Hausdorff dimension of limits sets of hyperbolic groups acting in 2-dimensional hyperbolic space when they are non-linear Cantor sets. The Hausdorff dimension is an invariant which is related to problems in geometric topology and analysis, as well as physics. We attempt to compute the Hausdorff dimension of the limit set, using techniques suggested by McMullen and expanding on results produced by Baragar.

Mathematical Analysis of Musical Instruments

Irina Neymotin, Farmingdale State College (faculty advisor)

Cebrina Porter, Farmingdale State College (student)

Aysegul Tomak, Farmingdale State College (student)

Michael Cherry, Farmingdale State College (student)

Tom Rotanz, Farmingdale State College (student)

The poster shows examples of how mathematics and music relate, as well as step-by-step mathematical analysis of the six-second recording of Chopin's waltz A minor, performed on piano. Fourier Transform and Spectrogram functions in the computer program Sigview were used to identify the notes played, and to write them down in musical notations in order to later re-play the entire six-second piece on a different musical instrument and compare the signals.



VENDOR PRESENTATION

Location: E101

4:20 p.m. Using Technology to Engage Today's Calculus Student

Lauren McLean, Sr. Publisher's Representative, Pearson

Calculus hasn't changed much over the years, but today's students have. This presentation will primarily focus on the resources available in MyMathLab for Calculus 2/e by Briggs/Cochran/Gillett, the most successful new calculus text published in the last two decades. MyMathLab offers built-in tools to identify gaps in prerequisite skills and provide personalized remediation for those skills. Learning aids, including guided exercises, additional examples, and tutorial videos ensure students are supported along the way. The award-winning eText, available within MyMathLab, contains more than 650 Interactive Figures that can be manipulated to shed light on key concepts.

**METROPOLITAN NEW YORK SECTION OF THE MAA
TREASURER'S REPORT
May 1, 2016**



ASSETS	BALANCE 05/02/15	BALANCE 04/22/16
Chase Business Classic	\$9,983.53	\$6,795.04
Chase Business Select High Yield Savings	\$13,306.40	\$15,074.34
CD	\$1,762.72	\$0.00
Miscellaneous	\$0.00	\$425.00
NY Metro Section Total Assets	\$25,052.65	\$22,294.38

CHASE BUSINESS SELECT HIGH YIELD SAVINGS (0366)

Credits		
Date	Description	Amount
07/25/15	Transfer from CD: 0719 to 0366	\$1,763.04
	Interest 05/02/15-05/01/16	\$4.90
Total Credits		\$1,767.94

CHASE BUSINESS CLASSIC (0365)

Deposits/Credits			
Check #	DATE	Description	Amount
	05/22/15	registration checks *	\$510.00
	05/22/15	registration checks *	\$490.00
	05/22/15	registration cash *	\$485.00
	05/26/15	registration check *	\$25.00
	06/01/15	NYCCT registration *	\$700.00
	06/19/15	Pearson donation *	\$693.00
	07/09/15	BMCC registration *	\$670.00
200325	08/27/15	2015 subvention: 07/16/15	\$1,283.00
200728	08/27/15	Spring 2015 sales: 07/31/15	\$11.44
	02/12/16	Bard College (advertisement)	\$100.00
	04/22/16	Hofstra University (advertisement)	\$50.00
Total Credits			\$5,017.44

* refers to the 2015 Annual Meeting at NYCCT

Checks Paid/Debits			
Check #	Date	Description	Amount
869	05/06/15	Abraham Mantell (4imprint #3857132)	\$186.88
871	06/04/15	Marjorie Senechal (honorarium *)	\$413.90
875	06/05/15	Armen Baderian (dinner and supplies *)	\$367.74
880	06/05/15	Judy Walker (honorarium *)	\$1,346.07
876	06/08/15	Janet Liou-Mark (food and supplies *)	\$543.08
877	06/11/15	MBT South, Inc. (food *)	\$1,750.00
874	06/12/15	Ronald Skurnick (registration assistant *)	\$100.00
872	06/23/15	Nadea Benakli (for student helper *)	\$15.00
873	06/24/15	Abraham Mantell (gifts and supplies *)	\$320.00
881	07/01/15	MBI South, Inc. (food *)	\$693.00
882	10/27/15	Aldin food Management Services, LLC (food and supplies)	\$349.75
885	02/01/16	Florin Catrina (Putnum mugs)	\$127.30
886	03/07/16	Abraham Mantell (4imprint #44723674)	\$1,242.42
887	04/19/16	Crown Trophy (Award Plaques)	\$170.00
888	04/20/16	Abraham Mantell (pens, newsletter)	\$536.29
Total Debits			\$8,161.43

* refers to the 2015 Annual Meeting at NYCCT

GRAPH THEORY FUND METROPOLITAN NEW YORK SECTION OF THE MAA



GRAPH THEORY DAY FUND (CONTAINED WITHIN 0365)				
Deposits/Credits				
Check #	Date	Description	Amount	
	11/16/15	Graph Theory Day 70 registration and donations	\$280.00	
Total Credits			\$280.00	
Checks Paid/Debits				
Check #	Date	Description	Amount	
883	11/30/15	Armen Baderian (Graph Theory day 70 dinner)	\$114.50	
884	03/10/16	Pace University (Graph Theory Day 70 registration)	\$210.00	
Total Debits			\$324.50	
			Balance	
			05/02/15	
			05/01/16	
Graph Theory Day Fund		(contained in ...0365)	\$930.00	\$885.50

MISCELLANEOUS TRANSACTIONS

Deposits/Credits	Date	Description	Amount
	05/03/15	McGraw Hill sponsorship fee (gift card *)	\$425.00
Total Credits			\$425.00

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