MAA MATHFEST

Program

Columbus, OH | August 3-6, 2016

MAA 100
MATHEMATICAL ASSOCIATION OF AMERICA
CELEBRATING A CENTURY OF ADVANCING MATHEMATICS

MASTER OF SCIENCE IN
DATA ANALYTICS
AT SLIPPERY ROCK UNIVERSITY

FAST FACTS

PROGRAM HIGHLIGHTS

- 100 percent online coursework
- A 33-credit program that can be completed in 10 months full time or two years part time
- SAS Certificate upon graduation
- Preparation for the Certified Analytics Professional exam
- Training in big data analytics, advanced statistical analysis and state-of-the-art technologies
- Highly accomplished faculty with big business experience
- Internship opportunities

DID YOU KNOW?

Slippery Rock University's master of science in data analytics prepares professionals to work in the rapidly-growing field of data analytics and big data and is aligned with standards established by professional certification programs, SAS.

- Market projections indicate a shortage of 190,000 jobs in data analytics by 2018
- Current projections in occupations involving data science are expected to grow 14 percent
- In Pennsylvania alone, there are 2,800 online job postings requiring SAS certification

ADMISSIONS REQUIREMENTS

Online graduate application

Official undergraduate transcripts

A minimum of a 3.0 grade point average requirement

Complete prerequisites with a "C" or better in "Differential Calculus," "Integral Calculus," "Probability/Inferential Statistics," programming language (C, C++, Java, Python)

NO GRE or GMAT scores required

To learn more about the program contact

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EXPERIENCE THE DIFFERENCE

WELCOME TO MAA MATHFEST!

We're here, starting our second century together in Columbus, where we began our first century as an Association!

The MAA was formed at a meeting in December 1915 at The Ohio State University. The American Mathematical Monthly editor at that time, Herbert E. Slaught, described the movement to start a new organization as being born from "a sincere desire to promote the course of mathematics in this country in all its many and varied aspects, and especially in that field that has been so greatly neglected, the field of collegiate mathematics."

Records show: "The call for an organization meeting of a new National Mathematical Association was signed by about four hundred and fifty persons representing every state in the Union, the District of Columbia, and Canada, and including high school, normal school, college, and university teachers, consulting engineers, actuaries, and others who are interested in mathematics purely for its own sake." The 1,045 people who had signed on as charter members by April 1916 included Dudley Weldon Woodard (the 2nd African-American to earn his PhD), 132 women (accounting for 1/5 of all charter members who had obtained the PhD at the time), 15 Canadians, and 145 high school teachers.

As we turn the page on a new century, we are stronger and more diverse than ever before. Today we are the world's largest community of mathematicians, students and enthusiasts. We accelerate the understanding of our world through mathematics, knowing that mathematics drives society and shapes our lives. Our members are united by our love of community, high quality exposition and education, and our love of teaching, learning, and research in mathematics.

I think you'll enjoy the MAA MathFest program, which showcases the 'many and varied aspects' of mathematics! There are many outstanding presentations, including the Hedrick Lectures---the expository lectures that are a MAA MathFest centerpiece---and this year, Hendrik Lenstra will showcase groups, rings, and fields in many interesting settings. His lectures are among many other great talks by many engaging invited speakers.

Attend the invited paper sessions, which are tied thematically to the invited speakers, where you will find many talks given by outstanding communicators: on knots, magic, geometry, games, life sciences, and undergraduate research. In addition, there are a myriad of cool events for students that grown-ups too will enjoy, like the newer competition Estimathon!

I hope you have a wonderful time here at MAA MathFest as we start our second century. As you enjoy the events take a moment to make some new friends and connections and help others to do the same. It's part of our legacy--we share the love of mathematics in a welcoming and inclusive community. Whatever your mathematical interest or profession, you are valued here.
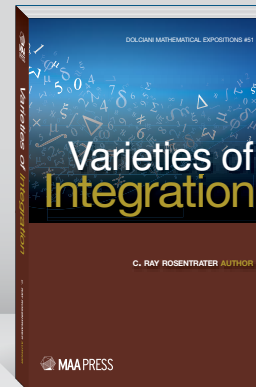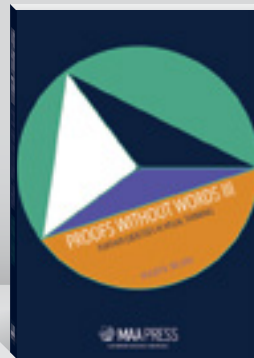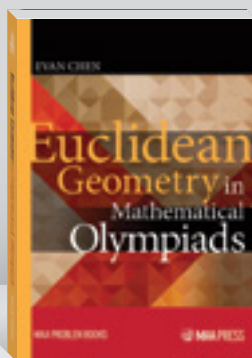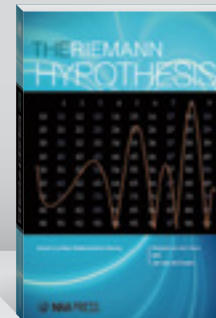
Francis Su
MAA President

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and Browse our Newest Titles
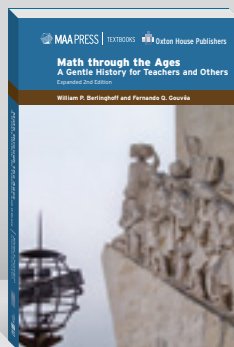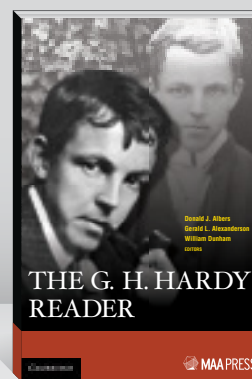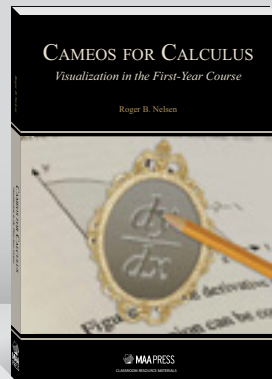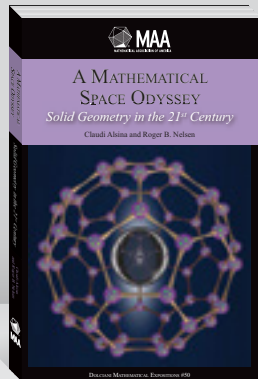
Invited Addresses

EARLE RAYMOND HEDRICK LECTURE SERIES

Hendrik Lenstra, *Universiteit Leiden*

The main message of the 2016 Hedrick Lectures is that "abstract algebra" is a misnomer: for those with eyes to see - groups, rings, and fields are everywhere. The script that concrete algebra is written in may not be readily decipherable, but mastering it is a sure step on the road to insight and wisdom. The three lectures sketch several of the sights to be seen.
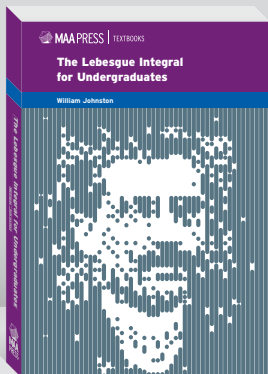
Hedrick Lecture 1. The Group Law on Elliptic Curves

Thursday, August 4, 10:30 a.m. - 11:20 a.m., Regency Ballroom

The theory of elliptic curves is a showpiece of modern mathematics. Its implications are felt from the brightest parts of number theory, where it supplied the key to Fermat's Last Theorem, to the darkest corners of cyberspace, where it provides the workhorses of secret communication. How much of the theory can with lucidity and rigor be developed in an undergraduate algebra course? The lecture outlines an approach to at least establishing the group law, using no other tools than what such a course ordinarily already covers.

Hedrick Lecture 2. The Combinatorial Nullstellensatz

Friday, August 5, 9:30 a.m. - 10:20 a.m., Regency Ballroom

Noga Alon's combinatorial Nullstellensatz (1999) is a quantitative sharpening of the familiar fact that a non-zero polynomial in several variables over an infinite field defines a function that does not vanish everywhere. It has an impressive number of consequences of a combinatorial nature, and forms an excellent example of what algebra can do for the non-algebraist. As the lecture shows, the combinatorial Nullstellensatz also belongs to the algebraist's own toolbox. A characteristic application is an elegant theorem about matrices that is just one step away from one of the loveliest theorems of Galois theory: the existence of a normal basis in any finite Galois extension.

Hedrick Lecture 3. Profinite Number Theory
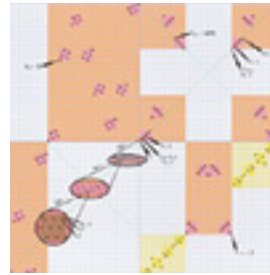
Illustration by Willem Jan Palenstijn

Saturday, August 6, 9:30 a.m. - 10:20 a.m. Regency Ballroom

What is a *number*? Surprisingly, one of the fundamental notions of mathematics is never given a rigorous definition. Usage determines the meaning of the word. When one refers to the typical element of some ring as a "number", one expresses a certain familiarity with that ring. The algebraist who defines a new ring creates a new species of number, and may feel master of the universe. Profinite numbers are elements of the ring of profinite integers, an important instrument in both infinite Galois theory and arithmetic geometry. In the lecture, the world of profinite numbers with its wealth of wonders is explored for its own sake.

AMS-MAA JOINT INVITED ADDRESS

Understanding Geometry (and Arithmetic) through Cutting and Pasting

Ravi Vakil, *Stanford University*

Thursday, August 4, 9:30 a.m. - 10:20 a.m. Regency Ballroom

Euler's famous formula tells us that (with appropriate caveats), a map on the sphere with f countries (faces), e borders (edges), and v border-ends (vertices) will satisfy $v-e+f=2$. And more generally, for a map on a surface with g holes, $v-e+f=2-2g$. Thus we can figure out the genus of a surface by cutting it into pieces (faces, edges, vertices), and just counting the pieces appropriately. This is an example of the topological maxim "think globally, act locally". A starting point for modern algebraic geometry can be understood as the realization that when geometric objects are actually algebraic, then cutting and pasting tells you far more than it does in "usual" geometry. I will describe some easy-to-understand statements (with hard-to-understand proofs), as well as easy-to-understand conjectures (some with very clever counterexamples, by M. Larsen, V. Lunts, L. Borisov, and others). I may also discuss some joint work with Melanie Matchett Wood.

Invited Addresses (continued)

MAA INVITED ADDRESS

Mathematical Sense and Nonsense outside the Classroom: How Well Are We Preparing Our Students to Tell the Difference?

Robert Megginson, *University of Michigan*

Thursday, August 4, 8:30 a.m. - 9:20 a.m.
Regency Ballroom

"Mathematics will always be a key element of liberal education, since it promotes logical reasoning." You have likely heard this claim, or perhaps made it yourself. And we generally do a decent job of teaching our mathematics and statistics students how to avoid certain types of errors in their own deductive and inductive reasoning. But it is not so clear that we have done as good a job of preparing our students to examine critically the reasoning, mathematical and otherwise, of others who are trying to convince us to buy their product or adopt their position on an issue. In this presentation, which expands upon an invited 20 minute talk given at JMM 2013 in San Diego, the speaker will propose a three-category classification of types of fallacious mathematical arguments that have been used to try to convince the public of the wisdom of a policy decision or the safety of a new product, in the hope of starting a conversation about where and how in our school and college mathematics curricula we could better prepare students to be suspicious when presented with arguments in each category, and help them think about the questions they should ask when their suspicions are aroused. Examples will be given, several with roots in applications of mathematics to climate science, one of the speaker's interests. For those involved in teacher preparation or who are K-12 teachers themselves, some connections to the Common Core standards will be given.

MAA INVITED ADDRESS

Magical Mathematics

Arthur Benjamin, *Harvey Mudd College*

Friday, August 5, 10:30 a.m. - 11:20 a.m.
Regency Ballroom

We will explore mathematical magic tricks using cards, calculations, and combinatorics! Sometimes the underlying mathematical secret is just as interesting as the magic trick itself.

MAA INVITED ADDRESS

Immersion in Mathematics via Digital Art

Judy Holdener, *Kenyon College*

Saturday, August 6, 10:30 a.m. - 11:20 a.m.
Regency Ballroom

The relationship between mathematics and art has a long and rich history. Artists past and present have used mathematics in significant ways to carry out their artistic vision, and mathematicians have used formulas, algorithms and computers to produce art. In my own case, I find art to be a good medium for conveying the nature of mathematics to a wide audience. In this lecture I examine my recent venture into digital art with the creation of a mathematical artwork I title "Immersion". The surface patterns in the piece reflect my own day-to-day immersion in mathematics, depicting patterns that relate to the content of courses I teach as well as research I have conducted with undergraduates in the area of dynamical systems. I will describe how patterns in the piece reflect the connection between two well-known mathematical objects: the Thue-Morse sequence and the von Koch curve. Additionally, I will describe how the formal mathematical meaning of "immersion" plays a role in the composition of my piece. In particular, my work highlights "Boy's Surface", which is an immersion of the real projective plane into three-dimensional Euclidean space.

MAA JAMES R.C. LEITZEL LECTURE

Inquiry, Encouragement, Home Cooking (And Other Boundary Value Problems)

Annalisa Crannell, *Franklin & Marshall College*

Saturday, August 6, 8:30 a.m. - 9:20 a.m.
Regency Ballroom

When you teach an abstract algebra class in a bagel shop, there's this problem: you have no chalkboards. Likewise, no chalk. Worse yet, the acoustics are lousy for lecturing, especially if you are trying to keep your voice down so you don't annoy the non-algebra bagel customers.

But crossing the threshold into new physical spaces can lead to crossing metaphorical boundaries into strange and wonderful new pedagogies. In this talk we'll explore a personal approach to stumbling into inquiry-based learning. Along the way, we'll meander into developing pragmatic strategies that help us in cheerleading for our students, and of course, we'll celebrate food.

Invited Addresses (continued)

AWM-MAA ETTA Z. FALCONER LECTURE

Harmonic Analysis and Additive Combinatorics on Fractals

Izabella Laba, *University of British Columbia*
Friday, August 5, 8:30 a.m. - 9:20 a.m.
Regency Ballroom

A plane is flat; a sphere is curved. Both are smooth, well behaved surfaces on which one can define measure and integration. If a harmonic analyst only knows the behaviour of analytic objects associated with a given surface, for example singular or oscillatory integrals, can she tell whether the surface is curved or flat? It turns out that, yes, the geometry of the surface is indeed reflected in such analytic estimates.

It might be somewhat surprising that similar phenomena have also been observed for fractals, including Cantor-type sets on the line. Some fractals behave, from the analytic point of view, as if they were flat; others display features typical of the sphere, and we have also seen additional types of behaviours that are never observed for smooth surfaces. The recent work investigating such phenomena highlights the connection to arithmetic properties of fractals, expressed in terms of "randomness" and "structure."

MAA CHAN STANEK LECTURE FOR STUDENTS

Zombies & Calculus: A Survival Guide

Colin Adams, *Williams College*
Thursday, August 4, 1:00 p.m. - 1:50 p.m.
Regency Ballroom

If you are reading this, then you have managed to survive the zombie apocalypse so far. Congratulations! But as the world sinks further into ruin, what additional strategies can you apply to endure the onslaught? Learn how calculus can help you to defeat the zombie hordes. The lecture room will be certified a safe haven for the duration of the talk.

PI MU EPSILON J. SUTHERLAND FRAME LECTURE

Combinatorics - The Mathematics That Counts

Robin Wilson, *Open University*
Friday, August 5, 8:00 p.m. - 8:50 p.m.
Regency Ballroom

How many Sudoku puzzles are there? Are there 33 Londoners with the same number of hairs on their head? Can a knight visit all the squares of a chessboard just once? And can we tile a floor with squares and regular hexagons? These are all problems in combinatorics, the branch of mathematics concerned with selecting, arranging, counting and listing things. In this talk I shall illustrate the nature and uses of combinatorics by means of a number of entertaining problems.

NAM DAVID HAROLD BLACKWELL LECTURE

Urban Analytics: The Case for Smart Parking

Robert Hampshire, *University of Michigan*
Friday, August 5, 1:00 p.m. - 1:50 p.m.
Regency Ballroom

Parking management has been a vexing problem for cities since the invention of the automobile. One concern is excess travel, congestion, air pollution and greenhouse gas (GHG) emissions that are caused by drivers searching for available parking — an activity colloquially known as cruising.

A recent study by UCLA economist and urban planner, Donald Shoup, found that in a 15-block area of Westwood, cruising for parking generates 950,000 excess vehicle-miles of travel, wastes 47,000 gallons of gas, 100,000 hours and produces 730 tons of greenhouse gas carbon dioxide per year.

I present the results of an investigation of this problem using queueing theory, stochastic processes, statistics including the Rao-Blackwell theorem, optimization and machine learning. The analysis is enabled by a large dataset of sensor data, cell phone data, parking payment data, and connected vehicle data.

Invited Paper Sessions

INVITED PAPER SESSIONS

Knot Theory

Thursday, August 4, 8:30 a.m. - 9:50 a.m and 2:00 p.m. - 4:20 p.m., Fairfield

With the increase in undergraduate research there is also an increased need for open and accessible problems for students to tackle. Knot theory is particularly fertile ground for such problems. Each speaker in this session will introduce a topic, pose three open questions that are accessible to undergraduate research, and place the questions in context of the topic.

Organizers:

Colin Adams, *Williams College*
Lew Ludwig, *Denison University*

Part A

Turning Knots into Flowers: Petal Number and Related Problems
8:30 a.m. - 8:50 a.m.
Colin Adams, *Williams College*

Knot Mathematical Fiddlestix: An Introduction to Lattice Knots
9:00 a.m. - 9:20 a.m.
Jennifer McLoud-Mann, *University of Washington, Bothell*

Problems Related to Spanning Surfaces of Knots
9:30 a.m. - 9:50 a.m.
Cynthia Curtis, *College of New Jersey*

Part B

Rope Magic and Topology
2:00 p.m. - 2:20 p.m.
Louis Kauffman, *University of Illinois, Chicago*

Accessible Problems for Undergraduates in Knot Coloring
2:30 p.m. - 2:50 p.m.
Candice Price, *Sam Houston State University*

Computer Algorithms for Counting Knot Mosaics
3:00 p.m. - 3:20 p.m.
Lew Ludwig, *Denison University*

Gamifying Knot Theory
3:30 p.m. - 3:50 p.m.
Jennifer Townsend, *Bellevue College*

Unknotting Knots
4:00 p.m. - 4:20 p.m.
Allison Henrich, *Seattle University*

The Mathematics of Games

Thursday, August 4, 2:00 p.m. - 3:50 p.m., Harrison
Games, how to win them and how to design them, often lead to mathematical questions. Generally intractable games, such as poker, have 'toy' variants that yield to explicit mathematical analysis, while some simple 'solved' games such as tic-tac-toe become very challenging when moves are auctioned to the highest bidder. The talks in this session discuss the design considerations of games and the determination of optimal play in both games of chance and no-chance.

Organizer:

Michael Catalano-Johnson,
Susquehanna International Group

Recent Advances in Game Design
2:00 p.m. - 2:20 p.m.
David Pettey, *Susquehanna International Group*

Solving Poker-Like Games
2:30 p.m. - 2:50 p.m.
Bill Chen, *Susquehanna International Group*

Richman Games
3:00 p.m. - 3:20 p.m.
Daniel Loeb, *Susquehanna International Group*

Misère Russian Roulette (with Multiple Revolvers)
3:30 p.m. - 3:50 p.m.
Michael Catalano-Johnson, *Susquehanna International Group*

Invited Paper Sessions (continued)

Mathematics and Magic

Friday, August 5, 1:00 p.m. - 3:55 p.m., Fairfield
Speakers will demonstrate and explain magic tricks based on interesting mathematical principles.

Organizer:
Arthur Benjamin, *Harvey Mudd College*

Tricks You Can Count On
1:00 p.m. - 1:15 p.m.
Irl Bivens, *Davidson College*

Shuffling Cards and Binary Numbers
1:20 p.m. - 1:35 p.m.
Steve Butler, *Iowa State University*

More Card Effects from the Perfect Shuffle
1:40 p.m. - 1:55 p.m.
Doug Ensley, *Shippensburg University*

Dunninger Meets DeBruijn
2:00 p.m. - 2:15 p.m.
Ron Graham, *University of California, San Diego*

Telepathy or Tele-mathy-y?
2:20 p.m. - 2:35 p.m.
John Harris, *Furman University*

Tricks with SET ®
2:40 p.m. - 2:55 p.m.
Liz McMahon and Hannah Gordon, *Lafayette College*

Fitch Cheney's 5 Card Trick for Values of 5 Less Than 5
3:00 p.m. - 3:15 p.m.
Colm Mulcahy, *Spelman College*

This is Knot a Trick!
3:20 p.m. - 3:25 p.m.
Heather Russell, *University of Richmond*

Stretching Your Mind with Topological Mime
3:40 p.m. - 3:55 p.m
Tim and Tanya Chartier, *Davidson College*

Numbers, Geometries, and Games: A Centenarian of Mathematics

Saturday, August 6, 1:00 p.m. - 3:10 p.m. Fairfield
Born nearly at the same time as the MAA, Richard Guy has had a tremendous impact on mathematics through his (continuing) work in number theory, geometry, and game theory. This session brings together friends an colleagues to talk about these mathematical areas, to celebrate Richard's achievements, and to mark his transition to his second century.

Organizers:
Steve Butler, *Iowa State University*
Barbara Faires, *Westminster College*

Sums of Unit Fractions
1:00 p.m. - 1:20 p.m.
Ron Graham, *University of California San Diego*

Products of Farey Fractions
1:30 p.m. - 1:50 p.m.
Jeffrey Lagarias, *University of Michigan*

Fibonacci Plays Billiards, Again
2:30 p.m. - 2:50 p.m.
Elwyn Berlekamp, *University of California Berkeley*

Remarks
3:00 p.m. - 3:10 p.m.
Richard Guy, *University of Calgary*

Invited Paper Sessions (continued)

Mathematics and the Life Sciences at MBI

Friday, August 5, 1:00 p.m. - 4:10 p.m., Harrison

In this session we demonstrate how the mathematical sciences help address important and interesting questions in neuroscience, virology, cancer immunology, cellular communication, and sleep cycle dynamics.

Abstract: Using mathematics to gain new insights into the biological sciences requires the use of existing techniques and also the development of new mathematics. The interplay between math and life sciences is a key component of the mission of the Mathematical Biosciences Institute (MBI). This session samples research related to several of MBI's recent and upcoming thematic programs: molecular biosciences, cancer and the immune system, network dynamics, mathematical neuro-science, and the analysis of complex data.

In this session, we discuss how the mathematical sciences are utilized to make contributions to biological and biomedical questions. Theory and concepts from algebra, geometry, dynamical systems, numerical analysis, probability theory, and other areas will be presented. The math will be used to uncover symmetries in neural activity, quantify signaling dynamics inside cancerous immune cells, consider the impact of oscillations on coupled cells, investigate circadian rhythms and energy regulation, and increase the understanding of viruses and how to overcome their resistant nature.

Organizer:

Reginald L. McGee, *Mathematical Biosciences Institute*

Why We Sleep: Math Sheds New Light on Personal Energy Conservation
1:00 p.m. - 1:30 p.m
Janet Best, *The Ohio State University*

Dynamical Systems and Emergent Properties of Cell Networks
1:40 p.m. - 2:10 p.m.
Richard L. Buckalew, *Mathematical Biosciences Institute*

Singled Out: Using Single-Cell Data to Identify Signaling Trends in Leukemia
2:20 p.m. - 2:50 p.m.
Reginald L. McGee, *Mathematical Biosciences Institute*

An Insight to Viral Assembly through Normal Model Analysis
3:00 p.m. - 3:30 p.m.
Farrah Sadre–Marandi, *Mathematical Biosciences Institute*

Binocular Rivalry and Symmetry Breaking
3:40 p.m. - 4:10 p.m.
Marty Golubitsky, *Mathematical Biosciences Institute*

Undergraduate Research Projects in the Mathematical Sciences

Saturday, August 6, 1:00 p.m. - 3:20 p.m., Harrison

The undergraduate mathematics curriculum continues to evolve from expository classes to students working on original research projects. This curriculum change has created a need in the mathematical community for more REU programs and for faculty to develop accessible research projects for students at their respective institutions. For new faculty, developing such projects may be challenging, as their particular expertise might require extensive background and is hence not suitable for an undergraduate audience. Fortunately, faculty programs, such as The Center for Undergraduate Research in Mathematics (CURM) Mini-Grants, Preparation for Industrial Careers in Mathematical Sciences (PIC Math) Preparing Undergraduates Through Mentoring toward PhD's (PUMP), Project NExT (New Experiences in Teaching), and Research Experience for Undergraduate Faculty (REUF), have an impressive track record of helping faculty develop and promote accessible research projects at the undergraduate level.

In this session, past CURM, PIC Math, PUMP, Project NExT, and REUF faculty participants present the mathematical results of their student's original mathematical research and share tools they learned and used to develop these projects. In addition, speakers will provide early-career faculty with information related the respective faculty programs and open problems that are accessible to undergraduate students. Mathematical topics are broad and include number theory, graph theory, applications of PDEs, and industrial mathematics.

Organizers:

Pamela E. Harris, *Williams College*
Alicia Prieto Langarica, *Youngstown State University*

Counting Dessins
1:00 p.m. - 1:20 p.m.
Naiomi Cameron, *Lewis & Clark University*

PIC Math: A Course for Undergraduate Students to Do Research on Actual Problems from Industry
1:30 p.m. - 1:50 p.m.
Michael Dorff, *Brigham Young University*

Constructing Solutions to Truncated Moment Problems and Applications to PDE; a PUMP Undergraduate Research Group
2:00 p.m. - 2:20 p.m.
Cynthia Flores, *California State University, Channel Islands*

Undergraduate Research in Pebbling
2:30 p.m. - 2:50 p.m.
Aparna Higgins, *University of Dayton*

Research Collaborations in the Public Sector
3:00 p.m. - 3:20 p.m.
Thomas Wakefield, *Youngstown State University*

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Themed Contributed Paper Sessions

CAMP: Calculus Applied Mathematics Projects

Thursday, August 4, 1:00 p.m. - 3:55 p.m., Franklin A

Teaching mathematics includes not only helping students learn the material but also appreciating the utility and applicability of those skills in better understanding the world. One technique in achieving this appreciation is through the use of projects which also strengthens inquiry, collaboration, reasoning and communication. However, there are currently limited curricular materials readily available to instructors of single and multivariable calculus. We invite you to come CAMP with us by offering innovative applied mathematics project ideas that can be used in the Calculus sequence.

Organizers:
Ellen Swanson, *Centre College*
Emek Kose, *St. Mary's College of Maryland*

Fostering a Problem-Solving Culture for Students

Thursday, August 4, 1:00 p.m. - 4:15 p.m., Taft A

All of us have experienced what George Pólya describes as "the tension and triumph of discovery" that comes from solving a difficult problem. This is something numerous faculty endeavor to bring to their students. The purpose of this session is to share ideas for extracurricular activities involving problem-solving events that occur regularly. These can range from Problem of the Day/Week/Month to forming a Problem Solvers Group that meets often to an Annual Inter-Collegiate Problem Contest, and so on. Let us share what worked, what can be improved, and how you entice students to participate. Our desire is for inclusivity, so these events should be open to all students, not just your best math majors. Talks in this session address specifically the aspects of establishing and maintaining a practice of extracurricular problem solving among students and not single undergraduate research projects. We also want to know if these led to more student engagement such as GRE Study clusters, journal problem-solving groups, Putnam involvement, teams for the Mathematical Contest in Modeling, or something else.

Organizers:
J. Lyn Miller, *Slippery Rock University*
Ron Taylor, *Berry College*
Robert Vallin, *Lamar University*

My Favorite Math Circle Problem

Thursday, August 4, 1:00 p.m. - 5:15 p.m., Franklin C

A math circle is an enrichment activity for K-12 students or their teachers, which brings them into direct contact with mathematically sophisticated leaders, fostering a passion and excitement for deep mathematics in the participants. Math circles combine significant discovery and excitement about mathematics through problem solving and exploration. Talks in this session will address a favorite problem or topic that was successful with a math circle audience.

Organizers:
Katherine Morrison, *University of Northern Colorado*
Philip Yasskin, *Texas A&M University*
SIGMAA MCST

Novel Introductions to Non-Euclidean Geometry

Thursday, August 4, 1:00 p.m. - 2:55 p.m., Union A

This session invites presenters to share interesting ways in which to introduce undergraduate students to non-Euclidean geometry. These "tastes" of geometry may be demonstrations, in-class activities, projects, proofs, or ways in which to guide undergraduates to explore and to learn about non-Euclidean geometries. but not those related to differential geometry or (low-level) graduate courses. Those discussing demonstrations or in-class activities are encouraged to share key portions. Presenters should discuss the facets of their approaches which highlight the differences between the geometry being explored and the Euclidean geometry with which undergraduates are familiar. Information regarding prerequisite topics and related areas with which students have difficulty should be discussed as should follow-up topics and problems, if any, experienced when using this approach. Presenters are invited to discuss how they have modified their approaches over time and to share information about successes, failures, and student reaction. Abstracts should include the type of geometry being examined, a brief description of the aspects of this geometry which are introduced, the theorem, if appropriate, the software or application, if any, which may be used, and what makes this approach a unique introduction to non-Euclidean geometry. Those whose presentations are dependent upon software or tablet explorations must provide their own laptop or tablet.

Organizer:
Sarah L. Mabrouk, *Framingham State University*

Themed Contributed Paper Sessions (continued)

Encouraging Early Career Teaching Innovation

Part A: Friday, August 5, 1:00 p.m. - 4:55 p.m., Union A
Part B: Saturday, August 6, 9:30 a.m. - 11:45 a.m., Union A

Faculty are eager to offer activities in the classroom that foster student success, but many are not formally trained in pedagogy. Junior faculty in particular may feel overwhelmed with adjusting to a new position, and the need to create an impressive tenure portfolio. This session will consist of presentations of effective and innovative tips, techniques, and tricks that experienced faculty members have used. Talks will address the reasoning behind, design, and implementation of their resource. While these activities may be whole course techniques, we also seek presentations on activities that can be dropped into an existing class to bolster student learning and reflection. Such activities may include exam wrappers, question stems, and IF-AT scratch off cards. Techniques do not have to be original to the presenter, but sources should be credited and proof of success (or failure and redesign) should be given.

We hope that this session will allow junior faculty in particular to be exposed to new, successful techniques that have been vetted by experienced faculty. We would also encourage presenters to be open to being contacted by attendees with questions about implementation, addressing any possible barriers to implementation, etc.

Organizers:
Susan Crook, *Loras College*
David Failing, *Quincy University*

Inviting All Students to Do Mathematics – Engaging Courses, Projects, and Activities for Liberal Arts Students

Part A: Thursday, August 4, 8:30 a.m. - 10:05 a.m., Union B
Part B: Friday, August 5, 8:30 a.m. - 9:45 a.m., Union C
Part C: Friday, August 5, 1:00 p.m. - 6:15 p.m., Union C

All students should have the opportunity to do mathematics in a meaningful way for the sheer fun of it. Such experiences, if well designed, improve students' effective thinking skills, increase their appreciation of the beauty and utility of mathematics, and prepare them to be mathematically-literate members of society. This session invites talks on how we can engage the liberal arts student through courses specifically designed for them. We welcome presentations on innovative course design, pedagogy, projects, or activities, as well as talks on tools used to assess such courses. Presentations should include a research basis for the design or pedagogical choices, a report on outcomes in student learning or attitude, or other evidence of success. Papers about programs demonstrating success engaging students who enter the course reluctant to engage in mathematics are especially encouraged. We also welcome talks on first year seminars or other experiences that engage first year students in doing mathematics as well as Honors courses in mathematics that incorporate the liberal arts.

Organizers:
Jennifer Nordstrom, *Linfield College*
Suzanne Doree, *Augsburg College*
Sarah Mabrouk, *Framingham State University*
Victor Piercey, *Ferris State University*
Curriculum Renewal Across the First Two Years (CRAFTY) Committee

Recreational Mathematics: Puzzles, Card Tricks, Games, Gambling, and Sports

Part A: Thursday, August 4, 1:00 p.m. - 3:55 p.m., Taft C
Part B: Friday, August 5, 1:00 p.m. - 4:55 p.m., Taft C

Puzzles, card tricks, board games, game shows, gambling, and sports provide an excellent laboratory for testing mathematical strategy, probability, and enumeration. The analysis of such diversions is fertile ground for the application of mathematical and statistical theory. Submissions to this session are encouraged that look at new problems as well as novel solutions to old problems. Submissions by undergraduates or examples of the use of the analysis in the undergraduate classroom are encouraged.

Organizers:
Paul R. Coe, *Dominican University*
Kristen Schemmerhorn, *Concordia University Chicago*
Sara B. Quinn, *Dominican University*

Themed Contributed Paper Sessions (continued)

Formative Assessment Techniques for Undergraduate Math Courses

Part A: Friday, August 5, 1:00 p.m. - 4:35 p.m., Union B
Part B: Saturday, August 6, 1:00 p.m. - 3:35 p.m., Union B
Recent trends indicate that formative assessment encourages a growth mindset, reduces test anxiety, and improves student gains in math classrooms. The purpose of this session is to disseminate new approaches to student evaluation that use assessment as a learning experience and help students overcome challenges that disproportionately affect students in math classes, including test anxiety, insufficient prerequisite knowledge, or lack of confidence. Examples of formative assessment include mastery-based testing schemes, feedback on rough drafts of student work, peer review of coursework, and oral exams. The focus of the session is on pedagogical rationales for formative assessment tools, their practical implementation, and their impact on the aforementioned challenges facing students. Speakers should talk about formative assessment techniques they use in these contexts, and provide evidence of how they encourage student success in math courses. In addition, speakers are encouraged to share their experiences and their advice for educators planning to incorporate formative assessment in their classes.

Organizers:
Jarod Hart, *University of Kansas*
Alyssa Armstrong, *Wittenberg University*
Katie Haymaker, *Villanova University*
Mike Janssen, *Dordt College*
Austin Mohr, *Nebraska Wesleyan University*
Jessica Stewart, *Christopher Newport University*
Jessica O'Shaughnessy, *Shenandoah University*
Amanda Harsy, *Lewis University*

Programming in Mathematics Classes and Mathematics for Programming

Saturday, August 6, 1:00 p.m. - 5:15 p.m., Union A
This session invites participants to reflect upon their use of computer programming and/or computer algebra systems within their upper-level mathematics curriculum. Implementations using SAGE, Maple, Mathematica or other programming/computer algebra environments are welcome. The purpose of this session is to explore the outcomes of different aspects of programming in mathematics education while providing tools and/or examples for anyone that is interested in incorporating more programming into their own curriculum. Presenters will describe the tools used, lessons developed, and examples of student outcomes.

Organizers:
Jacci White, Monika Kiss, and Brian Camp, *Saint Leo University*

Undergraduate Research Activities in Mathematical and Computational Biology

Saturday, August 6, 1:00 p.m. - 2:15 p.m., Taft A

This session is dedicated to aspects of undergraduate research in mathematical and computational biology. First and foremost, this session would like to highlight research results of projects that either were conducted by undergraduates or were collaborations between undergraduates and their faculty mentors. Of particular interest are those collaborations that involve students and faculty from both mathematics and biology. Secondly, as many institutions have started undergraduate research programs in this area, frequently with the help of initial external funding, the session is interested in the process and logistics of starting a program and maintaining a program even after the initial funding expires. Important issues include faculty development and interdisciplinary collaboration, student preparation and selection, the structure of research programs, the acquisition of resources to support the program, and the subsequent achievements of students who participate in undergraduate research in mathematical and computational biology.

Organizer:
Timothy D. Comar, *Benedictine University*
BIO SIGMAA

General Contributed Paper Sessions

Organized by: **Gizem Karaali,** *Pomona College*
                John Wilson, *Centre College*

Thursday, Friday, and Saturday (August 4-6) Mornings and Afternoons, Union D & E

The general sessions accept abstracts of papers in all areas of mathematics, pedagogy, and the undergraduate mathematics curriculum. Talks are scheduled in the following categories:

Assessment	**Teaching or Learning Other Mathematics**
History or Philosophy of Mathematics	**Algebra**
Interdisciplinary Topics in Mathematics	**Analysis**
Mathematics and Technology	**Applied Mathematics**
Mentoring	**Geometry**
Modeling or Applications	**Graph Theory**
Outreach	**Linear Algebra**
Teaching or Learning Advanced Mathematics	**Logic or Foundations**
Teaching or Learning Calculus	**Number Theory**
Teaching or Learning Developmental Mathematics	**Probability or Statistics**
Teaching or Learning Introductory Mathematics	**Other than the Above**

Panel Sessions

Quantitative Literacy at the Post-Secondary Level: Future Directions in Research

Thursday, August 4, 1:00 p.m. - 2:20 p.m., McKinley

Since Steen's 2001 call for action in "Mathematics and Democracy," there has been an influx of research on best practices for promoting quantitative literacy (QL) at the post-secondary level. While such efforts have aided in the development of curricula and pedagogy, there is a need for reflection on the field's progress and direction. The purpose of this discussion is to channel these efforts, ultimately culminating in a paper for the journal Numeracy. Tentatively, the panel consists of Semra Kilic-Bahi (mathematician and educator), Catherine Crockett (mathematician and educator), Gregory Foley (math educator), Victor Piercey (mathematician), and Milo Schield (physicist and statistics educator). Potential questions for this diverse group include: What practices have we yet to determine are meaningful in promoting numeracy? What is the minimum amount of change one needs within a traditional math course to effect better QL outcomes? What role will technology (and online courses) have in the QL effort? To what degree is writing needed in a course with a QL designation? Which literacy and statistics skills do students need that a mathematics course can promote?

Organizer:
Luke Tunstal, *Michigan State University*

Panelists:
Semra Kilic-Bahi, *Colby-Sawyer College*
Catherine Crockett, *Point Loma Nazarene University*
Gregory Foley, *Ohio University*
Victor Piercey, *Ferrist State University*
Milo Schield, *Augsburg College*

Sponsor:
SIGMAA-QL

Active Learning Approaches in Mathematics Instruction: Practice and Assessment Symposium

Thursday, August 4, 2:35 p.m. - 3:55 p.m., Hayes

Recent studies have supported the positive impact of active learning approaches on college level mathematics. A recent study by Sandra Laursen of the University of Colorado makes the case that active learning increases the academic performance of key under represented student groups in the STEM disciplines. A meta-study by Freeman, Eddy, McDonough and their colleagues encourages moving beyond a focus on comparisons between active learning vs. lecture format and towards exploring the best methods with an active learning classroom. The group wrote that their results "raise questions about the continued use of traditional lecturing as a control in research studies, and support active learning as the preferred, empirically validated teaching practice in regular classrooms." Thus, new research and evaluation projects are needed to establish which active learning approaches prove most effective and to broaden the study of various methods in how they impact students. The analysis of "big data" sources presents a particularly intriguing different approach to analyzing the benefits of various active learning methods. While not directly related to the issue area, Glenn Ellison and Ashley Swanson's approach to analyzing "the gender gap in secondary school mathematics at high achievement levels" demonstrates this approach.

A symposium will be held just prior to MAA MathFest 2016 to discuss what key research questions need to be posed and to encourage larger scale evaluation projects that work towards answering these key questions. New research can identify which active learning mathematics teaching methods work best for specific groups of students, especially underserved groups, while also extending the case that active learning methods trump traditional lecture based approaches. In the special session the panelists will discuss the findings and recommendations of this symposium. Panel discussion will be led by Ronald Douglas, David Bressoud, and Doris Zahner, along with Michael Starbird (and one more name to be determined). While the symposium is by invitation only, there may be openings still available at time of publication. If you are interested go to http://www.workshop.eduadvance.org

Organizers:

Ronald Douglas, *Texas A&M University*
David Bressoud, *Macalester College*
Doris Zahner, *Council for Aid to Education*

Panelists:

Ronald Douglas, *Texas A&M University*
David Bressoud, *Macalester College*
Doris Zahner, *Council for Aid to Education*
Michael Starbird, *University of Texas*
Dennis Deturck, *University of Pennsylvania*

Panel Sessions (continued)

How to Apply for jobs in Academia and Industry after Your PhD

This session is aimed at graduate students and recent PhDs. An overview of the employment process will be given with ample opportunity for participants to ask questions. Questions that will be addressed include: How do you find which jobs are available? How do you choose which jobs you want to apply for? What are academic and other employers looking for in the materials that you send? How should you tailor your application materials for the job that you are applying for? How do schools conduct interviews?

Organizers:

Estela Gavosto, *University of Kansas*
Mark Snavely, *Carthage College*

Panelists:

David C. Manderscheid, *Ohio State University*
Joanne Peeples, *El Paso Community College*
Mark Snavely, *Carthage College*

Sponsor:
MAA Committee on Graduate Students

Education and Science Policy

The work of Transforming Post-Secondary Education in Mathematics (TPSE) and the MAA's Common Vision project have raised the profile of education in the mathematical sciences, especially in the first-two years. The high-degree of turnover in recent years among Members of Congress gives us a great opportunity to get our policymakers up to speed with education in the STEM fields, including mathematics. This panel will give ideas about how we can inform and engage policy-makers about the needs in post-secondary education in the mathematical sciences.

Organizers:

Karen Saxe, *Macalester College*
David Manderscheid, *The Ohio State University*

Panelists:

William "Brit" Kirwan, *University of Maryland*
Joan Leitzel, *The Ohio State University, University of New Hampshire*
Karen Saxe, *Macalester College*

Sponsor:
Science Policy Committee

Re-Energizing Your Career at All Stages

Preliminary results of a national survey of professors by the Collaborative on Academic Careers in Higher Education at Harvard University indicate that in many measures associate professors have lower job satisfaction levels than both assistant and full professors. The reasons for lower job satisfaction are many, and they can affect faculty at all ranks. Since faculty are primarily responsible for the advancement of their own careers, it is important for faculty to find ways in which they can remain vital and active in teaching, scholarship, and service. In this session, colleagues who have successfully managed to achieve this sometimes difficult goal will share strategies and experiences that have helped them stay engaged throughout their careers.

Organizers:

Julia Barnes, *Western Carolina University*
Steve Schlicker, *Grand Valley State University*

Panelists:

David Austin, *Grand Valley State University*
Audrey Malagon, *Virginia Wesleyan College*
Hortensia Soto-Johnson, *University of Northern Colorado*
David Torain, *Hampton University*

Sponsor:
MAA Committee on Professional Development

Panel Sessions (continued)

Non-Academic Mathematical Career Paths for Undergraduates

Friday, August 5, 2:35 p.m. - 3:55 p.m., McKinley
Step one: earn a degree in mathematics. Step three: have a great career! What is step two? Whether you are a mathematics student looking for a job once you graduate or an advisor looking for advice to give to future job-seeking students, this session will help you gain new perspectives on nonacademic career experiences and what employers value in their employees. Panelists will share the paths to their current positions, the ways in which they utilize their mathematical background, and offer advice to others looking for employment in similar venues.

Organizers:
May Mei, *Dennison University*
Ben Galluzzo, *Shippensburg University*

Panelists:
Karla Dixon, *Abercrombie & Fitch*
Bruce Myers, *National Security Agency*
Derek Straiton, *Gahanna Lincoln High School*
Tony Hovest, *Motorists Insurance Group*

Sponsor:
MAA Committee on Undergraduate Student Activities and Chapters

Prioritizing Your Career and Professional Goals

Saturday, August 6, 1:00 p.m. - 2:20 p.m., McKinley
Whether first-year faculty or senior members of the department, we often struggle with balancing the three aspects of our careers: teaching, research, and service. Successfully doing so requires identifying our goals and priorities, which then help us choose which opportunities to embrace and which are not best-suited to our interests, time frame, and talents. Panelists will discuss strategies for identifying goals and priorities and share their experiences of being confronted with such situations, including how they made their decisions and how they said "no" when appropriate. In particular, Panelists will address these questions: How does one accomplish the goals on a priority list? How does one determine what will be valued? What is the best way to say "no" when that is called for? This panel is sponsored by the Association for Women in Mathematics.

Organizers:
Jacqueline Jensen–Vallin, *Lamar University*
Alissa Crans, *Loyola Marymount University*
Maura Mast, *Fordham University*
Candice Price, *University of San Diego*

Panelists:
Jenna Carpenter, *Campbell University*
Annalisa Crannell, *Franklin & Marshall College*
Niles Johnson, *The Ohio State University*
Candice Price, *University of San Diego*

Sponsor:
Association for Women in Mathematics

Interested in Doing Outreach?

Stop by the NAMC/SIGMAA-MCST Booth and learn about quick and fun outreach activities!

Thursday 10:00 am - Noon	Friday 10:00 am - Noon	Friday 2:00 – 4:00 pm	Saturday 10:00 am - Noon
Stomp Rockets	Four Square Problem	Mathematical Tiling	Criss-Cross

Discover Math Circles!

https://www.mathcircles.org/content/mathfest-2016

Math Circle Events at MathFest 2016

Wednesday, Aug 3
  6:00 - 8:00 pm Grand Opening Exhibit Hall Reception (Exhibit Hall)

Thursday, Aug 4
  9:00 am - 5:00 pm Visit the NAMC Booth (Exhibit Hall)
  1:00 - 5:00 pm CPS: My Favorite Math Circle Problem (Franklin C)
  6:00 - 9:00 pm NAMC Math Circle Happy Hour (Location TBA)

Friday, Aug 5
  9:00 am - 5:00 pm Visit the NAMC Booth (Exhibit Hall)

Saturday, Aug 6
  9:00 am - Noon   Visit the NAMC Booth (Exhibit Hall)
  1:00 - 1:50 pm Special Presentation for High School Students, Parents, and Teachers:
          The Astounding Mathematics of Bicycle Tracks (Hayes)
  2:00 - 3:00 pm SIGMAA-MCST Math Teachers' Circle Demo (Morrow)
  4:00 - 5:30 pm Math Wrangle (Morrow)

For additional Math Circle Resources... Visit mathcircles.org and connect to the other members of the Math Circle Community

* NAMC on Facebook: http://www.facebook.com/MathCircles
* SIGMAA-MCST: http://sigmaa.maa.org/mcst
* Math Teachers' Circle (MTC) Network: http://mathteacherscircle.org

Poster Session

PosterFest 2016: A Poster Session of Scholarship by Early Career Mathematicians and Graduate Students

Friday, August 5, 3:30 p.m. - 5:00 p.m., Exhibit Hall

This poster session will allow early career mathematicians, including untenured faculty and graduate students, to present and discuss their scholarly activities with other attendees in an informal atmosphere. Examples of scholarly activities suitable for this poster session include expository work, preliminary reports, scholarship of teaching and learning, and research reports. Presenters should have their materials prepared in advance and will be provided with a self-standing, trifold tabletop poster approximately 48 in wide by 36 in high. Proposals should be submitted at www.maa.org/mathfest/abstracts. Questions regarding this session should be sent to the organizers.

Organizers:
Audrey Malagon, *Virginia Wesleyan College*
Jenny McNulty, *University of Montana*

Sponsors:
MAA Committee on Early Career Mathematicians

Minicourses

MAA Minicourses are partially supported by the William Lucas Fund.

1. Creating A Purposeful Student Learning Experience

Part A:
Friday, August 5, 3:30 p.m. - 5:30 p.m., Taft B

Part B:
Saturday, August 6, 3:30 p.m. - 5:30 p.m., Taft B

Do your requirements for your departmental majors constitute an integrated framework designed to build skills necessary for students to succeed in the workplace or in graduate school, or are they just a set of individual classes covering a standard array of content? Do your faculty work together effectively to develop and implement plans to achieve those desired outcomes and to assess your progress? Do you strategically incorporate experiences outside the classroom in student learning? This minicourse, taught in a hands-on workshop format, will assist and guide you in identifying practical steps toward achieving those goals and creating a learning-focused departmental culture. Departmental teams of 2 — 4 are encouraged to enroll, but are not required.
G. Daniel Callon, John Boardman, Justin Gash, Stacy Hoehn, Paul Fonstad, and Angie Walls, *Franklin College*

2. Visualizing Projective Geometry through Photographs and Perspective Drawings

Part A:
Thursday, August 4, 1:00 p.m. - 3:00 p.m., Taft B

Part B:
Friday, August 5, 1:00 p.m. - 3:00 p.m., Taft B

This Minicourse will introduce hands-on, practical art puzzles that motivate the mathematics of projective geometry---the study of properties invariant under projective transformations, often taught as an upper-level course. This Minicourse seeks to strengthen the link between projective geometry and art. On the art side, we explore activities in perspective drawing or photography. These activities provide a foundation for the mathematical side, where we introduce activities in problem solving and proof suitable for a sophomore-level proofs class. In particular, we use a geometrical analysis of Renaissance art and of photographs taken by students to motivate several important concept in projective geometry, including Desargues' Theorem, Casey's Theorem and its applications, and Eves' Theorem. No artistic experience is required.
Annalisa Crannell, *Franklin & Marshall College*
Fumiko Futamura, *Southwestern University*
Marc Frantz, *Indiana University*

3. Teaching Linear Algebra: Learning Concepts Often Difficult to Understand

Part A:
Thursday, August 4, 3:30 p.m. - 5:30 p.m., Taft B

Part B:
Saturday, August 6, 1:00 p.m. - 3:00 p.m., Taft B

Participants will work with GeoGebra interactive applets/ worksheets supporting instruction in Linear Algebra. The workshop will consist of a) an overview of the topics that are often difficult for students to understand; b) participants will work with selected worksheets with activities illustrating the connection between the visual, algebraic, and numeric perspectives of concepts. (A short introduction to GeoGebra will occur first); c) discussion of possible pedagogical approaches for understanding difficult concepts; d) a look at some related application problems; e) summary of preliminary evaluation results; f) wrap-up, including remarks and suggestions by participants and the link to other freely available resources.
James D. Factor and Susan Pustejovsky, *Alverno College*

4. Teaching the Lebesgue Integral to Undergraduates

Part A:
Thursday, August 4, 1:00 p.m. - 3:00 p.m., Taft D

Part B:
Friday, August 5, 1:00 p.m. - 3:00 p.m., Taft D

This minicourse shows how to teach a course on the Lebesgue integral at an accessible undergraduate level with surprisingly minimal prerequisites. Students who mastered single-variable calculus concepts of limits, derivatives, and series can learn the material. The key to success is the use of a "Daniell-Riesz approach." The treatment is self-contained; the course, often currently offered as Real Analysis 2, no longer needs Real Analysis I as a prerequisite. Along with Complex and Real Analysis I, the course provides a comprehensive undergraduate study of functions. Completion of any one course enhances the other two. Students can enroll after Calculus II or after a course in proofs. The minicourse thus shows how to give undergraduates the background for collaborative research and improved access to journal articles in analysis, creating a course with SLO topics that can include: the definition and properties of the Lebesgue integral; Banach and Hilbert spaces; integration with respect to Borel measures with associated $L^2(\mu)$ spaces; and bounded linear operators. Traditionally thought of as advanced and out of reach,

Minicourses (continued)

the minicourse shows how these topics are accessible for undergraduates and able to be taught by anyone who might also, e.g., teach Real or Complex Analysis.
William W. Johnston, *Butler University*
Derek Thompson, *Taylor University*

5. Teaching Modeling First Differential Equations - Building Community in SIMIODE

Part A:
Thursday, August 4, 3:30 p.m. - 5:30 p.m., Taft D
Part B:
Saturday, August 6, 1:00 p.m. - 3:00 p.m., Taft D

This minicourse permits participants to experience SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations, an online (www.simiode.org) community of teachers and learners of differential equations who use modeling and technology throughout the learning process. Participants do modeling scenarios from the student perspective, discuss pedagogical and content issues that might arise in such teaching, and initiate the development of their own modeling scenario contributions to SIMIODE through partnering with other participants during and after the minicourse. The minicourse is appropriate for all interested in teaching differential equations in a modeling first approach.
Therese Shelton, *Southwestern University*
Brian Winkel, *United States Military Academy*

6. Teaching Introductory Statistics with Simulation-Based Inference

Part A:
Friday, August 5, 3:30 p.m. - 5:30 p.m., Taft D
Part B:
Saturday, August 6, 3:30 p.m. - 5:30 p.m., Taft D

The goal of this minicourse is to help participants to revise their introductory statistics course to focus on the logic and scope of statistical inference by using simulation-based methods, as opposed to methods based on the normal probability distribution, to introduce students to concepts of statistical inference. The minicourse will provide direct experience with hands-on activities designed to introduce students to concepts of statistical inference. These activities make use of freely available applets to explore concepts and analyze real data from genuine research studies. Presenters will also offer advice and lead discussion about effective implementation and assessment of student learning.
Allan Rossman, Beth Chance, and Soma Roy, *Cal Poly San Luis Obispo*

WILLIAM F. LUCAS FUND

William F. Lucas (1933-2010), a native of Detroit, completed a PhD at the University of Michigan in 1963. His long career was spent primarily at Cornell University (1970-84) and the Claremont Graduate School (now Claremont Graduate University, 1984 until retirement), with a variety of visiting and short-term positions, including two years at Princeton University (1963-65) working with the Office of Naval Research and Mathematica, Inc., before spending a year as a Fulbright Professor at the Middle East Technical University in Ankara, Turkey. Prof. Lucas also held consulting or visiting positions at the Rand Corporation, the University of Wisconsin, Washington State University, and the Institute for Mathematics and its Applications at the University of Minnesota. Prof. Lucas wrote and spoke widely on topics in discrete mathematics, game theory, and operations research, including his own research as well as expository and educational materials that reflected his wish to develop interest and capacity in these fields.

Prof. Lucas served in a variety of editorial capacities on more than 15 journals, including a three-year term as Associate Editor of the American Mathematical Monthly (1974-77). He was instrumental in the early years of the Consortium for Mathematics and Its Applications (COMAP), where he served as Vice President and Clerk of the Board of Trustees (1981-1992). His long list of professional activities, to many organizations, demonstrated his commitment to advancing our profession.

As a long-time member of MAA, Prof. Lucas served on a variety of committees, including the Committee on the Undergraduate Program in Mathematics, which he chaired for two years (1976-78). He also served on the MAA Committee on Continuing Education from 1978-80, and over many years organized and led sessions at a variety of national and regional professional meetings, including minicourses at MAA meetings. To honor his long-standing interest in such programs, in 2005 friends, family, and colleagues joined together to establish the William F. Lucas Fund to provide ongoing support of MAA professional development programs. This fund now provides support for minicourses at MAA MathFest, and in particular allows MAA to offer reduced registration fees for students and high school teachers.

MyMathLab® and MyStatLab™

MyMathLab™ and MyStatLab® help students and instructors improve results. They provide engaging experiences and personalized learning for each student to ensure learning happens in any environment. Plus, they offer flexible and time-saving course management features to allow instructors to easily manage their classes, while remaining in complete control regardless of course format—traditional, hybrid, lab-based, or online.

MyMathLab and MyStatLab now provide Learning Catalytics™, an interactive student response tool that uses students' smartphones, tablets, or laptops to engage them in more sophisticated tasks and thinking. Generate class discussion, guide your lecture, and promote peer-to-peer learning with real-time analytics.

Join us and author, Nathan P. Ritchey, at **10:00am on Friday, August 4** to learn more about the balance between skill and application in learning and boosting student engagement.

For more information, visit us at **booth #202** and also at **mymathlab.com** or **mystatlab.com**.

Workshops

Teaching an Introduction to the Mathematics of Computer Graphics

Thursday, August 4, 2:35 p.m. - 3:55 p.m., Union C

This workshop introduces a project-based, general-population elective on the mathematics of computer graphics. Participants will see some new mathematics and receive a course outline and syllabus, and more importantly, a hands-on introduction to the free software used in the course projects. The workshop also covers how to extend the course for more advanced audiences, such as mathematics majors or computer science majors. The free software POV-Ray has been around for decades, but is still updated and released today. It creates realistic 3D images and animations from mathematical descriptions of the objects in a scene. This requires students to master the mathematical content in pursuit of their creative goals, but also gives them immediate and enjoyable practical applications of that content. Students no longer ask, "What is this good for?" They immediately see the purpose of the mathematics in their own creative projects, and in the computer graphics industry. Participants receive a list of suggested student projects with grading rubrics, interactive online tools, references for further reading, and more. Prerequisites for this general-population course are algebra and polynomial differentiation; linear algebra and/or computer programming are not required.

Nathan C. Carter, *Bentley University*

The Hungarian Approach, Its Emphasis on Problem Solving, and Implications for Secondary Classrooms

Thursday, August 4, 4:10 p.m. - 5:30 p.m., Union C

In the Hungarian approach to learning and teaching, an emphasis is placed on problem solving, creativity, and communication. Students learn by working on problems that emphasize procedural fluency, conceptual understanding, and connections. An overarching goal of each lesson is to learn what it means to engage in mathematics and to feel the excitement of discovery. In this workshop, participants will experience the Hungarian approach through a dual role of student and teacher. As students, they will grapple with interesting mathematical tasks from secondary schools; as teachers, they will reflect on the learning experience. We will discuss the implementation of the Hungarian approach. Topics include how teachers sequence tasks to provide coherence to their lessons; and how teachers establish a classroom where students are not afraid to share ideas or make mistakes. We will explore the implications for pre-service teacher preparation. We will share results from Budapest Semesters in Mathematics Education, a semester-long program (in Budapest) for American undergraduates that focuses on the Hungarian approach. The workshop is intended for undergraduates or recent graduates interested in teaching secondary school mathematics, and faculty members who work with them.

Ryota Matsuura, *St. Olaf College*

What's the Story? A Graduate Student Workshop on Formulating a Research Presentation for a General Audience

Thursday, August 4, 1:00 p.m. - 2:20 p.m., Union C

Presenting our research to undergraduate students can be both fun and rewarding. It can also be difficult, however, since the gory details of our results often require a great deal of specific jargon and background. Nonetheless, the big ideas can almost always be presented at a variety of levels, and this workshop is designed to interactively help participants develop the skills needed to formulate a presentation on their research that is appropriate for an audience of undergraduate students. Since many colleges and universities require giving such a talk as part of a job interview, almost any graduate student will have the opportunity to do so, and the ability to communicate complex mathematical ideas to students is a valued trait in a candidate. This workshop will consist of hands-on activities and audience interaction aimed toward developing and improving the necessary skills for creating an engaging and accessible presentation for undergraduates. Participants should be prepared to discuss in groups a potential presentation on their research or other related topic.

Rachel Schwell, *Central Connecticut State University*
May Mei, *Denison University*

Other Mathematical Sessions

MAA Prize Session

Thursday, August 4, 11:35 a.m. - 12:15 p.m., Regency Ballroom
This session is organized by Barbara Faires, Westminster College, MAA Secretary, and is moderated by Francis Su, Harvey Mudd College, MAA President.

MAA Section Officers Meeting

Thursday, August 4, 3:00 p.m. - 5:00 p.m., Franklin B
This session is moderated by Elizabeth Mayfield, Hood College, Chair of the MAA Committee on Sections. It is open to all section officers and their guests. The Committee on MAA/Department Liaisons will lead a discussion on liaisons in the Sections -- how are some Sections using liaisons, what suggestions do they have for others, how can we use this resource in the future? And the Committee on SIGMAAs will lead a similar discussion on the intersection of SIGMAAs and Sections. Bring your experiences and ideas!

Speed Interviewing Marathon for Students

Thursday, August 4, 4:10 p.m. - 5:25 p.m., McKinley
Employers suggest that communication skills are a critical component when considering a mathematics major for a job. An important time to demonstrate good communication skills is during the job interview. This session for undergraduate students, graduate students and early career mathematicians will start with an overview of best practices and tips on job interviewing, then guide participants in several speed interviewing sessions of 10 minutes each, where they can practice what they have learned and hone their interviewing skills. Speed interviewing sessions will include individual feedback for participants, as well as opportunities to network with fellow interviewees.

Organizers:
Jenna Carpenter, *Campbell University*
Michael Dorff, *Brigham Young University*

Committee on Professional Development
Committee on Graduate Students
Committee on Undergraduate Student Activities and Chapters

Alder Award Session

Friday, August 5, 2:30 p.m. - 4:00 p.m., Hayes
The MAA established the Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member to honor beginning college or university faculty members whose teaching has been extraordinarily successful and whose effectiveness in teaching undergraduate mathematics is shown to have influence beyond their own classrooms. Each year, at most three college or university teachers are honored with this national award. The awardees are invited to make a presentation in this session. The session is moderated by Francis Su, Harvey Mudd College, MAA President.

Maximal Subgroup Containment in Direct Products
2:30 p.m. - 2:50 p.m.
Dandrielle Lewis, *University of Wisconsin - Eau Claire*

Two Human Faces of Mathematics: Students and Medicine
3:00 p.m. - 3:20 p.m.
Jana Gevertz, *College of New Jersey*

Modeling Across the Curriculum
3:30 p.m. - 3:50 p.m.
Benjamin Galluzzo, *Shippensburg University*

Other Mathematical Sessions (continued)

Estimathon!

Friday, August 5, 3:30 p.m. - 5:00 p.m., Taft A

They're called Fermi problems...

- How heavy is the Eiffel Tower?
- How many prime numbers have distinct digits?
- How many calories would you be eating if you had "one of everything" at the Cheesecake Factory?

If you're looking for a mindbending mixture of math and trivia, look no further! Jane Street Capital presents The Estimathon contest: teams will have 30 minutes to work on 13 problems, ranging from totally trivial to positively Putnamesque. Can your team beat the all-time best score?? The top teams will receive prizes!

As in past years, we will run 2 contests. Feel free to show up to either one!

(Please show up 15 minutes before the start time of the contest you want to join.)

Our target schedule is as follows:

- 4:00 pm. Welcome, overview of rules and scoring.
- 4:15 pm. Estimathon contest #1
- 5:00 pm. Estimathon contest #2

Organizer:

Andy Niedermaier, *Jane Street Capital*

Town Hall Meeting

Revising Guidelines on the Recruitment, Retention, Development, and Evaluation of Faculty

Friday, August 5, 4:10 p.m. - 5:30 p.m., McKinley

The MAA Committee on the Status of the Profession invites ideas and suggestions regarding ongoing updates and revisions to The Guidelines for Programs and Departments in Undergraduate Mathematical Sciences. These Guidelines are intended to be used by mathematical sciences programs in self-studies, planning, and assessment of their undergraduate programs, as well as by college and university administrators and external reviewers.

In order to have the future online statements in the Guidelines be as complete and useful as possible, the committee is soliciting input from MAA members. In this session, panelists and committee members will take comments and questions from the audience regarding the sections on Program Faculty and Staffing. Specific topics will include guidelines related to emerging trends in recruiting, retaining, developing, and evaluating faculty.

Organizers:

Committee on the Status of the Profession

Moderator:

Tim Flowers, *Indiana University of Pennsylvania*

Panelists:

Edward Aboufadel, *Grand Valley State University*
Emily Puckette, *The University of the South*
Jennifer Quinn, *The University of Washington, Tacoma*
Committee on the Status of the Profession

ECM Mentoring Network Social

Friday, August 5, 5:30 p.m. - 7:30 p.m., Peppercorn

The Committee on Early Career Mathematicians (ECM) will host its inaugural mentoring network social from 5:30-7:30 pm in the Peppercorn Room, immediately following PosterFest on Friday, August 5th. The social is open to mentors and mentees already in the MAA Mentoring Network, as well as all those interested in joining the Mentoring Network. Early-career mathematicians are especially encouraged to attend - refreshments will be provided along with a cash bar.

Organizer:

Audrey Malagon, *Virginia Wesleyan College*

Other Mathematical Sessions (continued)

Special Presentation for High School Students, Parents, and Teachers

The Astounding Mathematics of Bicycle Tracks

Saturday, August 6, 1:00 p.m. - 1:50 p.m., Hayes

James Tanton, *MAA*

Sir Arthur Conan Doyle asked a question: If you come across a pair of bicycle tracks in the snow, could you determine in which direction the bicycle went? He got the answer wrong! So let's ride a bicycle, look at its tracks, and get the answer right. Even though this puzzle is now classic in the mathematics community (thanks to the charming MAA book Which Way did the Bicycle Go?... and Other Intriguing Mathematical Mysteries by Konhauser, Velleman, and Wagon), there is still much more we can say and do with bicycle tracks, all leading to some astounding surprises for students, teachers, mathematicians, and math enthusiasts alike. Hold on to your wheels for this one! This is a general outreach lecture presented by James Tanton of the MAA and designed to inspire relevant and exciting mathematical thinking and doing for the high-school classroom. All are so welcome to attend!

Organizer:

Deanna Haunsperger, *Carleton College*
Council on Outreach

Math Teacher's Circle Demonstration

Saturday, August 6, 2:00 p.m. - 3:30 p.m., Morrow

A math circle is an enrichment experience that brings mathematics professionals in direct contact with pre-college students and/or their teachers. Circles foster passion and excitement for deep mathematics. This demonstration session offers the opportunity for conference attendees to observe and then discuss a math circle experience designed for local teachers. While teachers are engaged in a mathematical investigation, mathematicians will have a discussion focused on appreciating and better understanding the organic and creative process of learning that circles offer, and on the logistics and dynamics of running an effective circle.

Organizers:

Amanda Serenevy, *Riverbend Community Math Center*
Bob Klein, *Ohio University*
Tatiana Shubin, *San Jose State University*
SIGMAA MCST

Math Wrangle

Saturday, August 6, 4:00 p.m. - 5:30 p.m., Morrow

Math Wrangle will pit teams of students against each other, the clock, and a slate of great math problems. The format of a Math Wrangle is designed to engage students in mathematical problem solving, promote effective teamwork, provide a venue for oral presentations, and develop critical listening skills. A Math Wrangle incorporates elements of team sports and debate, with a dose of strategy tossed in for good measure. The intention of the Math Wrangle demonstration at MAA MathFest is to show how teachers, schools, circles, and clubs can get students started in this exciting combination of mathematical problem solving with careful argumentation via public speaking, strategy and rebuttal.

Organizers:

Ed Keppelmann, *University of Nevada*
Paul Zeitz, *University of San Francisco*
Mark Saul, *American Math Competitions*
SIGMAA MCST

MAA Business Meeting

Saturday, August 6, 11:35 a.m. - 11:55 a.m., Hayes

The meeting is organized by Barbara Faires, Westminster College, MAA Secretary, and is chaired by Francis Su, Harvey Mudd College, MAA President.

Graduate Student Activities

WORKSHOP

What's the Story? A Graduate Student Workshop on Formulating a Research Presentation for a General Audience

Thursday, August 4, 1:00 p.m. - 2:20 p.m., Union C

Presenting our research to undergraduate students can be both fun and rewarding. It can also be difficult, however, since the gory details of our results often require a great deal of specific jargon and background. Nonetheless, the big ideas can almost always be presented at a variety of levels, and this workshop is designed to interactively help participants develop the skills needed to formulate a presentation on their research that is appropriate for an audience of undergraduate students. Since many colleges and universities require giving such a talk as part of a job interview, almost any graduate student will have the opportunity to do so, and the ability to communicate complex mathematical ideas to students is a valued trait in a candidate. This workshop will consist of hands-on activities and audience interaction aimed toward developing and improving the necessary skills for creating an engaging and accessible presentation for undergraduates. Participants should be prepared to discuss in groups a potential presentation on their research or other related topic.
Rachel Schwell, *Central Connecticut State University*
May Mei, *Denison University*

PANEL SESSION

How to Apply for Jobs in Academia and Industry After Your PhD

Thursday, August 4, 2:35 p.m. - 3:55 p.m., McKinley

This session is aimed at graduate students and recent PhDs. An overview of the employment process will be given with ample opportunity for participants to ask questions. Questions that will be addressed include: How do you find which jobs are available? How do you choose which jobs you want to apply for? What are academic and other employers looking for in the materials that you send? How should you tailor your application materials for the job that you are applying for? How do schools conduct interviews?

Organizers:
Estela Gavosto, *University of Kansas*
Mark Snavely, *Carthage College*

Panelists:
David C. Manderscheid, *Ohio State University*
Joanne Peeples, *El Paso Community College*
Mark Snavely, *Carthage College*
MAA Committee on Graduate Students

Speed Interviewing Marathon for Students

Thursday, August 4, 4:10 p.m. - 5:25 p.m., McKinley

Employers suggest that communication skills are a critical component when considering a mathematics major for a job. An important time to demonstrate good communication skills is during the job interview. This session for undergraduate students, graduate students and early career mathematicians will start with an overview of best practices and tips on job interviewing, then guide participants in several speed interviewing sessions of 10 minutes each, where they can practice what they have learned and hone their interviewing skills. Speed interviewing sessions will include individual feedback for participants, as well as opportunities to network with fellow interviewees.

Organizers:
Jenna Carpenter, *Campbell University*
Michael Dorff, *Brigham Young University*

Committee on Professional Development
Committee on Graduate Students
Committee on Undergraduate Student Activities and Chapters

Graduate Student Reception

Thursday, August 4, 5:30 p.m. - 6:30 p.m., Peppercorn

Graduate students are invited for some refreshments and to meet several of the invited speakers.

Organizers:
Estela A. Gavosto, *University of Kansas*
James Freeman, *Cornell College*

Graduate Student Activities (continued)

PANEL SESSION

Non-Academic Mathematical Career Paths for Undergraduates

Friday, August 5, 2:35 p.m. - 3:55 p.m., McKinley

Step one: earn a degree in mathematics. Step three: have a great career! What is step two? Whether you are a mathematics student looking for a job once you graduate or an advisor looking for advice to give to future job-seeking students, this session will help you gain new perspectives on nonacademic career experiences and what employers value in their employees. Panelists will share the paths to their current positions, the ways in which they utilize their mathematical background, and offer advice to others looking for employment in similar venues.

Organizers:
May Mei, *Dennison University*
Ben Galluzzo, *Shippensburg University*

Panelists:
Karla Dixon, *Abercrombie & Fitch*
Bruce Myers, *National Security Agency*
Derek Straiton, *Gahanna Lincoln High School*
Tony Hovest, *Motorists Insurance Group*
MAA Committee on Undergraduate Student Activities and Chapters

PosterFest 2016: A Poster Session of Scholarship by Early Career Mathematicians and Graduate Students

Friday, August 5, 3:30 p.m. - 5:00 p.m., Exhibit Hall

This poster session will allow early career mathematicians, including untenured faculty and graduate students, to present and discuss their scholarly activities with other attendees in an informal atmosphere. Examples of scholarly activities suitable for this poster session include expository work, preliminary reports, scholarship of teaching and learning, and research reports. Presenters should have their materials prepared in advance and will be provided with a self-standing, trifold tabletop poster approximately 48 in wide by 36 in high. Proposals should be submitted at www.maa.org/mathfest/abstracts. Questions regarding this session should be sent to the organizers.
Audrey Malagon, *Virginia Wesleyan College*
Jenny McNulty, *University of Montana*
MAA Committee on Early Career Mathematicians

GRADUATE STUDENT PAPER SESSION

Great Talks for a General Audience: Coached Presentations by Graduate Students

Saturday, August 6, 1:00 p.m. - 5:00 p.m., Madison

Presenters in this session must be graduate students. While many graduate students will be asked to give a lecture to an audience consisting of undergraduates and non-mathematicians (possibly as part of a job interview), most students do not have much experience talking to a non-research audience. This session gives graduate students the opportunity to give a 20-minute talk aimed at an undergraduate audience (speakers should assume the audience has been only exposed to calculus and possibly some linear algebra). Both the talks and abstracts should be designed to excite a wide range of undergraduates about mathematics. All participants in this session will receive private feedback on their presentations from an established faculty member and an undergraduate student. Contact a session organizer for help writing an abstract or preparing your talk for a general audience. Optional Q&A sessions with the organizers will be held at MathFest for presenters to receive feedback on their talks. Graduate student participants in this session should also attend the graduate student workshop (What's the Story?).

Organizers:
James Freeman, Cornell College
Rachel Schwell, Central Connecticut State University
Aliza Steurer, Dominican University
May Mei, Denison University

MAA Committee on Graduate Students

Undergraduate Student Activities

MAA-PME Student Reception

Wednesday, August 3, 4:30 p.m. - 5:30 p.m., Union D

Undergraduate students are invited to come for refreshments and a welcome to MathFest.

Math Jeopardy

Wednesday, August 3, 5:30 p.m. - 6:15 p.m., Union Station A, Columbus Convention Center

Answer: A fun undergraduate mathematics contest to lead off MathFest

Question: What is Mathematics Jeopardy?

Four teams of students will provide the questions to go with the mathematical answers in many categories. All interested students in the audience can enter their names to be chosen to play on one of the four teams of four players. There will be prizes for all the participants.

Come cheer for your favorite team. The session will be emceed by Michael Berry.

Organizers:
Robert W. Vallin, *Slippery Rock University*
Michael W. Berry, *University of Tennessee*

MAA Student Paper Sessions

Thursday, August 4, 8:30 a.m. - 11:25 a.m. and 2:00 p.m. - 6:15 p.m., Madison/Fayette/Clark/Champaign

Friday, August 5, 8:30 a.m. - 11:45 a.m. and 2:00 p.m. - 3:55 p.m. Madison

Students who wish to present at the MAA Student Paper Sessions at MathFest 2016 must be sponsored by a faculty advisor familiar with the work to be presented. Some funding to cover costs (up to $750) for student presenters is available. At most one student from each institution or REU can receive full funding; additional such students may be funded at a lower rate. All presenters are expected to take full part in the meeting and attend indicated activities sponsored for students on all three days of the conference. Abstracts and student travel grant applications should be submitted at www.maa.org/mathfest/abstracts. For additional information visit www.maa.org/students/undergrad.

Organizers:
Chasen Smith, *Georgia Southern University*
Theron Hitchman, *University of Northern Iowa*

Pi Mu Epsilon Student Paper Sessions

Thursday, August 4, 2:00 p.m. - 6:15 p.m., Knox/Marion/Morrow

Friday, August 5, 8:30 a.m. - 11:45 a.m. and 2:00 p.m. - 3:55 p.m., Knox/Marion/Morrow

Pi Mu Epsilon student speakers must be nominated by their chapter advisors. Application forms for PME student speakers will be available by March 1, 2016 on the PME web site www.pme-math.org. A PME student speaker who attends all the PME activities is eligible for transportation reimbursement up to $600, and additional speakers are eligible with a maximum $1200 reimbursement per chapter. PME speakers receive a free ticket to the PME Banquet with their conference registration fee. See the PME website for more details.

Organizer:
Darci Kracht, *Kent State University*

MAA Chan Stanek Lecture for Students

Zombies & Calculus: A Survival Guide
Thursday, August 4, 1:00 p.m. - 1:50 p.m., Regency Ballroom
Colin Adams, *Williams College*
If you are reading this, then you have managed to survive the zombie apocalypse so far. Congratulations! But as the world sinks further into ruin, what additional strategies can you apply to endure the onslaught? Learn how calculus can help you to defeat the zombie hordes. The lecture room will be will be certified a safe haven for the duration of the talk.

Undergraduate Student Activities (continued)

Speed Interviewing Marathon for Students

Thursday, August 4, 4:10 - 5:25 p.m., McKinley
Employers suggest that communication skills are a critical component when considering a mathematics major for a job. An important time to demonstrate good communication skills is during the job interview. This session for undergraduate students, graduate students and early career mathematicians will start with an overview of best practices and tips on job interviewing, then guide participants in several speed interviewing sessions of 10 minutes each, where they can practice what they have learned and hone their interviewing skills. Speed interviewing sessions will include individual feedback for participants, as well as opportunities to network with fellow interviewees.

Organizers:
Jenna Carpenter, *Campbell University*
Michael Dorff, *Brigham Young University*
Committee on Professional Development
Committee on Graduate Students
Committee on Undergraduate Student Activities and Chapters

Games Mathematicians Play

Friday, August 5, 1:00 p.m. - 1:50 p.m., Hayes
Christopher Swanson, *Ashland University*
A combinatorial game is a game between two opposing players who make alternate moves from some starting position with each player having a finite number of moves available and knowing all possible moves of both players. Furthermore, moves are not determined by chance and the game lasts at most a certain number of turns, with the result being a win for one player or a draw. Tic-Tac-Toe and Chess are two well-known combinatorial games. In analyzing combinatorial games, the basic question is who should win if two expert players play the game - the player who goes first, the player who goes second, or should the game end in a draw? In this student activity, audience members will play a number of combinatorial games and try to determine the answer to this basic question.

PANEL SESSION

Non-Academic Mathematical Career Paths for Undergraduates

Friday, August 5, 2:35 p.m. - 3:55 p.m., McKinley
Step one: earn a degree in mathematics. Step three: have a great career! What is step two? Whether you are a mathematics student looking for a job once you graduate or an advisor looking for advice to give to future job-seeking students, this session will help you gain new perspectives on nonacademic career experiences and what employers value in their employees. Panelists will share the paths to their current positions, the ways in which they utilize their mathematical background, and offer advice to others looking for employment in similar venues.

Organizers:
May Mei, *Dennison University*
Ben Galluzzo, *Shippensburg University*

Panelists:
Karla Dixon, *Abercrombie & Fitch*
Bruce Myers, *National Security Agency*
Derek Straiton, *Gahanna Lincoln High School*
Tony Hovest, *Motorists Insurance Group*
MAA Committee on Undergraduate Student Activities and Chapters

Undergraduate Student Activities (continued)

Estimathon!

Friday, August 5, 3:30 p.m. - 5:00 p.m., Taft A

They're called Fermi problems...

- How heavy is the Eiffel Tower?
- How many prime numbers have distinct digits?
- How many calories would you be eating if you had "one of everything" at the Cheesecake Factory?

If you're looking for a mindbending mixture of math and trivia, look no further! Jane Street Capital presents The Estimathon contest: teams will have 30 minutes to work on 13 problems, ranging from totally trivial to positively Putnamesque. Can your team beat the all-time best score?? The top teams will receive prizes!

As in past years, we will run 2 contests. Feel free to show up to either one! (Please show up 15 minutes before the start time of the contest you want to join.) Our target schedule is as follows:

- 4:00 pm. Welcome, overview of rules and scoring.
- 4:15 pm. Estimathon contest #1
- 5:00 pm. Estimathon contest #2

Organizer:

Andy Niedermaier, *Jane Street Capital*

Pi Mu Epsilon Banquet

Friday, August 5, 6:00 p.m. - 7:45 p.m., Franklin

All PME members and their supporters are welcome. See the registration form for more information on this ticketed event.

Pi Mu Epsilon J. Sutherland Frame Lecture

Combinatorics – The Mathematics That Counts

Friday, August 5, 8:00 p.m. - 8:50 p.m., Regency Ballroom

Robin Wilson, *Open University*

How many Sudoku puzzles are there? Are there 33 Londoners with the same number of hairs on their head? Can a knight visit all the squares of a chessboard just once? And can we tile a floor with squares and regular hexagons? These are all problems in combinatorics, the branch of mathematics concerned with selecting, arranging, counting and listing things. In this talk I shall illustrate the nature and uses of combinatorics by means of a number of entertaining problems.

MAA Ice Cream Social for Undergraduates

Friday, August 5, 9:00 p.m. - 10:00 p.m., McKinley

Besides cake and ice cream, we will recognize all students who gave talks in the MAA Student Paper Sessions, and award prizes for the best of them. All are invited.

MAA Mathematical Competition in Modeling (MCM) Winners

Saturday, August 6, 9:00 a.m. - 10:15 a.m., McKinley

About 400 American teams, each consisting of three undergraduates, entered the 2016 Mathematical Contest in Modeling in February. Teams choose one of two real(istic) problems. Teams have four days to deal with the MCM challenge and may use or access any inanimate source - computers, libraries, the Web, etc. MAA judges choose a winner for each problem. The two MAA winning teams of students will present their results of the MCM four-day challenge.

Organizer:

Ben Fusaro, *Florida State University*

Student Problem Solving Competition

Saturday, August 6, 1:00 p.m. - 2:15 p.m., Franklin A

This event is the finals of the Problem Solving Competition. Universities and colleges that participate monthly on their own campuses by holding problem solving contests are invited to send a contestant. Each contestant will be required to solve a series of mathematical problems. Based on the outcome, a champion along with 2nd through 6th place winners will be named.

Organizer:

Richard Neal, *American Society for the Communication of Mathematics*

K-12 Activities

The MAA strives to ensure that sessions at MAA MathFest present mathematics in a way that is accessible to a broad audience. As a result, K-12 teachers will find all the expository sessions at MAA MathFest to be informative and enriching. In addition, the following sessions are directed specifically at the professional interests of K-12 teachers. Register for the AMC 8 or AMC 10/12 Contest(s), and you're automatically enrolled as a K-12 Teacher Member. Invite your students to attend MAA MathFest 2016. The High School Student rate is only $49.

Math Teacher's Circle Demonstration

Saturday, 2:00 p.m. - 3:00 p.m., Morrow

Art Benjamin, *Harvey Mudd College*
A math circle is an enrichment experience that brings mathematics professionals in direct contact with pre-college students and/or their teachers. Circles foster passion and excitement for deep mathematics. This demonstration session offers the opportunity for conference attendees to observe and then discuss a math circle experience designed for local teachers. While teachers are engaged in a mathematical investigation, mathematicians will have a discussion focused on appreciating and better understanding the organic and creative process of learning that circles offer, and on the logistics and dynamics of running an effective circle.

Organizers:
Amanda Serenevy, *Riverbend Community Math Center*
Bob Klein, *Ohio University*
Tatiana Shubin, *San Jose State University*

Sponsor:
SIGMAA MCST

Math Wrangle

Saturday, August 6, 4:00 p.m. - 5:30 p.m., Morrow

Math Wrangle will pit teams of students against each other, the clock, and a slate of great math problems. The format of a Math Wrangle is designed to engage students in mathematical problem solving, promote effective teamwork, provide a venue for oral presentations, and develop critical listening skills. A Math Wrangle incorporates elements of team sports and debate, with a dose of strategy tossed in for good measure. The intention of the Math Wrangle demonstration at MAA MathFest is to show how teachers, schools, circles, and clubs can get students started in this exciting combination of mathematical problem solving with careful argumentation via public speaking, strategy and rebuttal.

Organizers:
Ed Keppelmann, *University of Nevada*
Paul Zeitz, *University of San Francisco*
Mark Saul, *American Math Competitions*

Sponsor:
SIGMAA MCST

Special Presentation for High School Students, Parents, and Teachers

The Astounding Mathematics of Bicycle Tracks
Saturday, 1:00 p.m. - 1:50 p.m., Hayes

James Tanton, MAA
Sir Arthur Conan Doyle asked a question: If you come across a pair of bicycle tracks in the snow, could you determine in which direction the bicycle went? He got the answer wrong! So let's ride a bicycle, look at its tracks, and get the answer right. Even though this puzzle is now classic in the mathematics community (thanks to the charming MAA book Which Way did the Bicycle Go?... and Other Intriguing Mathematical Mysteries by Konhauser, Velleman, and Wagon), there is still much more we can say and do with bicycle tracks, all leading to some astounding surprises for students, teachers, mathematicians, and math enthusiasts alike. Hold on to your wheels for this one! This is a general outreach lecture presented by James Tanton of the MAA and designed to inspire relevant and exciting mathematical thinking and doing for the high-school classroom. All are so welcome to attend!

Sponsored By:
Council on Outreach

Committee Meetings

Monday, August 1

Executive Committee Meeting
1:00 p.m. - 5:00 p.m., Clark

Meetings Management Committee Meeting
5:30 p.m. - 6:30 p.m., MAA Suite

Tuesday, August 2

Executive Committee Meeting
9:00 a.m. - 1:00 p.m., Clark

New Governors Orientation
3:00 p.m. - 5:30 p.m., Union E

Board of Governors Welcome Reception
7:00 p.m. - 9:00 p.m., MAA Suite

Wednesday, August 3

Board of Governors Meeting
8:30 a.m. - 5:00 p.m., Fairfield

Committee on Undergraduate Student Activities and Chapters
2:00 p.m. - 4:30 p.m., Eisenman (Columbus Conv. Center)

The Committee on Committees and Councils
5:00 p.m. - 6:30 p.m., MAA Suite

Thursday, August 4

Committee on Professional Development
9:00 a.m. - 10:00 a.m., Eisenman (Columbus Conv. Center)

Membership Committee
9:00 a.m. - 10:20 a.m., Nationwide A

Edith May Sliffe Award Committee
9:00 a.m. - 10:15 a.m., Nationwide B

Committee on Minicourses
9:30 a.m. - 10:30 a.m., Trott (Columbus Conv. Center)

Committee on Sections
12:30 p.m. - 2:30 p.m., Nationwide A

Membership Focus Group
2:00 p.m. - 5:00 p.m., Nationwide A

Committee on Journals
2:00 p.m. - 3:30 p.m., Eisenman (Columbus Conv. Center)

Council on Outreach
2:00 p.m. - 3:30 p.m., Trott (Columbus Conv. Center)

Committee on Books
3:30 p.m. - 5:00 p.m., Eisenman (Columbus Conv. Center)

Math Horizons Editorial Board
4:00 p.m. - 5:00 p.m., Trott (Columbus Conv. Center)

CPW - Committee on the Participation of Women in Mathematics
4:00 p.m. - 5:30 p.m., Nationwide A

Friday, August 5

Committee on Science Policy
8:00 a.m. - 9:00 a.m., Eisenman (Columbus Conv. Center)

Committee on Technologies in Mathematics Education
8:00 a.m - 9:15 a.m., Trott (Columbus Conv. Center)

Council on the Profession
8:00 a.m. - 9:15 a.m., Nationwide A

MAA FOCUS Editorial Board
8:30 a.m. - 9:30 a.m., Nationwide B

Editorial Manager Workshop
9:00 a.m. - 11:00 a.m., Ohio Center B (Columbus Conv. Center)

Committee on MAA/Department Liaisons
10:00 a.m. - 11:00 a.m., Eisenman (Columbus Conv. Center)

Committee on the Status of the Profession
10:00 a.m. - 11:00 a.m., Nationwide A

CRAFTY
10:00 a.m. - 11:30 a.m., Nationwide B

Math Horizons Undergraduate Focus Panel
11:00 a.m. - 1:00 p.m., Trott (Columbus Conv. Center)

Membership Focus Group
11:00 a.m. - 2:00 p.m., Nationwide A

Council on Members and Communities
1:30 p.m. - 3:00 p.m., Ohio Center B (Columbus Conv. Center)

Council on Meetings and Professional Development
2:00 p.m. - 3:30 p.m., Nationwide B

Council on Programs and Students
2:30 p.m. - 4:00 p.m., Nationwide A

Council of Publications
2:30 p.m. - 4:30 p.m., Eisenman (Columbus Conv. Center)

Committee Meetings (continued)

Please Note: All room locations are in the Hyatt Regency Columbus Hotel, unless otherwise specified.

Saturday, August 6

IP Guide Working Meeting
12:00 p.m. - 5:00 p.m., Champaign

Committee on the Undergraduate Program in Mathematics
1:00 p.m. - 3:00 p.m., Nationwide A

Sunday, August 7

IP Guide Working Meeting, Part 2
7:30 a.m. - 12:00 p.m., Champaign

SIGMAA Activities

BIO SIGMAA: The SIGMAA on Mathematical and Computational Biology

Contributed Paper Session: Undergraduate Research Activities in Mathematical and Computational Biology

Saturday, August 6, 1:00 p.m. - 2:15 p.m., Taft A

This session is dedicated to aspects of undergraduate research in mathematical and computational biology. First and foremost, this session would like to highlight research results of projects that either were conducted by undergraduates or were collaborations between undergraduates and their faculty mentors. Of particular interest are those collaborations that involve students and faculty from both mathematics and biology. Secondly, as many institutions have started undergraduate research programs in this area, frequently with the help of initial external funding, the session is interested in the process and logistics of starting a program and maintaining a program even after the initial funding expires. Important issues include faculty development and interdisciplinary collaboration, student preparation and selection, the structure of research programs, the acquisition of resources to support the program, and the subsequent achievements of students who participate in undergraduate research in mathematical and computational biology.

Timothy Comar, *Benedictine University*

SIGMAA MCST: The SIGMAA on Math Circles for Students and Teachers

Contributed Paper Session: My Favorite Math Circle Problem

Thursday, August 4, 1:00 p.m. - 5:15 p.m., Franklin C

A math circle is an enrichment activity for K-12 students or their teachers, which brings them into direct contact with mathematically sophisticated leaders, fostering a passion and excitement for deep mathematics in the participants. Math circles combine significant discovery and excitement about mathematics through problem solving and exploration. Talks in this session will address a favorite problem or topic that was successful with a math circle audience.

Katherine Morrison, *University of Northern Colorado*
Philip Yasskin, *Texas A&M University*

Math Teacher's Circle Demonstration

Saturday, August 6, 2:00 p.m. - 3:30 p.m., Morrow

Math Wrangle

Saturday, August 6, 4:00 p.m. - 5:30 p.m., Morrow

POM SIGMAA: The SIGMAA on the Philosophy of Mathematics

Reception

Thursday, August 4, 5:30 p.m. - 6:00 p.m., Union B

POM SIGMAA Guest Lecture

Potential Infinity: A Modal Account

Thursday, August 4, 6:00 p.m. - 7:00 p.m., Union B

Stewart Shapiro, *Ohio State University*

Beginning with Aristotle, almost every major philosopher and mathematician before the nineteenth century rejected the notion of the actual infinite. They all argued that the only sensible notion is that of potential infinity. The list includes some of the greatest mathematical minds ever. Due to Georg Cantor's influence, the situation is almost the opposite nowadays (with some intuitionists as notable exceptions). The received view is that the notion of a merely potential infinity is dubious: it can only be understood if there is an actual infinity that underlies it. After a sketch of some of the history, our aim to analyze the notion of potential infinity, in modal terms, and to assess its scientific merits. This leads to a number of more specific questions. Perhaps the most pressing of these is whether the conception of potential infinity can be explicated in a way that is both interesting and substantially different from the now-dominant conception of actual infinity. One might suspect that, when metaphors and loose talk give way to precise definitions, the apparent differences will evaporate. As we will explain, however, a number of differences still remain. Some of the most interesting and surprising differences concern consequences that one's conception of infinity has for higher-order logic. Another important question concerns the relation between potential infinity and mathematical intuitionism. We show that potential infinity is not inextricably tied to intuitionistic logic. There are interesting explications of potential infinity that underwrite classical logic, while still differing in important ways from actual infinity. However, we also find that on some more stringent explications, potential infinity does indeed lead to intuitionistic logic. (Joint work with Oystein Linnebo.)

SIGMAA Activities (continued)

SIGMAA QL: The SIGMAA on Quantitative Literacy

Panel Session: Quantitative Literacy at the Post–Secondary Level: Future Directions in Research
Thursday, August 4, 1:00 p.m. - 2:20 p.m., McKinley

SIGMAA TAHSM: The SiGMAA on Teaching Advanced High School Mathematics

Business Meeting and Reception
Friday, August 5, 5:30 p.m. - 6:30 p.m., Union B

WEB SIGMAA: The SIGMAA on Mathematics Instruction Using the WEB

Reception
Friday, August 5, 5:30 p.m. - 6:00 p.m., Union A

WEB SIGMAA Guest Lecture

Accessibility and WeBWorK: Online Homework for Everyone
Friday, August 5, 6:00 p.m. - 7:00 p.m., Union A
Geoff Goehle, *Western Carolina University*
Abstract. This talk describes changes that developers implemented to make sure WeBWorK meets accessability design standards, including support for keyboard navigation and screen readers. This is an ongo- ing project with three main components. The first is making sure that the WeBWorK interface is accessible. There has been a great deal of progress in this area and all of the WeBWorK pages visible to students meet current standards. The second is making sure that mathematical expressions formatted by WeBWorK are compatible with screen read- ers. There has been some progress in this area using MathJax. The third component is making sure that individual WeBWorK problems are written with accessibility in mind. This is the most challenging of the three components, but also the component where individual in- structors can have the biggest impact.

Congratulations

Congratulations to our MAA members celebrating 25 or more years of membership.

Please join your colleagues at the Closing Banquet on Saturday, August 6 at 6:00 p.m. Advance registration and ticket required to attend. Stop by Registration to sign up, if you have not already done so. Members celebrating 25 or 50 years will receive a special pin.

25 Years
Mark Bollman
Ruth Berger
Kiran Kedlaya
Christopher Swanson
Afshin Ghoreishi

26 Years
Paul Coe
Martha Abell
Jennifer Beineke
Clayton Brooks
Adam Coffman
Ockle Johnson
Glen Lobo
Edmund Lamagna
Abraham Mantell

27 Years
Michael Dorff
Julie Barnes
Timothy Comar
Sidney Graham
Colleen Livingston
Robert Molina
David Manderscheid
Jennifer Quinn
Virginia Watson
Robert Vallin
Stephen Bean

28 Years
Annalisa Crannell
J. Lehman
Susan Pustejovsky
Linda Van Niewaal
John Wierman
Colm Mulcahy
Hortensia Soto

29 Years
Patrick Headley
Aaron Montgomery
Colleen Vachuska
Edward Aboufadel
Jenna Carpenter
Michael Jones
Charles Lindsey
Sarah Mabrouk
Steven Schlicker

30 Years
James Beck
Diane Briars
Terrence Bisson
Dennis Collins
Pam Crawford
Barbara D'Ambrosia
Deanna Haunsperger
Gary Raduns
Randy Schwartz
Daniel Teague

Steven Wilkinson
Joe Yanik
Mohan Tikoo
Susan Schwartz Wildstrom
Crystal Lorch

31 Years
Colin Adams
Linda Becerra
Aparna Higgins
Edward Keppelmann
John Mayer
Karen Saxe
Ravi Vakil

32 Years
Arthur Benjamin
John Cade
David Dwyer
Richard Neidinger
Therese Shelton
Daniel Ullman
Elizabeth Yanik
Theresa Rahikka

33 Years
George Norton
Jay Schiffman
Peter Vachuska
Roman Wong
Daniel Hrozencik

34 Years
Wade Ellis
James Conklin
Fernando Gouvea
Stephen Davis
William Higgins
John Wilson
Michael Woltermann

35 Years
James Freeman
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Suzanne Doree

36 Years
G. Callon
Robert Devaney
Gregory Foley
John Frohliger
Bonnie Gold
Raymond Greenwell
Robert Megginson
Gary Richter

37 Years

Paul Flasch
C. Butler
David Housman
Jean Johnson
Robert Rogers

38 Years

Jeffrey Clark
Susan Colley
William Emerson
Barbara Faires
Gary Gordon

39 Years

Dan Kalman
James Carlson
James Daniel
Andrew Matchett
David Shannon
Bruce Yoshiwara

40 Years

Frank Morgan
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Theodore Sundstrom

41 Years

William Dunham
Gerard Venema
Virginia Buchanan
Penelope Dunham
Dennis Deturck
James Henle

Thomas Sibley
Michael Starbird

42 Years

Ezra Brown
Daniel Curtin
Patricia Kenschaft
Andrew Rich
Norman Richert
Douglas Shier
Kay Somers
Paul Zorn

43 Years

Charles Toll
Donald Stuber
Stephen Andrilli
Donna Beers
David Carothers
Lloyd Douglas
Jon Johnson

44 Years

Jean Chan
Catherine Aust
Joanne Dombrowski
Bruce Murrie

45 Years

Thomas Bengtson
Milton Eisner
Jonathan Kane
Steven Lay
Christine Shannon
Calvin Van Niewaal
Amy Cohen

46 Years

Thomas Banchoff
Joel Cohen
Francis Ford

Francis Jones
Kishore Marathe
Bostwick Wyman
Philip Yasskin

47 Years

James Blowers
Robert Eslinger
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49 Years

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50 Years

Chris Christensen

51 Years

Carl Spitznagel
Walter Stromquist
Brian Winkel

52 Years

Donald Quiring

53 Years

Daniel Kemp
Nancy Rodgers
David Smith

54 Years

Ronald Douglas
Joanne Peeples
Kenneth Williams

55 Years

Lowell Beineke
Bert Fristedt
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Subhash Saxena

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57 Years

Gerald Porter

59 Years

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60 Years

Kenneth Ross

61 Years

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62 Years

Bernard Fusaro

64 Years

Tyler Haynes

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The Icosahedron Society recognizes benefactors who have shown extraordinary generosity to the Mathematical Association of America.

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Social Events

Welcome to Columbus!

The Columbus Convention and Visitors Bureau, Experience Columbus, will have a staffed satellite desk available for MAA MathFest attendees in the Hyatt Regency Columbus Ballroom Foyer on the hotel's third floor, during most registration hours. Stop by the desk across from registration to pick up maps, local guides, Columbus touring ideas, make restaurant reservations, or ask for details about airport transportation options and local complimentary bus routes, to better explore all the city has to offer to visitors! Experience Columbus has also provided a map and an updated listing of the latest downtown restaurants, by neighborhood, and a "VIP" coupon list with attraction and entertainment discounts, and CBUS brochures included in your registration bags!

Get Ready for Chicago!

We look forward to seeing everyone in Chicago for next year's MAA MathFest, being held July 26-29 2017! Next year's conference will be held at the Hilton Chicago Hotel, which overlooks Lake Michigan, Grant Park and the Museum Campus- home of Shedd Aquarium, Field Museum, and the Adler Planetarium. Stop by the Hyatt Regency Columbus Ballroom Foyer, near the third floor MAA MathFest registration, to pick up a local guide provided by the Chicago Convention and Visitors Bureau, Choose Chicago, to start preparing for your 2017 Chicago visit.

WEDNESDAY, AUGUST 3

Math Jeopardy

Wednesday, August 3, 5:30 p.m. - 6:15 p.m., Union Station Ballroom A (Columbus Convention Center)

Answer: A fun undergraduate mathematics contest to lead off MAA MathFest

Question: What is Mathematics Jeopardy?

Four teams of students will provide the questions to go with the mathematical answers in many categories. All interested students in the audience can enter their names to be chosen to play on one of the four teams of four players. There will be prizes for all the participants.

Come cheer for your favorite team. The session will be emceed by Michael Berry.

Organizers:

Robert W. Vallin, *Slippery Rock University*

Michael W. Berry, *University of Tennessee*

Exhibit Hall & Grand Opening Reception

Wednesday, August 3, 6:00 p.m. - 8:00 p.m., Exhibit Hall / Battelle South

The MAA MathFest Grand Opening Reception will launch this year's MAA MathFest on a high note. This event is intended to draw attendees together in a spirit of camaraderie. While scientific sessions will still commence on Thursday, we warmly invite you to enjoy complimentary light hors d'oeuvres while you mix and mingle in the Exhibit Hall with other registered participants and guests, sponsors, and exhibitors.

MAA-PME Student Reception

Wednesday, August 3, 4:30 p.m. - 5:30 p.m., Union D
Undergraduate students are invited to come for refreshments and a welcome to MAA MathFest.

Undergraduate Student Activity

Games Mathematicians Play

Friday, August 5, 1:00 p.m. - 1:50 p.m., Hayes

Christopher Swanson, *Ashland University*
A combinatorial game is a game between two opposing players who make alternate moves from some starting position with each player having a finite number of moves available and knowing all possible moves of both players. Furthermore, moves are not determined by chance and the game lasts at most a certain number of turns, with the result being a win for one player or a draw. Tic-Tac-Toe and Chess are two well-known combinatorial games. In analyzing combinatorial games, the basic question is who should win if two expert players play the game - the player who goes first, the player who goes second, or should the game end in a draw? In this student activity, audience members will play a number of combinatorial games and try to determine the answer to this basic question.

THURSDAY, AUGUST 4

POM SIGMAA Reception

Thursday, August 4, 5:30 p.m. - 6:00 p.m., Union B

Graduate Student Reception

Thursday, August 4, 5:30 p.m. - 6:30 p.m., Peppercorn
Graduate students are invited for some refreshments and to meet several of the invited speakers.

Organizer:

Estela A. Gavosto, *University of Kansas*
James Freeman, *Cornell College*

NSA's WIMS Networking Session

Thursday, August 4, 6:00 p.m. - 8:00 p.m.
Stop by NSA booth in the Exhibit Hall for more information.

Social Events (continued)

FRIDAY, AUGUST 5

ECM Mentoring Network Social

Friday, August 5, 5:30 p.m. - 7:30 p.m., Peppercorn

The Committee on Early Career Mathematicians (ECM) will host its inaugural mentoring network social from 5:30-7:30 pm in the Peppercorn Room, immediately following PosterFest on Friday, August 5th. The social is open to mentors and mentees already in the MAA Mentoring Network, as well as all those interested in joining the Mentoring Network. Early-career mathematicians are especially encouraged to attend - refreshments will be provided along with a cash bar.

Organizer:
Audrey Malagon, *Virginia Wesleyan College*

SIGMAA TAHSM Business Meeting and Reception

Friday, August 5, 5:30 p.m. - 6:30 p.m., Union B

WEB SIGMAA Reception

Friday, August 5, 5:30 p.m. - 6:00 p.m., Union A

WEB SIGMAA Guest Lecture

Accessibility and WeBWorK: Online Homework for Everyone
Friday, August 5, 6:00 p.m. - 7:00 p.m., Union A
Geoff Goehle, *Western Carolina University*

Estimathon!

Friday, August 5, 3:30 p.m. - 5:00 p.m., Taft A
They're called Fermi problems...
* How heavy is the Eiffel Tower?
* How many prime numbers have distinct digits?
* How many calories would you be eating if you had "one of everything" at the Cheesecake Factory?

If you're looking for a mindbending mixture of math and trivia, look no further! Jane Street Capital presents The Estimathon contest: teams will have 30 minutes to work on 13 problems, ranging from totally trivial to positively Putnamesque. Can your team beat the all-time best score?? The top teams will receive prizes!

As in past years, we will run 2 contests. Feel free to show up to either one! (Please show up 15 minutes before the start time of the contest you want to join.) Our target schedule is as follows:
* 4:00 pm. Welcome, overview of rules and scoring.
* 4:15 pm. Estimathon contest #1
* 5:00 pm. Estimathon contest #2

Organizer:
Andy Niedermaier, *Jane Street Capital*

Pi Mu Epsilon Banquet

Friday, August 5, 6:00 p.m. - 7:45 p.m., Franklin
All PME members and their supporters are welcome. See the registration form for more information on this ticketed event.

MAA Ice Cream Social For Undergraduates

Friday, August 5, 9:00 p.m. - 10:00 p.m., McKinley
Besides cake and ice cream, we will recognize all students who gave talks in the MAA Student Paper Sessions, and award prizes for the best of them. All are invited.

Strawberry Fields in Columbus?

The Greater Columbus Convention Center's Strawberry Fields cart brings out the kid in all of us! Strawberry Fields, and its owner Monica, have quickly become a guest favorite at the Convention Center. Daily offerings include made to order smoothies, frozen lemonade, fresh popped kettle corn, cotton candy, roasted nuts and Bavarian pretzels. Prices range from $4-$6 per item. Take advantage of the tables in the MAA MathFest Exhibit Hall in Battelle South, accessible from the third floor Hyatt Regency Columbus Ballroom Foyer, near registration, and sit back and relax with fellow attendees to enjoy some favorite American snacks! Look for the colorful Strawberry Fields cart between 11:00 AM and 4:00 PM Thursday and Friday in the Exhibit Hall.

Meet Attendees and Exhibitors and Enjoy Breakfast, Coffee and Lunch in the Exhibit Hall

Plenty of seating is available in the Battelle South Exhibit Hall, which is accessible from the Hyatt Regency Columbus Ballroom Foyer, on the third floor, during Hall hours. Join other attendees' tables and network, whenever taking breaks from education sessions, or stroll through the exhibitors' booths and discover all the Exhibit Hall has to offer, including the MAA Pavilion. The Concession stand will be open Thursday, Friday and Saturday, with a variety of breakfast, snack and lunch offerings available for sale, including fresh salads and sandwiches. Coffee breaks will also be available in the Exhibit Hall- please check our Exhibit pages for more details.

Social Events (continued)

SATURDAY, AUGUST 6

Math Wrangle

Saturday, August 6, 4:00 p.m. - 5:30 p.m., Morrow

Math Wrangle will pit teams of students against each other, the clock, and a slate of great math problems. The format of a Math Wrangle is designed to engage students in mathematical problem solving, promote effective teamwork, provide a venue for oral presentations, and develop critical listening skills. A Math Wrangle incorporates elements of team sports and debate, with a dose of strategy tossed in for good measure. The intention of the Math Wrangle demonstration at MAA MathFest is to show how teachers, schools, circles, and clubs can get students started in this exciting combination of mathematical problem solving with careful argumentation via public speaking, strategy and rebuttal.

Organizers:

Ed Keppelmann, *University of Nevada*

Paul Zeitz, *University of San Francisco*

Mark Saul, *American Math Competitions*

SIGMAA MCST

Closing Banquet Reception

Saturday, August 6, 6:00 p.m. - 6:30 p.m., Franklin Foyer

Closing Banquet

Tom Lehrer Sing–along
Saturday, August 6, 6:30 p.m. - 9:00 p.m., Franklin

Master of Ceremonies

Art Benjamin, *Harvey Mudd College*
Ezra Brown, *Virginia Tech*
After Dinner: Bud Brown (at the piano) and Art Benjamin will sing favorite songs by mathematician/political satirist Tom Lehrer, including many that have a mathematical flavor to them, such as New Math, Lobachevsky, The Elements, and That's Mathematics. Song lyrics will be projected and the audience will be invited to sing along.

See the registration form for more information on this ticketed event.

Food and Beverage in the Exhibit Hall

Battelle South Concession Stand
(Breakfast, snacks and lunch for purchase)
Thursday, August 4: 9:00 am-3:00 pm
Friday, August 5: 9:00 am-3:00 pm
Saturday, August 6: 9:00 am-12:00 pm

Strawberry Fields Cart
(Snacks and smoothies for purchase)
Thursday, August 4: 11:00 am-4:00 pm
Friday, August 5: 11:00 am-4:00 pm

Coffee Breaks
(Complimentary)
Thursday, August 4: 10:00-10:30 am, 3:00-3:30 pm
Friday, August 5: 10:00-10:30 am, 3:00-3:30 pm
Saturday, August 6: 10:00-10:30 am

Wednesday, August 3

Registration
1:00 p.m. - 8:00 p.m., Regency Foyer

SOCIAL EVENT
PME-MAA Student Reception
4:30 p.m. - 5:30 p.m., Union D

SOCIAL EVENT
Math Jeopardy
5:30 p.m. - 6:15 p.m., Union Station Ballroom 1 (Columbus Conv. Ctr.)

SOCIAL EVENT
Exhibit Hall & Grand Opening Reception
6:00 p.m. - 8:00 p.m., Battelle South

Thursday, August 4

Registration
8:00 a.m. - 5:00 p.m., Regency Foyer

INVITED ADDRESS
MAA Invited Address
Mathematical Sense and Nonsense outside the Classroom: How Well Are We Preparing Our Students to Tell the Difference?
8:30 a.m. - 9:20 a.m., Regency Ballroom
Robert Megginson, *University of Michigan*

INVITED PAPER SESSION
Knot Theory, Part A
8:30 a.m. - 9:50 a.m., Fairfield

Turning Knots into Flowers: Petal Number and Related Problems
8:30 a.m. - 8:50 a.m.
Colin Adams, *Williams College*

Knot Mathematical Fiddlestix: An Introduction to Lattice Knots
9:00 a.m. - 9:20 a.m.
Jennifer McLoud-Mann, *University of Washington, Bothell*

Problems Related to Spanning Surfaces of Knots
9:30 a.m. - 9:50 a.m.
Cynthia Curtis, *College of New Jersey*

THEMED CONTRIBUTED PAPER SESSION
TCPS 5. Inviting All Students to Do Mathematics – Engaging Courses, Projects, & Activities for Liberal Arts Students, Part A
8:30 a.m. - 10:05 a.m., Union B

Pascal, Rascals and Inquiry
8:30 a.m. - 8:45 a.m.
Philip Hotchkiss, *Westfield State University*

Mathematics around Central Field-Trips
8:50 a.m. - 9:05 a.m.
Brandy Wiegers, *Central Washington University*

How I Spent My Summer Vacation or How to Plan and Organize a Math Study Abroad
9:10 a.m. - 9:25 a.m.
Pamela Peters, *San Juan College*
Lisa Ruffier, *San Juan College*

Making Polynomials Fun for All via Polynomiography
9:30 a.m. - 9:45 a.m.
Bahman Kalantari, *Rutgers University*

Puzzles + Games = Analytical Thinking
9:50 a.m. - 10:05 a.m.
Edmund Lamagna, *University of Rhode Island*

GENERAL CONTRIBUTED PAPER SESSION
Geometry
8:30 a.m. - 10:25 a.m., Union D

Perturbing Isolated Points of Algebraic Space Curves
8:30 a.m. - 8:40 a.m.
Adam Coffman, *Indiana University - Purdue University Fort Wayne*
Jiří Lebl, *Oklahoma State University*

Deriving Formulas for the Perfect 19-Sided Enneadecagon
8:45 a.m. - 8:55 a.m.
Genghmun Eng, *FFRDC Retired Scientist*

Geometry through Guided Inquiry
9:00 a.m. - 9:10 a.m.
David M. Clark, *SUNY New Paltz*

Take a Ride on the Parallel Transport
9:15 a.m. - 9:25 a.m.
Jeff Johannes, *SUNY Geneseo*

Deriving the Finite Geometry of Pappus from a Simpler Set of Axioms
9:30 a.m. - 9:40 a.m.
Stephen Andrilli, *La Salle University*

Defining the Energy of a Knot
9:45 a.m. - 9:55 a.m.
Richard G. Ligo, *University of Iowa*

Thursday, August 4 (continued)

Special Polynomials and Minimal Surfaces
10:00 a.m - 10:10 a.m.
Peter Connor, *Indiana University South Bend*

A Trisectrix from a Carpenter's Square
10:15 a.m. - 10:25 a.m.
David Richeson, *Dickinson College*

GENERAL CONTRIBUTED PAPER SESSION
Linear & Abstract Algebra

8:30 a.m. - 10:25 a.m., Union E

A Useful Shortcut for Computing (Some) Matrix Determinants and Inverses
8:30 a.m. - 8:40 a.m.
Aaron M. Montgomery, *Baldwin Wallace University*

A Classification of Small Operators Using Graph Theory
8:45 a.m. - 8:55 a.m.
Jonathan Lopez, *Canisius College*
Terrence Bisson, *Canisius College*

Matrix Differential Equations: Noncommutative Variation of Parameters
9:00 a.m. - 9:10 a.m.
Andrew K. Greene, *Manhattan College*

The Structure of a Polynomial Ring R[x] and R[x,sigma,delta] Relative to the Structure of R
9:15 a.m. - 9:25 a.m.
Irawati Irawati, *Institut Teknologi Bandung*

When is a Polynomial Isomorphic to an Even Polynomial?
9:30 a.m. - 9:40 a.m.
Chad Awtrey, *Elon University*
James Beuerle, *Elon University*
Michael Keenan, *Elon University*

Density of a Normal Subgroup of the Invertibles in Certain Multiplier Algebras
9:45 a.m. - 9:55 a.m.
Tracy Robin, *University of Louisiana at Lafayette*

Permutation Groups and Sliding Disk Puzzles
10:00 a.m. - 10:10 a.m.
Lee Raney, *University of North Alabama*

Pancake Worlds
10:15 a.m. - 10:25 a.m.
Charles Buehrle, *Franklin & Marshal College*

UNDERGRADUATE STUDENT ACTIVITY
MAA Student Paper Session #1

8:30 a.m. - 10:25 a.m., Madison

MAA Student Paper Session #2

8:30 a.m. - 10:25 a.m., Fayette

MAA Student Paper Session #3

8:30 a.m. - 10:25 a.m., Clark

MAA Student Paper Session #4

8:30 a.m. - 10:25 a.m., Champaign

MAA MathFest 2016 Exhibit Hall

9:00 a.m. - 5:00 p.m., Battelle South

INVITED ADDRESS
AMS-MAA Joint Invited Address

Understanding Geometry (and Arithmetic) through Cutting and Pasting
9:30 a.m. - 10:20 a.m., Regency Ballroom
Ravi Vakil, *Stanford University*

INVITED ADDRESS
Earle Raymond Hedrick Lecture Series

Hedrick Lecture 1. The Group Law on Elliptic Curves
10:30 a.m. - 11:20 a.m., Regency Ballroom
Hendrik Lenstra, *Universiteit Leiden*

OTHER MATHEMATICAL SESSION
MAA Prize Session

11:35 a.m. - 12:15 p.m., Regency Ballroom

INVITED ADDRESS
The Jean Bee Chan and Peter Stanek Lecture for Students

Zombies & Calculus: A Survival Guide
1:00 p.m. - 1:50 p.m., Regency Ballroom
Colin Adams, *Williams College*

Thursday, August 4 (continued)

PANEL SESSION
Quantitative Literacy at the Post-Secondary Level: Future Directions in Research

1:00 p.m. - 2:20 p.m., McKinley

THEMED CONTRIBUTED PAPER SESSION
TCPS 1. Fostering a Problem-Solving Culture for Students

1:00 p.m. - 4:15 p.m., Taft A

Creating a Culture of Engagement
1:00 p.m. - 1:15 p.m.
Heidi Hulsizer, *Benedictine College*

Undergraduate Involvement in Problem Solving at Youngstown State University
1:20 p.m. - 1:35 p.m.
George T. Yates, *Youngstown State University*

The Great Escape: Undergraduate Problem Solving for Freedom
1:40 p.m. - 1:55 p.m.
Elizabeth A. Peitz, *University of Central Florida*

Dead Poets Society
2:00 p.m. - 2:15 p.m.
Ron Taylor, *Berry College*
Robert Vallin, *Lamar Unviersity*

Reflections on a Puzzle–Themed Scavenger Hunt
2:20 p.m. - 2:35 p.m.
Andrew Penland, *Western Carolina University*

Student Problem Solving at Math Club Meetings: You Don't Have To Do It Alone
2:40 p.m. - 2:55 p.m.
Julie Barnes, *Western Carolina University*

Evolution of a Problem–Solving Culture: One Department's Experience
3:00 p.m. - 3:15 p.m.
J. Lyn Miller, *Slippery Rock University*

How to Create it, How to Solve it, and What to do with it: A Problem–Posing Primer
3:20 pm. - 3:35 p.m.
Greg Oman, *University of Colorado, Colorado Springs*

Designing an Introductory Seminar to Encourage Problem Solving in Mathematics
3:40 p.m. - 3:55 p.m.
Laurie Zack, *High Point University*

What I Learned and What I Hope Students Learned from Running a Problem Solving Seminar
4:00 p.m. - 4:15 p.m.
Nicholas Long, *Stephen F. Austin State University*

MINICOURSE
Minicourse 2. Visualizing Projective Geometry through Photographs and Perspective Drawings, Part A

1:00 p.m. - 3:00 p.m., Taft B

THEMED CONTRIBUTED PAPER SESSION
TCPS 10. Recreational Mathematics: Puzzles, Card Tricks, Games, Game Shows, and Gambling, Part A

1:00 p.m. - 3:55 p.m., Taft C

Using Algebra to Solve Two Popular Puzzles That Aren't Sudoku
1:00 p.m. - 1:15 p.m.
Stephen Adams, *Cabrini University*

Locker Lotto
1:20 p.m. - 1:35 p.m.
Ying Zhou, *Rhode Island College*
Walter G. Gall, *Rhode Island College*

Mathematical Strategies for the Game of SET ®
1:40 p.m. - 1:55 p.m.
Anne Quinn, *Edinboro University of Pennsylvania*

An Analysis of Sorry!
2:00 p.m. - 2:15 p.m.
Gordon A. Swain, *Ashland University*

Chutes and Ladderless
2:20 p.m. - 2:35 p.m.
Darren Glass, *Gettysburg College*
Jonathan Needleman, *Le Moyne College*
Stephen Lucas, *James Madison University*

Risk and War: Is A Good Offense the Best Defense?
2:40 p.m. - 2:55 p.m.
Flavia Sancier–Barbosa, *Antioch College*

Strategic Placement in *Ticket to Ride*©
3:00 p.m. - 3:15 p.m.
Kimberly Jordan Burch, *Indiana University of Pennsylvania*
Rachelle Bouchat, *Indiana University of Pennsylvania*
Derek Hanely, *Indiana University of Pennsylvania*
Mitchell Ponchione, *Indiana University of Pennsylvania*
Aaron Werner, *Indiana University of Pennsylvania*

The Topology of Knight's Tours on Surfaces
3:20 p.m. - 3:35 p.m.
Bradley Forrest, *Stockton University*
Kara Teehan, *Rutgers University*

Two–Player Games on Arithmetic Expressions, Graphs and Checkerboards
3:40 p.m. - 3:55 p.m.
Sarang Aravamuthan, *Tata Consultancy Services*

Thursday, August 4 (continued)

MINICOURSE
Minicourse 4. Teaching the Lebesgue Integral to Undergraduates

1:00 p.m. - 3:00 p.m., Taft D

THEMED CONTRIBUTED PAPER SESSION
TCPS 4. CAMP: Calculus Applied Mathematics Projects

1:00 p.m. - 3:55 p.m., Franklin A

Travel Inspired Projects
1:00 p.m. - 1:15 p.m.
Ellen Swanson, *Centre College*

The Calculus of New York City's Subways
1:20 p.m. - 1:35 p.m.
Jared Warner, *Guttman Community College*

Complex, Technology–Based Problems in Calculus Equations
1:40 p.m. - 1:55 p.m.
Brian Winkel, *Emeritus of US Military Academy, West Point NY and Director of SIMIODE*

Using Group Projects to Extend Coverage
2:00 p.m - 2:15 p.m.
Stepan Paul, *University of California Santa Barbara*

Cookies and Cars in Calculus
2:20 p.m. - 2:35 p.m.
Stacy Hoehn, *Franklin College*

Calculus in Clinical Medicine: Using the Campus Simulation Center to Motivate and Apply Calculus
2:40 p.m. - 2:55 p.m.
Melissa Stoner, *Salisbury University*

Removing Distortion in Star Images with Calculus
3:00 p.m. - 3:15 p.m.
Christina Selby, *Rose-Hulman Institute of Technology*

Gravity with First Year Calculus
3:20 pm. - 3:35 p.m.
Jerry D. Schermerhorn, *Owens Community College*

The "Force" of Interest
3:40 p.m. - 3:55 p.m.
Victor Piercey, *Ferris State University*

THEMED CONTRIBUTED PAPER SESSION
TCPS 6. My Favorite Math Circle Problem

1:00 p.m. - 5:15 p.m., Franklin C

Tiling with Pentagons
1:00 p.m. - 1:15 p.m.
Judith Covington, *LSU Shreveport*

The Check Is in the Mail
1:20 p.m. - 1:35 p.m.
Mary Garner, *Kennesaw State University*
Virginia Watson, *Kennesaw State University*

Measuring Up: Perfect Rulers
1:40 p.m. - 1:55 p.m.
Chris Bolognese, *Columbus Academy*
Raj Shah, *Math Plus Academy*

First Survey of National Association of Math Circles
2:00 p.m. - 2:15 p.m.
Diana White, *University of Colorado Denver, NAMC*
Brandy S. Wiegers, *Central Washington University, NAMC*

Using Tools to Communicate in a Math Teachers' Circle
2:20 p.m. - 2:35 p.m.
Sandra Richardson, *National Science Foundation*

Making Infinitely Many Mistakes Deliberately –– Iteration
2:40 p.m. - 2:55 p.m.
Robert Sachs, *George Mason University*

Fractals: Theory, Application– and Business Cards?
3:00 p.m. - 3:15 p.m.
Douglas B. Meade, *University of South Carolina*

Stimulating Math Curriculum for Students from Challenging Socio–Economic Backgrounds
3:20 p.m. - 3:35 p.m.
Alessandra Pantano, *University of California, Irvine*

Visualize the Two Conjugate Complex Roots for Quadratic Equations
3:40 p.m. - 3:55 p.m.
Li Feng, *Albany State University*
Janis T. Carthon, *Albany State University*
Courtney L. Brown, *Albany State University*

Projective Geometry Hidden Inside: Can You Spot It?
4:00 p.m. - 4:15 p.m.
Thomas Clark, *Dordt College*

The Mathematics of Shidoku
4:20 p.m. - 4:35 p.m.
Crystal Lorch, *Ball State University*
John Lorch, *Ball State University*

Pirate Zombie Math
4:40 p.m. - 4:55 p.m.
Angie Hodge, *University of Nebraska Omaha*

Thursday, August 4 (continued)

Discussion
4:55 p.m. - 5:15 p.m.
Diana White, *NAMC*
Brianna Donaldson, *AIM*

THEMED CONTRIBUTED PAPER SESSION
TCPS 9. Novel Introductions to Non-Euclidean Geometry

1:00 p.m. - 2:55 p.m., Union A

Bending Students' Intuition
1:00 p.m. - 1:15 p.m.
Thomas Q. Sibley, *St. John's University, College of St. Benedict*

Concrete Conics and Pencils in Projective Geometry
1:20 p.m. - 1:35 p.m.
Michael Hvidsten, *Gustavus Adolphus College*

Explorations Using Cinderella
1:40 p.m. - 1:55 p.m.
Ruth I. Berger, *Luther College*

Introducing Spacetime Geometry: Relativity on Rotated Graph Paper
2:00 p.m. - 2:15 p.m.
Roberto Salgado, *University of Wisconsin La Crosse*

Discussion
2:20 p.m. - 2:55 p.m.

WORKSHOP
What's the Story? A Graduate Student Workshop on Formulating a Research Presentation for a General Audience

1:00 p.m. - 2:20 p.m., Union C

GENERAL CONTRIBUTED PAPER SESSION
Applied Mathematics

1:00 p.m. - 4:55 p.m., Union D

Mathematical and Computational Modeling of Anaesthetic–Induced Neural Oscillations
1:00 p.m. - 1:10 p.m.
Israel Ncube, *Alabama A&M University*

A Spatial Model for the Conservation of Sheepshead (Archosargus Probatocephalus)
1:15 p.m. - 1:25 p.m.
Leslie Jones, *University of Tampa*
Bridgette Froeschke, *University of Tampa*

Unified, Simpler and Time Saving Solution of a Polar Vector Equation by the Method of Vector Rotation
1:30 p.m. - 1:40 p.m.
Narasimha S. Malladi, *Malladi Academy*

Gödel Metric & the Penrose Interpretation of Gravitizing Quantum Mechanics
1:45 p.m. - 1:55 p.m.
Patrick M. Lank, *University of Massachusetts - Lowell*

Toward Generalized Gravity
2:00 p.m. - 2:10 p.m.
Dennis G. Collins *UPR-Mayaguez*

Investigations in Star Formation: A Model to Consider in a First Course in Partial Differential Equations
2:15 p.m. - 2:25 p.m.
Lisa Holden, *Northern Kentucky University*

Project Based Learning via Density Functional Theory
2:30 p.m. - 2:40 p.m.
Barry C. Husowitz, *Wentworth Institute of Technology*

An Optimal Domain Decomposition Algorithm for Non–symmetric Problem
2:45 p.m. - 2:55 p.m.
Lopamudra Chakravarty, *Kent State University*

Nonoscillatory Solutions of Two Dimensional Nonlinear Dynamical Systems with Delay
3:00 p.m. - 3:10 p.m.
Ozkan Ozturk, *Missouri University of Science and Technology*
Elvan Akin, *Missouri University of Science and Technology*

"You've Never Heard of the Millennium Falcon?": Steering Han Solo's Spacecraft Using Chaos Control
3:15 p.m. - 3:25 p.m.
Matthew A. Morena, *Young Harris College*

Improved Laplace Decomposition Method For Solving Nonlinear Initial Value Problems
3:30 p.m. - 3:40 p.m.
Johnson A. Osilaguin, *University of Lagos*

Considering the Circular Cascade
3:45 p.m. - 3:55 p.m.
Denver Stahl, *Washington & Jefferson College*

An Immersed Interface Flux Recovery Method for Parabolic Equations
4:00 p.m. - 4:10 p.m.
Champike Attanayake, *Miami University*

Constructing a Solution for the Dynamic Programming Equation
4:15 p.m. - 4:25 p.m.
Jesus A. Pascal, *American University of Afghanistan*

Thursday, August 4 (continued)

SIMIODE A Community for Teaching Modeling First Differential Equations
4:30 p.m. - 4:40 p.m.
Brian Winkel, *Emeritus of US Military Academy, West Point NY and Director of SIMIODE*

An Exact Solution for the Cubic-Quintic Duffing Oscillator
4:45 p.m. - 4:55 p.m.
William R. Fuller, *Ohio Northern University*
Nathan Knodel, *Ohio Northern University*

GENERAL CONTRIBUTED PAPER SESSION
Teaching Calculus
1:00 p.m. - 4:55 p.m., Union E

Implementing Pre-Class Readings in Calculus
1:00 p.m. - 1:10 p.m.
Houssein El Turkey, *University of New Haven*
Salam Turki, *Rhode Island College*

Reviewing Precalculus in Calculus: Integrated vs. Beginning of Course
1:15 p.m. - 1:25 p.m.
Kimberly Roth, *Juniata College*
Henry Escuadro, *Juniata College*

Flipping the Calculus Course (Not the Class!)
1:30 p.m. - 1:40 p.m.
Robert Rogers, *SUNY Fredonia*
Eugene Boman, *Penn State - Harrisburg*

Flipping the Calculus Classroom - Blended Learning as an Instructional Approach
1:45 p.m. - 1:55 p.m.
Kara Teehan, *Rutgers University*

Going Deeper: An Interactive Approach to Studying Calculus (or Other Math)
2:00 p.m. - 2:10 p.m.
Karen McCready, *King's College*

Faculty Chair
2:15 p.m. - 2:25 p.m.
Louis Freese, *DeVry University*

Highlighting Mindset and Self-Regulation in Calculus
2:30 p.m. - 2:40 p.m.
Rachel Weir, *Allegheny College*

A Course Innovation Initiative Proposal for Our Calculus I
2:45 pm. - 2:55 p.m.
Linda Becerra, *University of Houston - Downtown*

Introducing MYMathApps Calculus
3:00 p.m. - 3:10 p.m.
Philip B. Yasskin, *Texas A&M University*

Calculus with Ximera: Building an Open-Source Interactive Calculus Textbook with LaTeX
3:15 p.m. - 3:25 p.m.
Bart Snapp, *The Ohio State University*

Using SageMathCloud Worksheets to Facilitate Computational Thinking and Collaboration in Calculus
3:30 p.m. - 3:40 p.m.
James Quinlan, *University of New England*

Newton's Square Roots of Power Series Functions
3:45 p.m. - 3:55 p.m.
Lee N. Collins, *County College of Morris*

The Attitudes of Students in Calculus of Life Science Toward Mathematics in Their Careers
4:00 p.m. - 4:10 p.m.
Yanping Ma, *Loyola Marymount University*
Christina Eubanks-Turner, *Loyola Marymount University*

Preparing Future Faculty to Teach Mathematics Meaningfully
4:15 p.m. - 4:25 p.m.
Stacy Musgrave, *California State Polytechnic University, Pomona*
Marilyn P. Carlson, *Arizona State University*

A New Application of the Markowitz Optimal Portfolio Theory and Its Efficient Frontier
4:30 p.m. - 4:40 p.m.
Gregory V. Bard, *University of Wisconsin - Stout*

Cross Countries Comparison of the Calculus Education for STEM, Students
4:45 p.m. - 4:55 p.m.
Serge Yaskolko, *South University*
Genady Ya Gabarnik, *St. John's University*
Luiza Kim-Tyan, *MIS&S*

INVITED PAPER SESSION
Knot Theory, Part B
2:00 p.m. - 4:20 p.m., Fairfield

Rope Magic and Topology
2:00 p.m. - 2:20 p.m.
Louis Kauffman, *University of Illinois, Chicago*

Accessible Problems for Undergraduates in Knot Coloring
2:30 p.m. - 2:50 p.m.
Candice Price, *Sam Houston State University*

Thursday, August 4 (continued)

Computer Algorithms for Counting Knot Mosaics
3:00 p.m. - 3:20 p.m.
Lew Ludwig, *Denison University*

Gamifying Knot Theory
3:30 p.m. - 3:50 p.m.
Jennifer Townsend, *Bellevue College*

Unknotting Knots
4:00 p.m. - 4:20 p.m.
Allison Henrich, *Seattle University*

INVITED PAPER SESSION
The Mathematics of Games

2:00 p.m. - 3:50 p.m., Harrison

Recent Advances in Game Design
2:00 p.m. - 2:20 p.m.
David Pettey, *Susquehanna International Group*

Solving Poker–Like Games
2:30 p.m. - 2:50 p.m.
Bill Chen, *Susquehanna International Group*

Richman Games
3:00 p.m. - 3:20 p.m.
Daniel Loeb, *Susquehanna International Group*

Misère Russian Roulette (with Multiple Revolvers)
3:30 p.m. - 3:50 p.m.
Michael Catalano–Johnson, *Susquehanna International Group*

UNDERGRADUATE STUDENT ACTIVITY
MAA Student Paper Session #5

2:00 p.m. - 3:55 p.m., Madison

MAA Student Paper Session #6

2:00 p.m. - 3:55 p.m., Fayette

MAA Student Paper Session #7

2:00 p.m. - 3:55 p.m., Clark

MAA Student Paper Session #8

2:00 p.m. - 3:55 p.m., Champaign

UNDERGRADUATE STUDENT ACTIVITY
PME Student Paper Session #1

2:00 p.m. - 3:55 p.m., Knox

PME Student Paper Session #2

2:00 p.m. - 3:55 p.m., Marion

PME Student Paper Session #3

2:00 p.m. - 3:55 p.m., Morrow

PANEL SESSION
Active Learning Approaches in Mathematics Instruction: Practice and Assessment Symposium

Thursday, August 4, 2:35 p.m. - 3:55 p.m., Hayes

PANEL SESSION
How to Apply for jobs in Academia and Industry after Your PhD

Thursday, August 4, 2:35 p.m. - 3:55 p.m., McKinley

WORKSHOP
Teaching an Introduction to the Mathematics of Computer Graphics

Thursday, August 4, 2:35 p.m. - 3:55 p.m., Union C

MAA Section Officers Meeting

Thursday, August 4, 3:00 p.m. - 5:00 p.m., Franklin B

MINICOURSE
Minicourse 3. Teaching Linear Algebra: Learning Concepts Often Difficult to Understand, Part A

3:30 p.m. - 5:30 p.m., Taft B

MINICOURSE
Minicourse 5. Teaching Modeling First Differential Equations - Building Community in SIMIODE

3:30 p.m. - 5:30 p.m., Taft D

UNDERGRADUATE STUDENT ACTIVITY
MAA Student Paper Session #9

4:00 p.m. - 6:15 p.m., Madison

MAA Student Paper Session #10

4:00 p.m. - 6:15 p.m., Fayette

MAA Student Paper Session #11

4:00 p.m. - 6:15 p.m., Clark

MAA Student Paper Session #12

4:00 p.m. - 6:15 p.m., Champaign

UNDERGRADUATE STUDENT ACTIVITY
PME Student Paper Session #4

4:00 p.m. - 6:15 p.m., Knox

PME Student Paper Session #5

4:00 p.m. - 6:15 p.m., Marion

Thursday, August 4 (continued)

PME Student Paper Session #6
PME Student Paper Session #6

4:00 p.m. - 6:15 p.m., Morrow

PANEL SESSION
Education and Science Policy

4:10 p.m. - 5:30 p.m., Hayes

GRADUATE STUDENT ACTIVITY
Speed Interviewing Marathon for Students

4:10 p.m. - 5:25 p.m., McKinley

WORKSHOP
The Hungarian Approach, Its Emphasis on Problem Solving, and Implications for Secondary Classrooms

4:10 p.m. - 5:30 p.m., Union C

SIGMAA ACTIVITY
POM SIGMAA Reception

5:30 p.m. - 6:00 p.m., Union B

POM SIGMAA Guest Lecture

Potential Infinity: A Modal Account
6:00 p.m. - 7:00 p.m., Union B
Stewart Shapiro, *Ohio State University*

SOCIAL EVENT
Graduate Student Reception

5:30 p.m. - 6:30 p.m., Peppercorn

Friday, August 5

Registration

8:00 a.m. - 5:00 p.m., Regency Foyer

INVITED ADDRESS
AWM-MAA Etta Z. Falconer Lecture

Harmonic Analysis and Additive Combinatorics on Fractals
8:30 a.m. - 9:20 a.m., Regency Ballroom
Izabella Laba, *University of British Columbia*

THEMED CONTRIBUTED PAPER SESSION
TCPS 5. Inviting All Students to Do Mathematics – Engaging Courses, Projects, & Activities for Liberal Arts Students, Part B

8:30 a.m. - 9:45 a.m., Union C

Bringing the Arts into a Liberal Arts Math Course
8:30 a.m. - 8:45 a.m.
Angela Brown, *Sul Ross State University*

Puzzles and Paradoxes: Engaging the Interests of Both the Willing and the Reluctant
8:50 a.m. - 9:05 a.m.
Douglas Shier, *Clemson University*
Marilyn Reba, *Clemson University*

Mathematics Without Calculations – It's a Beautiful Thing!
9:10 a.m. - 9:25 a.m.
Jason Molitierno, *Sacred Heart University*

Projects for Poets
9:30 a.m. - 9:45 a.m.
Margaret Boman, *Harrisburg Area Community College-Lebanon Campus*

GENERAL CONTRIBUTED PAPER SESSION
Teaching Introductory Level Mathematics and Assessment

8:30 a.m. - 11:40 a.m., Union D

A Freshman Transition Program Experience
8:30 a.m. - 8:40 a.m.
Mary B. Walkins, *The Community College of Baltimore County*

Strategies to Energize a Developmental Mathematics Class
8:45 a.m. - 8:55 a.m.
Gowribalan A. Vamadeva, *University of Cincinnati*

Learning Without Lectures: A Tablet-Based Approach to Developmental mathematics
9:00 a.m. - 9:10 a.m.
Kenneth A. Parker, *NYC College of Technology*

The Effects of Calculator Use: Research from Psychology and Education
9:15 a.m. - 9:25 a.m.
Sunil Chetty, *College of Saint Benedict and Saint John's University*

The Development and Promotion of Constructivist-Learning Environment to Facilitate Learning Design on Learners with Learning Barriers in Mathematics
9:30 a.m. - 9:40 a.m.
Najeem Lateef, *University of South Africa*

Visit the MAA Pavilion in the exhibit hall, your one-stop shop for...

Membership

MAA American Mathematics Competitions

Problem of the Day

WeBWorK

Amazon Kindle Raffle
Complete and return the MAA Sudoku found in your registration bag by 5 p.m. on Thursday for a chance to win an Amazon Kindle.

MAA Books Bucks
Check your registration bag for your MAA Books Bucks. Use it towards your book purchases of $50 or more.

3 Books. 3 Days.
Thursday at 2 p.m.: **$4** | Friday at 2 p.m.: **$5** | Saturday at 10:30 a.m.: **$6**

Snack Break
Stop by for a light treat on Friday at 3 p.m.

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Friday, August 5 (continued)

Productive Failure in the Modern College Algebra Classroom
9:45 a.m. - 9:55 a.m.
Ben Vanderlinden, *Grand Canyon University*
Filippo Posta, *Grand Canyon University*

Instructional Games in Teaching Algebra among High School Students: Basis for Instructional Intervention
10:00 a.m. - 10:10 a.m.
Jhemson C. Elis, *Department of Education*
Elizabeth M. Ebora, *Department of Education*
Aurea P. Ocon, *Department fo Education*
Teresita L. Culla, *Department of Education*

A Reward System for General Education Math Courses
10:15 a.m. - 10:25 a.m.
Jesse Prince-Lubawy, *University of North Alabama*

Ohio Mathematics Initiative: Re-thinking Post-Secondary Mathematics
10:30 a.m. - 10:40 a.m.
Michelle L. Younker, *Owens Community College*

An Assessment Study across Multi-Sections of 'Large' College Algebra Classrooms and a 'Small' College Algebra Classroom: A Preliminary Report
10:45 a.m. - 10:55 a.m.
Perry Y. Lee, *Kutztown University of Pennsylvania*
Padraig McLoughlin, *Kutztown University of Pennsylvania*

WeBWorK Open Problem Library
11:00 a.m. - 11:10 a.m.
John Jones, *Arizona State University*
Jeff Holt, *University of Virginia*

Guided Post Assessment Reflection for Student Success
11:15 a.m. - 11:25 a.m.
Rachel Frankel, *UC Blue Ash College*

Grading on a Tablet: Solutions, Experiences, and Unintended Pedagogical Benefits
11:30 a.m. - 11:40 a.m.
Steven M. McKay, *Brigham Young University*

GENERAL CONTRIBUTED PAPER SESSION
Graph Theory and Other Topics
8:30 a.m. - 11:40 a.m., Union E

Digit Sums on Vertex-Weighted Graphs
8:30 a.m. - 8:40 a.m.
Ji Young Choi, *Shippensburg University of Pennsylvania*

Trees for Values of the Span and Icaps for L(2, 1) – Colorings
8:45 a.m. - 8:55 a.m.
William Higgins, *Wittenberg University*
Aparna Higgins, *University of Dayton*
Karrolyne Fogel, *California Lutheran University*
John Villalpando, *California Lutheran University*
Vesta Coufal, *Gonzaga University*
Robert Ray, *Gonzaga University*
Kathie Yerion, *Gonzaga University*

Counting Euler Circuits
9:00 a.m. - 9:10 a.m.
Natacha Fonts-Merz, *Westminster College*

Snake's Path Quilts and Graph Theory
9:15 a.m. - 9:25 a.m.
Mary Shepherd, *Northwest Missouri State University*

Contact Graphs for Packings of Convex Bodies
9:30 a.m. - 9:40 a.m.
Muhammad A. Khan, *University of Calgary*

Who Is Really In Charge? Connecting Graph and Network Theory to Analyzing Social Networks
9:45 a.m. - 9:55 a.m.
Donna Beers, *Simmons College*
Mary Goodloe, *Belmont University*
Maurino Bautista, *Rochester Institute of Technology*

Exploring the Fibonacci Word
10:00 a.m. - 10:10 a.m.
Jeffrey Clark, Elon University

Signed Path Matrices and Oriented Hypergraphic Generalizations
10:15 a.m. - 10:25 a.m.
Amber Lu, *Texas Academy of Math and Science*
David Xiang, *Westwood High School*
Eric Li, *Clements High School*

Improved Percolation Threshold Bounds for Archimedean Lattices
10:30 a.m. - 10:40 a.m.
John C. Wierman, *John Hopkins University*

Math and Music of Recuerdos De La Alhambra
10:45 a.m. - 10:55 a.m.
Duk-Hyung Lee, *Asbury University*

Musical Applications of Generalized Fibonnacci Polynomials
11:00 a.m. - 11:10 a.m.
Kurt Ludwick, *Salisbury University*

Reaping the Benefits of Technology without the Frustration
11:15 a.m. - 11:25 a.m.
David Calvis, *Baldwin Wallace University*

Friday, August 5 (continued)

Should We Prepare Students for Our Tests or for the Workforce?: Evaluating Long-Term Retention in Introductory Statistics
11:30 am- 11:40am
Michael Posner, *Villanova University*
Meghan Buckley, *Villanova University*

UNDERGRADUATE STUDENT ACTIVITY
MAA Student Paper Session #13

8:30 a.m. - 11:45 a.m., Madison

MAA Student Paper Session #14

8:30 a.m. - 11:45 a.m., Fayette

MAA Student Paper Session #15

8:30 a.m. - 11:45 a.m., Clark

MAA Student Paper Session #16

8:30 a.m. - 10:25 a.m., Champaign

UNDERGRADUATE STUDENT ACTIVITY
PME Student Paper Session #7

8:30 a.m. - 11:45 a.m., Knox

PME Student Paper Session #8

8:30 a.m. - 11:45 a.m., Marion

PME Student Paper Session #9

8:30 a.m. - 11:45 a.m., Morrow

Exhibit Hall

9:00 a.m. - 5:00 p.m., Battelle South

INVITED ADDRESS
Earl Raymond Hedrick Lecture Series

Hedrick Lecture 2. The Combinatorial Nullstellensatz
9:30 a.m. - 10:20 a.m., Regency Ballroom
Hendrik Lenstra, *Universiteit Leiden*

INVITED ADDRESS
MAA Invited Address

Magical Mathematics
10:30 a.m. - 11:20 a.m., Regency Ballroom
Arthur Benjamin, *Harvey Mudd College*

PANEL SESSION
Reenergizing Your Career at All Stages

10:30 a.m. - 11:50 a.m., McKinley

INVITED ADDRESS
NAM David Harold Blackwell Lecture

Urban Analytics: The Case for Smart Parking
1:00 p.m. - 1:50 p.m., Regency Ballroom
Robert Hampshire, *University of Michigan*

UNDERGRADUATE STUDENT ACTIVITY
Games Mathematicians Play

1:00 p.m. - 1:50 p.m., Hayes

INVITED PAPER SESSION
Mathematics and Magic

1:00 p.m. - 3:55 p.m., Fairfield

Tricks You Can Count On
1:00 p.m. - 1:15 p.m.
Irl Bivens, *Davidson College*

Shuffling Cards and Binary Numbers
1:20 p.m. - 1:35 p.m.
Steve Butler, *Iowa State University*

More Card Effects from the Perfect Shuffle
1:40 p.m. - 1:55 p.m.
Doug Ensley, *Shippensburg University*

Dunninger Meets DeBruijn
2:00 p.m. - 2:15 p.m.
Ron Graham, *University of California, San Diego*

Telepathy or Tele-mathy-y?
2:20 p.m. - 2:35 p.m.
John Harris, *Furman University*

Tricks with SET ®
2:40 p.m. - 2:55 p.m.
Liz McMahon and Hannah Gordon, *Lafayette College*

Fitch Cheney's 5 Card Trick for Values of 5 Less Than 5
3:00 p.m. - 3:15 p.m.
Colm Mulcahy, *Spelman College*

This is Knot a Trick!
3:20 p.m. - 3:25 p.m.
Allison Henrich, *Seattle University*

Stretching Your Mind with Topological Mime
3:40 p.m. - 3:55 p.m
Tim and Tanya Chartier, *Davidson College*

INVITED PAPER SESSION
Mathematics and the Life Sciences at MBI

1:00 p.m. - 4:10 p.m., Harrison

Why We Sleep: Math Sheds New Light on Personal Energy Conservation
1:00 p.m. - 1:30 p.m
Janet Best, *The Ohio State University*

Friday, August 5 (continued)

Dynamical Systems and Emergent Properties of Cell Networks
1:40 p.m. - 2:10 p.m.
Richard L. Buckalew, *Mathematical Biosciences Institute*

Singled Out: Using Single-Cell Data to Identify Signaling Trends in Leukemia
2:20 p.m. - 2:50 p.m.
Reginald L. McGee, *Mathematical Biosciences Institute*

An Insight to Viral Assembly through Normal Model Analysis
3:00 p.m. - 3:30 p.m.
Farrah Sadre-Marandi, *Mathematical Biosciences Institute*

Binocular Rivalry and Symmetry Breaking
3:40 p.m. - 4:10 p.m.
Marty Golubitsky, *Mathematical Biosciences Institute*

MINICOURSE
Minicourse 2. Visualizing Projective Geometry through Photographs and Perspective Design, Part B

1:00 p.m. - 3:00 p.m., Taft B

THEMED CONTRIBUTED PAPER SESSION
TCPS 10. Recreational Mathematics: Puzzles, Card Tricks, Games, Gambling and Sports, Part B

1:00 p.m. - 4:15 p.m., Taft C

Winning a Football Pool is Harder Than You Thought
1:00 p.m. - 1:15 p.m.
John Bonomo, *Westminster College*

Goals in Context: An Analysis of Iowa Conference Goal Scorers
1:20 p.m. - 1:35 p.m.
Russell E. Goodman, *Central College*

Non-transitive Swim Meets
1:40 p.m. - 1:55 p.m.
Paul Fonstad, *Franklin College*
Justin Armbruster, *Franklin College*

Sequences Related to Bounded Juggling
2:00 p.m. - 2:15 p.m.
Jon Stadler, *Capital University*

What's Up with Countdown?
2:20 p.m. - 2:35 p.m.
Ryan Fox, *Belmont University*

The Probability of Joining the *Monopoly Millionaires' Club*
2:40 p.m. - 2:55 p.m.
Anthony DeLegge, *Benedictine University*

Waiting for a Sequence in Roulette
3:00 p.m. - 3:15 p.m.
Robert W. Vallin, *Lamar University*

Penny Keno and Integer Programming
3:20 p.m. - 3:35 p.m.
Mark Bollman, *Albion College*

Arbitrarily Unfair Card Decks and a Conjecture of Artin
3:40 p.m. - 3:55 p.m.
Jeff Rosoff, *Gustavus Adolphus College*

A Fair-Bold Gambling Function is Simply Singular
4:00 p.m. - 4:15 p.m.
Richard D. Neidinger, *Davidson College*

MINICOURSE
Minicourse 4. Teaching the Lebesgue Integral to Undergraduates, Part B

1:00 p.m. - 3:00 p.m., Taft D

THEMED CONTRIBUTED PAPER SESSION
TCPS 5. Inviting All Students to Do Mathematics – Engaging Courses, Projects, & Activities for Liberal Arts Students, Part C

1:00 p.m. - 6:15 p.m., Union C

Using the History of Mathematics to Invigorate Honors Calculus
1:00 p.m. - 1:15 p.m.
Dan Kemp, *South Dakota State University*

A Course on the Mathematics of the Pre-Columbian Americas
1:20 p.m. - 1:35 p.m.
Ximena Catepillan, *Millersville University of Pennsylvania*

Grounding Calculus Learning in the History of Mathematics
1:40 p.m. - 1:55 p.m.
Aaron Trocki, *Elon University*

Integration of Faith and Learning in the Mathematics Curriculum
2:00 p.m. - 2:15 p.m.
Filippo Posta, *Grand Canyon University*
Ben Vanderlinden, *Grand Canyon University*

Mathematics in Ministry
2:20 p.m. - 2:35 p.m.
Jacqueline Brannon Giles, *CC Central College/Teas Southern University/S.H.A.P.E. Community Center*

Friday, August 5 (continued)

Divination: Using Excel to Explore Ethnomathematics
2:40 p.m. - 2:55 p.m.
Osman Yurekli, *Ithaca College*
Cristina Gomez, *Ithaca College*

Teaching Proofs to Gen Ed-Lib Arts Learners—Leapfrogging Basic Skills Deficits While Building Learner Self-Confidence
3:00 p.m. - 3:15 p.m.
G. Gerard Wojnar, *Frostburg State University*

Math as a Creative Art: Reflections on an Honors Proofs Class for Liberal Arts Majors
3:20 p.m. - 3:35 p.m.
Pat Devlin, *Rutgers University*
Nora Devlin, *Rutgers University*

Graph Theory: Non-Quantitative Mathematics for Liberal Arts Students
3:40 p.m. - 3:55 p.m.
Jonathan Hulgan, *Oxford College of Emory University*

Quantitative Literacy at Michigan State University: Present Successes and Challenges
4:00 p.m. - 4:15 p.m.
Samuel Luke Tunstall, *Michigan State University*
Richard Edwards, *Michigan State University*
Jeff Craig, *Michigan State University*
Andy Krause, *Michigan State University*
Vince Melfi, *Michigan State University*

Building Quantitative Reasoning Through Interdisciplinary Theme-Based First-Year Courses
4:20 p.m. - 4:35 p.m.
Rebecca Walker, *Guttman Community College*

Introducing Fermi Problems and the Art of Reckoning to Liberal Arts Students
4:40 p.m. - 4:55 p.m.
Alexander Atwood, *Suffolk County Community College*

Innovations in a Liberal Arts Probability Course
5:00 p.m. - 5:15 p.m.
Michael Weingart, *Rutgers University*

Introductory Statistics - Group Project in a Large Class
5:20 p.m. - 5:35 p.m.
Catherine A. Robinson, *University of Rhode Island*

The Impact of Academic Presentations on Students Understanding of Mathematical Concepts in General Education Mathematics
5:40 p.m. - 5:55 p.m.
Hope Essien, *Malcolm X College (City Colleges of Chicago)*

Revitalizing College Algebra and Pre-Calculus through Curricular Collaboration and Team Teaching with Partner Disciplines in a Liberal Education Program
6:00 p.m. - 6:15 p.m.
Lorraine F. Dame, *University of Minnesota Rochester*
Aminul Huq, *University of Minnesota Rochester*
Bijaya Aryal, *University of Minnesota Rochester*
Xavier Prat-Resina, *University of Minnesota Rochester*

THEME CONTRIBUTED PAPER SESSION
TCPS 7. Encouraging Early Career Teaching Innovation, Part A

1:00 p.m. - 4:55 p.m., Union A

Teaching Tips and Tricks I Wish I Knew 25 Years Ago!
1:00 p.m. - 1:15 p.m.
Magdalena Luca, *MCPHS University*

Preludes: A Question-Based Approach to Linear Algebra
1:20 p.m. - 1:35 p.m.
Sarah Wolff, *Denison University*

Posing Problems Using the "What-if-not" Strategy in a Geometry Class
1:40 p.m. - 1:55 p.m.
Roger Wolbert, *University at Buffalo and Edinboro University of Pennsylvania*

A Flipped College Geometry Course
2:00 p.m. - 2:15 p.m.
Ashley Johnson, *University of North Alabama*

Easy Innovations in Real Analysis
2:20 p.m. - 2:35 p.m.
Donna Flint, *South Dakota State University*

Teacching Students to Read Their Textbook
2:40 p.m. - 2:55 p.m.
Jacqueline Jensen-Vallin, *Lamar University*

Improving Proof-Writing with Reading Guides
3:00 p.m. - 3:15 p.m.
Michael Janssen, *Dordt College*

Writing Assignments for Math Courses
3:20 p.m. - 3:35 p.m.
Maria Fung, *Worcester State University*

It's the Little Things that Matter: Assignments that Go Somewhere
3:40 p.m. - 3:55 p.m.
Nicholas Long, *Stephen F. Austin State University*

Friday, August 5 (continued)

Foster Student Understanding with Formal Test Corrections
4:00 p.m. - 4:15 p.m.
Kristin Lassonde, *Klamath Community College*

Effective Techniques to Get Students Engaged
4:20 p.m. - 4:35 p.m.
Caroline Maher-Boulis, *Lee University*

Techniquest for Fostering Community, Engagement, and Inquiry in Lower Level Classes
4:40 p.m. - 4:55 p.m.
Christopher T. Sass, *Young Harris College*

THEMED CONTRIBUTED PAPER SESSION

TCPS 08-Formative Assessment Techniques for Undergraduate Math Courses, Part A

Friday, August 5, 1:00 p.m.- 4:35 p.m., Union B

Formative Assessment in the new STEM Prep Pathway
1:00 pm- 1:15pm
Frank Savina, *The Charles A Dana Center, University of Texas at Austin*
Stuart Boersma, *Central Washington University*
Rebecca Hartzler, *Seattle Central College*

A Formative Assessment Approach to Teaching Integration Techniques
1:20 pm - 1:35 pm
Jenna P. Carpenter, *Campbell University*

Preparation Assignments and Student Success
1:40 pm - 1:55 pm
Jeanette Mokry, *Dominican University*

Using Oral Exams to Reinforce Calculus Concepts
2:00 pm - 2:15 pm
Timothy Boester, *Wright State University*

Oral Reviews:Formative Assessment that Results in Improved Grades, Understanding and Retention
2:20 pm - 2:35 pm
Mary Nelson, *George Mason University*

Re-Think and Re-Do: A Learning Opportunity
2:40 pm - 2:55 pm
Sarah L. Mabrouk, *Framingham State University*

Mastery-Based Assessment: An Implementation with Reflective Writing
3:00 pm - 3:15 pm
Anil Venkatesh, *Ferris State University*

Mastery-Based Exams Are Self-Evidently Better Than Traditional Exams
3:20 pm - 3:35 pm
Austin Mohr, *Nebraska Wesleyan University*

Mastery Grading in Calculus
3:40 pm - 3:55 pm
John E. Foster, *Walla Walla University*

Comparing Mastery-Based and Traditional Assessment in Calculus II Courses
4:00pm - 4:15pm
Amanda Harsy, *Lewis University*

A Journey Towards Specifications Grading
4:20 PM- 4:35 PM
Derek Thompson, *Taylor University*

GENERAL CONTRIBUTED PAPER SESSION

Teaching Introductory Level Mathematics

1:00 p.m. - 4:55 p.m., Union D

Relationship between Students' Success and Students' Academic Backgrounds in Developmental Mathematics
1:00 p.m. - 1:10 p.m.
Seongchun Kwon, *Missouri State University - West Plains*
Minhui Paik, *University of Toledo*

Redesigning an Intermediate Algebra Course using Active Learning Techniques
1:15 p.m. - 1:25 p.m.
Mary Wagner-Krankel, *St. Mary's University*

Active Learning TACTivities for College Algebra
1:30 p.m. - 1:40 p.m.
Gary A. Olson, *University of Colorado Denver*

Inquiry-Based Learning Through Blogs
1:45 p.m. - 1:55 p.m.
Forest Fisher, *Guttman Community College, CUNY*

First-year Students and Online Math Courses: A Dangerous Mix
2:00 p.m. - 2:10 p.m.
J. Andrew George, *Penn State Erie*

Using MyMathLab for Teaching Undergraduate Mathematics Courses
2:15 p.m. - 2:25 p.m.
Bariaa Shatila, *Flagler College*

Using Reflective Writing to Improve Students' Attitudes toward Mathematics
2:30 p.m. - 2:40 p.m.
Emily Gismervig, *University of Washington Bothell*

Embedded Tutors in First Year General Education Mathematics Classes
2:45 p.m. - 2:55 p.m.
Grace E. Cook, *Bloomfield College*

Friday, August 5 (continued)

Using Blanks in Guided Lecture Notes: Do They Enhance Learning?
3:00 p.m. - 3:10 p.m.
Karen F. Smith, *University of Cincinnati Blue Ash*

Radically Inclusive Mathematics Classrooms
3:15 p.m. - 3:25 p.m.
Darryl Yong, *Harvey Mudd College*

Career and Technical Content in High School Mathematics (CATCH Math)
3:30 p.m. - 3:40 p.m.
Caroline Maher-Boulis, *Lee University*
Jeneva Moseley, *Lee University*
Jason Robinson, *Lee University*

Benefits of Encouraging Student Exploration of Word Problems before Formally Presenting the Relevant Algorithms
3:45 p.m. - 3:55 p.m.
Luke Smith, *Auburn University at Montgomery*

Tying Math to Art with the Fibonacci Sequence
4:00 p.m. - 4:10 p.m.
Doug Titchenal, *The Ohio State University*

Making Sense of Finite Mathematics Using Cartoons
4:15 p.m. - 4:25 p.m.
Janet St. Clair, *Alabama State University*

Teaching and Assessing Pre-Engineering Students at a Non-Residential Institution
4:30 p.m. - 4:40 p.m.
Chris Oehrlein, *Oklahoma City Community College*

System Thinking Multidisciplinary Causal Modeling Exercices for a Better Understanding of Interdependencies Effects on Multi-criteria Problems
4:45 p.m. - 4:55 p.m.
Miquel A. Piera, *Universitat Autònoma de Barcelona*

GENERAL CONTRIBUTED PAPER SESSION
Teaching Advanced Level Mathematics

1:00 p.m. - 5:10 p.m., Union E

Running an Online Mathematics Graduate Program
1:00 p.m. - 1:10 p.m.
Chad Wiley, *Emporia State University*

The Master's Degree: The Forgotten Middle Child of College Mathematics Education
1:15 p.m. - 1:25 p.m.
Patricia S. Costello, *Eastern Kentucky University*
Lisa W. Kay, *Eastern Kentucky University*
Shane P. Redmond, *Eastern Kentucky University*

An Argument for Broadening the Definition of Undergraduate Research in Mathematics To Include Authentic Inquiry-Based Endeavours
1:30 p.m. - 1:40 p.m.
Padraig McLoughlin, *Kutztown University of Pennsylvania*

Teaching Mathematical Writing in an Upper-Level Elective
1:45 p.m - 1:55 p.m.
Laura K. Gross, *Bridgewater State University*

The Role of Proof in Teaching and Learning Mathematics
2:00 p.m. - 2:10 p.m.
David Easdown, *University of Sydney*

Teaching Real Analysis: Logical vs. Chrono-logical Approach
2:15 p.m. - 2:25 p.m.
Eugene Boman, *Penn State, Harrisburg Campus*
Robert Rogers, *SUNY, Fredonia*

An Extension of the Lusin-Privalov Radial Uniqueness Theorem
2:30 p.m. - 2:40 p.m.
Michael C. Fulkerson, *University of Central Oklahoma*

Beyond the Cauchy Sequences
2:45 p.m. - 2:55 p.m.
Huseyin Cakalli, *Maltepe University*

Hybrid Iterative Sequences of Jungck-type and Common Fixed Point Theorems
3:00 p.m. - 3:10 p.m.
Hudson Akewe, *University of Lagos*

Higher Order Multiplicative Contraction Principle for Self-Maps
3:15 p.m. - 3:25 p.m.
Clement B. Ampadu, *Boston, MA*

Fractional Numberov's Type Methods for Two Dimensional Space-Time Fractional Differential Equations
3:30 p.m. - 3:40 p.m.
Toheeb A. Biala, *Sule Lamido University*

Teaching Applied and Bio-Statistics with R Package
3:45 p.m. - 3:55 p.m.
Leon Kaganovskiy, *Touro College Brooklyn Campus*

Slopes: An Interactive App for Exploring Differential Equations
4:00 p.m. - 4:10 p.m.
Timothy Lucas, *Pepperdine University*

Friday, August 5 (continued)

A Combinatorial Proof for the Rank-Unimodality of Poset Order Ideals
4:15 p.m. - 4:25 p.m.
Kevin Rao, *Texas Mathworks*
Hans Li, *Texas Mathworks*
William Liu, *Texas Mathworks*

Taking Abstract Algebra O.E.R.
4:30 p.m. - 4:40 p.m.
Emma Wright, *Plymouth State University*

Alternative Assessment in a Cryptography Course
4:45 p.m. - 4:55 p.m.
Lindsey Bosko-Dunbar, *Spring Hill College*

Green's Functions of Fractional Boundary Value Problems
5:00 p.m. - 5:10 p.m.
Jeffrey T. Neugebauer, *Eastern Kentucky University*

UNDERGRADUATE STUDENT ACTIVITY
MAA Student Paper Session #17

2:00 p.m. - 3:55 p.m., Madison

UNDERGRADUATE STUDENT ACTIVITY
PME Student Paper Session #10

2:00 p.m. - 3:15 p.m., Knox

PME Student Paper Session #11

2:00 p.m. - 3:15 p.m., Marion

OTHER MATHEMATICAL SESSION
Alder Award Session

2:30 p.m. - 4:00 p.m., Hayes

Do You: How Mathematics + Mentoring + Passion = Opportunities
2:30 p.m. - 2:50 p.m.
Dandrielle Lewis, *University of Wisconsin - Eau Claire*

Two Human Faces of Mathematics: Students and Medicine
3:00 p.m. - 3:20 p.m.
Jana Gevertz, *College of New Jersey*

Modeling Across the Curriculum
3:30 p.m. - 3:50 p.m.
Benjamin Galluzzo, *Shippensburg University*

PANEL SESSION
Non-Academic Mathematical Career Paths for Undergraduates

2:35 p.m. - 3:55 p.m., McKinley

UNDERGRADUATE STUDENT ACTIVITY
Estimathon!

3:30 p.m. - 5:00 p.m., Taft A

MINICOURSE
Minicourse 1. Creating a Purposeful Student Learning Experience, Part A

3:30 p.m. - 5:30 p.m., Taft B

MINICOURSE
Minicourse 6. Teaching Introductory Statistics with Simulation-Based Inference, Part A

3:30 p.m. - 5:30 p.m., Taft D

GRADUATE STUDENT ACTIVITY
PosterFest 2016

3:30 p.m. - 5:00 p.m., Exhibit Hall

OTHER MATHEMATICAL SESSION
Town Hall Meeting

Revising Guidelines on the Recruitment, Retention, Development, and Evaluation of Faculty
4:10 p.m. - 5:30 p.m., McKinley

SIGMAA ACTIVITY
WEB SIGMAA Reception

5:30 p.m. - 6:00 p.m., Union A

SIGMAA ACTIVITY
SIGMAA TAHSM Business Meeting and Reception

5:30 p.m. - 6:30 p.m., Union B

ECM Mentoring Network Social

5:30 p.m. - 7:30 p.m., Peppercorn

Pi Mu Epsilon J. Sutherland Frame Lecture

Combinatorics – The Mathematics That Counts
8:00 p.m. - 8:50 p.m., Regency Ballroom

Robin Wilson, *Open University*

SIGMAA ACTIVITY
WEB SIGMAA Guest Lecture

Accessibility and WeBWork: Online Homework for Everyone
6:00 p.m. - 7:00 p.m., Union A

Geoff Goehle, *Western Carolina University*

SOCIAL EVENT
Pi Mu Epsilon Banquet

6:00 p.m. - 7:45 p.m., Franklin

UNDERGRADUATE STUDENT ACTIVITY
MAA Ice Cream Social for Undergraduates

9:00 p.m. - 10:00 p.m., McKinley

Saturday, August 6

Registration

8:00 a.m. - 3:00 p.m., Regency Foyer

MAA INVITED ADRESS
James R.C. Leitzel Lecture

Inquiry, Encouragement, Home Cooking (And Other Boundary Value Problems)
8:30 a.m. - 9:20 a.m., Regency Ballroom
Annalisa Crannell, *Franklin & Marshall College*

GENERAL CONTRIBUTED PAPER SESSION
Number Theory

8:30 a.m. - 11:40 a.m., Union D

Finding Unique Coverings for Rings of Integers
8:30 a.m. - 8:40 a.m.
Aaron J. Blodgett, *The University of Findlay*

Level Compatibility in the Passage from Modular Symbols to Cup Products
8:45 a.m. - 8:55 a.m.
Ronnie S. Williams, *University of Central Oklahoma*

Exploring the Characteristics of Modulo One Sequences.
9:00 a.m. - 9:10 a.m.
Yasanthi Kottegoda, *University of New Haven*

Prime Graphs and Generalized Euler Phi functions
9:15 a.m. - 9:25 a.m.
Michael Brilleslyper, *U. S. Air Force Academy*

Generating Near-Isosceles Primitive Pythagorean Triples Using Pell-Type Sequences
9:30 a.m. - 9:40 a.m.
Frederick Chichester, *New Jersey Microsystems*

Areas of Generalized Fibonacci Polygons
9:45 a.m. - 9:55 a.m.
Jeremiah Bartz, *University of North Dakota*

Beautiful Integer Patterns: Version 2.0
10:00 a.m. - 10:10 a.m.
Charlie Smith, *Park University*

Counting Hyper M-ary partitions
10:15 a.m. - 10:25 a.m.
Timothy B. Flowers, *Indiana University of Pennsylvania*
Shannon R. Lockard, *Bridgewater State University*

Exploring Triangular Numbers
10:30 a.m. - 10:40 a.m.
James Carpenter, *Iona College*

Patterns, Primes and Number Tricks Associated with the Jacobsthal Sequence
10:45 a.m. - 10:55 a.m.
Jay L. Schiffman, *Rowan University*

A Digital Binomial Theorem for Sheffer Sequences
11:00 a.m. - 11:10 a.m.
Toufik Mansour, *University of Haifa*
Hieu Nguyen, *Rowan University*

Seeding Polynomials for Congruences Modulo Prime Powers
11:15 a.m. - 11:25 a.m.
Larry Lehman, *University of Mary Washington*

Monthly Problem 3173, Sam Beatty, and $1/p+1/q=1$

11:30 a.m. - 11:40 a.m.
Ezra Brown, *Virginia Tech*

GENERAL CONTRIBUTED PAPER SESSION
History of Mathematics

8:30 AM - 11:40 AM, Union E

Euclid's Elements and the Beginning of Modern Science
8:30 a.m. - 8:40 a.m.
Tim Clayton, *Lincoln Memorial University*

Pioneering Women in Mathematics in Ireland
8:45 a.m. - 8:55 a.m.
Colm Mulcahy, *Spelman College*

The Central Role of Centers of Gravity in Early Modern Mathematics
9:00 a.m. - 9:10 a.m.
Andrew Leahy, *Knox College*

Did Alan Turing Come to My College? A Mystery.
9:15 a.m. - 9:25 a.m.
Douglas Daniel, *Presbyterian College*

Agnesi's Geometric Interpretation of the Solutions of Quadratic Equations
9:30 a.m. - 9:40 a.m.
Antonella Cupillari, *Penn State Erie - The Behrend College*

Ibn Al-Ha'im's 1402 poem, Al Mknifi'l-jabrwa'l-muqabala, OnAlgebraic Operations
9:45 a.m. - 9:55 a.m.
Ishraq Al-Awamleh, *New Mexico State University*

Viete Meets the Challenge!
10:00 a.m. - 10:10 a.m.
Andy Martin, *Kentucky State University*

Saturday, August 6 (continued)

The Trend Away from Euclid: A Glimpse Through the Looking Glass
10:15 a.m. - 10:25 a.m.
Meredith G. Anderson, *Adams State University*

Learning Elementary Math Logic from Gorgias
10:30 a.m. - 10:40 a.m.
Ann C. L. von Mehren, *University of Houston*

The Equations and Theories of Heat Motion by Fourier and Poisson
10:45 a.m. - 10:55 a.m.
Shigeru Masuda, *Ex. Long Term Researcher of RIMS, Kyoto University*

A Volume Optimization by Sharaf al-Dīn al-Tusi
11:00 a.m. - 11:10 a.m.
Randy K. Schwartz, *Schoolcraft College*

Nepohualtzintzin: A Closer Look
11:15 a.m. - 11:25 a.m.
Chuck Lindsey, *Florida Gulf Coast University*

Emmy Noether's Ideal Theory
11:30 a.m. - 11:40 a.m.
Phil Blau, *Shawnee State University*

UNDERGRADUATE STUDENT ACTIVITY
MAA Mathematical Competition in Modeling (MCM) Winners
9:00 a.m. - 10:15 a.m., McKinley

Exhibit Hall
9:00 a.m. - 12:30 p.m., Battelle South

INVITED ADDRESS
Earle Raymond Hedrick Lecture Series
Hedrick Lecture 3. Profinite Number Theory
9:30 a.m. - 10:20 a.m., Regency Ballroom
Hendrik Lenstra, *Universiteit Leiden*

THEMED CONTRIBUTED PAPER SESSION
TCPS 7. Encouraging Early Career Teaching Innovation, Part B
9:30 a.m. - 11:45 a.m., Union A

At the Bell: Designing, Implementing, and Assessing Entrance Quizzes
9:30 a.m. - 9:45 a.m.
Suzanne I. Dorée, *Augsburg College, Minneapolis*

Authentic Applied Problems: Like Story Problems Only Less Stupid
9:50 a.m. - 10:05 a.m.
Dawn Archey, *University of Detroit Mercy*

Quick and Easy Random Groups
10:10 a.m. - 10:25 a.m.
Justin Dunmyre, *Frostburg State University*

Using Microsoft OneNote for Lesson Plans
10:30 a.m. - 10:45 a.m.
Michelle Cordler, *Wheeling Jesuit University*

Knowing our Students
10:50 a.m. - 11:05 a.m.
Roberto C. Soto, *California State University, Fullerton*

Me and My Shadow: Teaching Students about Pedagogy
11:10 a.m. - 11:25 a.m.
Brian Katz, Augustana College

Using Video to Prompt Reflection in Mathematics Courses for Prospective Elementary Teachers
11:30 a.m. - 11:45 a.m.
Erin Moss, *Millersville University of Pennsylvania*

INVITED ADDRESS
MAA Invited Address
Immersion in Mathematics via Digital Art
10:30 a.m. - 11:20 a.m., Regency Ballroom
Judy Holdener, *Kenyon College*

OTHER MATHEMATICAL SESSION
MAA Business Meeting
11:35 a.m. - 11:55 a.m., Hayes

OTHER MATHEMATICAL SESSION
Special Presentation for High School Students, Parents, and Teachers: The Astounding Mathematics of Bicycle Tracks
1:00 p.m. - 1:50 p.m., Hayes
James Tanton, *MAA*

INVITED PAPER SESSION
Numbers Geometries and Games: A Centenarian of Mathematics
1:00 p.m. - 3:10 p.m., Fairfield

Sums of Unit Fractions
1:00 p.m. - 1:20 p.m.
Ron Graham, *University of California San Diego*

Products of Farey Fractions
1:30 p.m. - 1:50 p.m.
Jeffrey Lagarias, *University of Michigan*

Fibonacci Plays Billiards, Again
2:30 p.m. - 2:50 p.m.
Elwyn Berlekamp, *University of California Berkeley*

Saturday, August 6 (continued)

Remarks
3:00 p.m. - 3:10 p.m.
Richard Guy, *University of Calgary*

INVITED PAPER SESSION
Undergraduate Research Projects in the Mathematical Sciences

1:00 p.m. - 3:20 p.m., Harrison

Counting Dessins
1:00 p.m. - 1:20 p.m.
Naiomi Cameron, *Lewis & Clark University*

PIC Math: A Course for Undergraduate Students to Do Research on Actual Problems from Industry
1:30 p.m. - 1:50 p.m.
Michael Dorff, *Brigham Young University*

Constructing Solutions to Truncated Moment Problems and Applications to PDE; a PUMP Undergraduate Research Group
2:00 p.m. - 2:20 p.m.
Cynthia Flores, *California State University, Channel Islands*

Undergraduate Research in Pebbling
2:30 p.m. - 2:50 p.m.
Aparna Higgins, *University of Dayton*

Research Collaborations in the Public Sector
3:00 p.m. - 3:20 p.m.
Thomas Wakefield, *Youngstown State University*

PANEL SESSION
Prioritizing Your Career and Professional Goals

1:00 p.m. - 2:20 p.m., McKinley

THEMED CONTRIBUTED PAPER SESSION
TCPS 02 - Undergraduate Research Activities in Mathematical and Computational Biology

1:00 p.m. - 2:15 p.m., Taft A

Investigating the Dynamics of Self-Catalyzing Reaction Networks
1:00 p.m. - 1:15 p.m.
Ted Theodosopoulos, *Worcester Academy*
Patricia Theodosopoulos, *Worcester Academy*

Using Stochastic Leslie Matrix Models to Investigate Stage-Structured Populations Under Changing Environmental Conditions
1:20 p.m. - 1:35 p.m.
Daniel Hrozencik, *Chicago State University*

The Dynamics of Impulsive Models
1:40 p.m. - 1:55 p.m.
Timothy D. Comar, *Benedictine University*

Dynamics of a Two-Vector, Two-Pathogen, Single-Host Model
2:00 p.m. - 2:15 p.m.
Caleb Adams, *Radford University*
David DeLara, *Radford University*

MINICOURSE
Minicourse 3. Teaching Linear Algebra: Learning Concepts Often Difficult to Understand, Part B

1:00 p.m. - 3:00 p.m., Taft B

MINICOURSE
Minicourse 5. Teaching Modeling First Differential Equations - Building Community in SIMIODE

1:00 p.m. - 3:00 p.m., Taft D

UNDERGRADUATE STUDENT ACTIVITY
Student Problem Solving Competition

1:00 p.m. - 2:15 p.m., Franklin A

THEMED CONTRIBUTED PAPER SESSION
TCPS 08B - Formative Assessment Techniques for Undergraduate Math Courses

1:00 p.m. - 3:35 p.m., Union B

Using In-Class Assignments in a First Proofs Course
1:00 p.m. - 1:15 p.m.
Gary MacGillivray, *University of Victoria*

Improving and Evaluating Proof Writing in a First Abstract Algebra Course
1:20 p.m. - 1:35 p.m.
Katie Anders, *University of Texas at Tyler*

Using Technology to Provide Effective and Efficient Feedback for Proof-Writing
1:40 p.m. - 1:55 p.m.
Alison G. Lynch, *California State University, Monterey Bay*

Instructor-led Workshops Provide Formative Assessment
2:00 p.m. - 2:15 p.m.
Amy Cohen, *Rutgers University*

Reading,(W)Riting, Reflecting, and Reviewing: The Four "R's" of Formative Assessment in Mathematics
2:20 p.m. - 2:35 p.m.
Dave Klanderman, *Trinity Christian College*
Sarah Klanderman, *Michigan State University*

Formative Assessment with a Purpose: From Philosophical Considerations to Pragmatic Implementation
2:40 p.m. - 2:55 p.m.
Gizem Karaali, *Pomona College*

Saturday, August 6 (continued)

Considering Influence of Mathematics Students' Characteristics on Successful Use of Formative Assessments
3:00 p.m. - 3:15 p.m.
Allen G. Harbaugh, *Boston University*

The Open Problem Curriculum and the Future of Calculus
3:20 p.m. - 3:35 p.m.
Chandra Kethi-Reddy, *University of Central Florida*

THEMED CONTRIBUTED PAPER SESSION
TCPS 03 - Programming in Mathematics Classes and Mathematics for Programming

1:00 p.m. - 5:15 p.m., Union A

Using Python in an Introductory ODE Course
1:00 p.m. - 1:15 p.m.
Patrick Davis, *Central Michigan University*

Computational Number Theory - Quest and Discovery in the Undergraduate Classroom
1:20 p.m. - 1:35 p.m.
Mihai Caragiu, *Ohio Northern University*

Explorations in Financial Mathematics with Fathom
1:40 p.m. - 1:55 p.m.
Klaus Volpert, *Villanova University*

Creating Art Patterns with Math and Code
2:00 p.m. - 2:15 p.m.
Boyan Kostadinov, *City Tech, CUNY*

Maple and Mathematica for March Madness
2:20 p.m. - 2:35 p.m.
Chrissy Safranski, *Franciscan University of Steubenville*

Interactivity with Processing
2:40 p.m. - 2:55 p.m.
Shirley Yap, *California State University East By*

Using Python in a Numerical Methods Course
3:00 p.m. - 3:15 p.m.
Brian Heinold, *Mount St. Mary's University*

Programming and Problem Solving: Getting Started on the Right Foot.
3:20 p.m. - 3:35 p.m.
Jean Marie Linhart, *Central Washington University*
Adam Larios, *University of Nebraska Lincoln*
Josef Sifuentes, *University of Texas Rio Grande Valley*

Using Julia via SageMathCloud in an Introductory Matrix Algebra Course
3:40 p.m. - 3:55 p.m.
Jan Hlavacek, *Saginaw Valley State University*

Using Technology to Implement Discovery Learning in the Classroom
4:00 p.m. - 4:15 p.m.
Kevin Murphy, *Saint Leo University*

A Games and Puzzles Class with Programming
4:20 p.m. - 4:35 p.m.
Saúl A. Blanco, *Indiana University*

Maple Implementations in a Cryptology Course
4:40 p.m. - 4:55 p.m.
Manmohan Kaur, *Benedictine University*

The Mathematician as a Programmer
5:00 p.m. - 5:15 p.m.
Brian Camp, *Saint Leo University*
Monika Kiss, *Saint Leo University*

GENERAL CONTRIBUTED PAPER SESSION
GCPS on Outreach and Other Topics

1:00 p.m. - 4:55 p.m., Union D

Teachers Go Back To School!: Post-secondary and Elementary Schools Working Together
1:00 p.m. - 1:10 p.m.
R. Kevin Maxwell, *Penn State Fayette, The Eberly Campus*
Nicole Hill, *Penn State Fayette, The Eberly Campus*

Mathematics Instruction Improvement Project at a STEAM K-6 School
1:15 p.m. - 1:25 p.m.
Maria G. Fung, *Worcester State University*
Brendan Keenan, *Bagnall Elementary School*

STEM Opportunities Camp: Increasing Access to STEM Fields for At-risk Middle School Students
1:30 p.m. - 1:40 p.m.
Amy L. Hlavacek, *Saginaw Valley State University*
Jan Hlavacek, *Saginaw Valley State University*
Christopher Nakamura, *Saginaw Valley State University*

Summer Math Program for Incoming Engineering and Computer Science Students: Curriculum and Results
1:45 p.m. - 1:55 p.m.
Amanda L. Hattaway, *Wentworth Institute of Technology*
Emma Smith Zbarsky, *Wentworth Institute of Technology*
Joan Giblin, *Wentworth Institute of Technology*

Creating and Running an Urban ACT Prep. Program
2:00 p.m. - 2:10 p.m.
Britney Hopkins, *University of Central Oklahoma*
Kristi Karber, *University of Central Oklahoma*

Saturday, August 6 (continued)

Getting Starting in Outreach
2:15 p.m. - 2:25 p.m.
Jessie Hamm, *Winthrop University*

Learning from Freedom Summer
2:30 p.m. - 2:40 p.m.
Erion J. Clark, *University High School of Indiana*

Mathematics in Rural America: Access and Outcomes
2:45 p.m. - 2:55 p.m.
Daniel Showalter, *Eastern Mennonite University*

Building and Mentoring a Community
3:00 p.m. - 3:10 p.m.
Carol Williams, *Texas Tech University*

Preparing Students for Successful Mentoring Relationships
3:15 p.m. - 3:25 p.m.
G. Brock Williams, *Texas Tech University*

Math-Forensics Conference for High School Students
3:30 p.m. - 3:40 p.m.
Violeta Vasilevska, *Utah Valley University*

Future of Notices AMS
3:45 p.m. - 3:55 p.m.
Frank Morgan, *Williams College*

An Experimental Undergraduate Course in Complex Systems
4:00 p.m. - 4:10 p.m.
Robert Rovetti, *Loyola Marymount University*

Student Reported Connections between Math and Science Courses for Non-STEM Majors
4:15 p.m. - 4:25 p.m.
Richard Edwards, *Michigan State University*

Simulating Imperfect Quantum Algorithms
4:30 p.m. - 4:40 p.m.
Orion Martin, *Rose-Hulman Institute of Technology*

Factorization in Closed String Field Theory
4:45 p.m. - 4:55 p.m.
Abdulmajeed Abdurrahman, *Shippensburg University*
Nicholas Brunswick, *Shippensburg University*
Ibrahim Abdurrahman, *Shippensburg University*

GENERAL CONTRIBUTED PAPER SESSION
GCPS on Probability, Statistics and Calculus

1:00 p.m. - 5:10 p.m., Union E

Quantification of Uncertainty in Probabilistic Seismic Risk Assessment of Electric Power Systems
1:00 p.m. - 1:10 p.m.

Abdullahi M. Salman, *Michigan Technological University*
Shurong Fang, *Fairfield University*

Statistical Analysis of Sedimentological and Paleontological Data
1:15 p.m. - 1:25 p.m.
Jillian Stupiansky, *University of North Alabama*
David Schmidt, *Westminster College*
Brian Steffen, *South Louisiana Community College*

Beyond Real Data in Teaching Statistical Inference
1:30 p.m. - 1:40 p.m.
Andrew Matchett, *University of Wisconsin - La Crosse*

Physical Models of Population Parameters
1:45 p.m. - 1:55 p.m.
Dennis L. Clason, *University of Cincinnati Blue Ash College*

On Resistant Versions of the Standard Score
2:00 p.m. - 2:10 p.m.
David DiMarco, *Neumann University*
Ryan Savitz, *Neumann University*
Blane Hollingsworth, *Middle Georgia State College*

Comparing Pitman's Measure of Closeness with Other Comparing Pitman's Measure of Closeness with Other Optimality Criteria
2:15 p.m. - 2:25 p.m.
M. Z. Raqab, *Kuwait University*

Roots of Unity and Asymptotic Analysis of Periodic Queues
2:30 p.m. - 2:40 p.m.
Barbara Margolius, *Cleveland State University*

New Perspectives on Curves of Pursuit
2:45 p.m. - 2:55 p.m.
Andrew Gard, *University of the Virgin Islands*

Computation Of Solutions Of Non-Linear Functions Using Julia Set
3:00 p.m. - 3:10 p.m.
Louis E. Effiong, *Abia State Polytechnic, Aba, Nigeria*
Ugochukwu Agomuo, *Abia State Polytechnic, Aba, Nigeria*
Godswill U. Achi, *Abia State Polytechnic, Aba, Nigeria*

Excursions in Newton's Method
3:15 p.m. - 3:25 p.m.
Bathi Kasturiarachi, *Kent State University at Stark*

On the Logistic Equation with Two Delays
3:30 p.m. - 3:40 p.m.
Amera Almusharrf, *Oakland University*

Saturday, August 6 (continued)

Integration of Problem Solving, Modeling, & Technology in the Study of the Geometric Mean & the Planar p–means
3:45 p.m. - 3:55 p.m.
Orlando B. Alonso, *Lehman College*
Otilio B. Mederos, *Universidad Autónoma de Coahuila*

Calculus of Generating Functions
4:00 p.m. - 4:10 p.m.
MK Panahi, *El Centro College*
Mikiko Okura, *El Centro College*

Some Results Concerning Real Infinite Series
4:15 p.m. - 4:25 p.m.
Jonathan Martin, *Purdue University*
Andy Martin, *Kentucky State University*

An IBL Activity for Multivariable Differential Calculus
4:30 p.m. - 4:40 p.m.
Susan Wildstrom, *Walt Whitman High School*

Finding a Calculus Primitive Source for our 2–space Parabola Curve
4:45 p.m. - 4:55 p.m.
Alexander L. Garron, *Sand Box Geometry LLC*

OTHER MATHEMATICAL SESSION
Math Teacher's Circle Demonstration

2:00 p.m. - 3:30 p.m., Morrow

GRADUATE STUDENT PAPER SESSION
Great Talks for a General Audience: Coached Presentations by Graduate Students

1:00 p.m. - 5:00 p.m., Madison

MINICOURSE
Minicourse 1. Creating a Purposeful Student Learning Experience, Part B

3:30 p.m. - 5:30 p.m., Taft B

MINICOURSE
Minicourse 6. Teaching Introductory Statistics with Simulation-Based Inference

3:30 p.m. - 5:30 p.m., Taft D

OTHER MATHEMATICAL SESSION
Math Wrangle

4:00 p.m. - 5:30 p.m., Morrow

SOCIAL EVENT
Closing Banquet Reception

6:00 p.m. - 6:30 p.m., Franklin Foyer

Closing Banquet

6:00 p.m. - 9:00 p.m., Franklin

Sponsors & Exhibitors

Sponsors

Drexel University Department of Mathematics

The Drexel University Department of Mathematics offers MS and PhD degrees in Mathematics. These degrees offer a solid grounding in theory, with enough flexibility for students to pursue their own interests. Research specialties in the department include combinatorics, probability and stochastic processes, scientific computing, mathematical neuroscience, optics, operator theory, and applied analysis and partial differential equations. Recent graduates have undertaken careers in academia as well as in industry. PhD students are able to get full funding, which includes tuition remission and teaching or research assistantships.

Hawkes Learning
(BOOTHS 33-34)

Discover the advantages of interactive software created by a company that has been specializing in mathematics for 30 years. Hawkes Learning promotes grade improvement and motivates students by engaging them in the learning process. Students learn more effectively through tutorials, unlimited practice, mastery-based homework, and error-specific feedback. Hawkes Learning is the solution for your students' success!

Maplesoft
(BOOTH 19)

Maplesoft has provided mathematics-based software solutions to educators and researchers in science, technology, engineering, and mathematics (STEM) fields for over 25 years. Maplesoft's flagship product, Maple, combines the world's most powerful mathematics engine with an interface that makes it extremely easy to explore, visualize, and solve mathematical problems. Building on this technology, Maplesoft also provides STEM-focused solutions for online assessment and online courseware, including the Maple T.A. MAA Placement Test Suite, which offers the renowned Mathematical Association of America placement tests in an online environment.

McGraw Hill Education
(BOOTH 6)

At McGraw-Hill Education, we believe that our contribution to unlocking a brighter future lies within the application of our deep understanding of how learning happens and how the mind develops. It exists where the science of learning meets the art of teaching. Our mission is to accelerate learning through intuitive, engaging, efficient and effective experiences — grounded in research. Why? Because learning changes everything.

National Association of Math Circles
(BOOTH 38)

In a growing field of mathematical outreach programs, Math Circles stand out as an innovative approach to cultivating mathematically-talented youth and increasing mathematical appreciation and proficiency. The National Association of Math Circles provides training, resources and ongoing support to the leaders and facilitators of Math Circles. Visit www.mathcircles.org for a listing of Math Circles and their websites, sample problems and lesson plan collections, and the Circle in a Box handbook. To learn more about Math Circles, meet members of the Math Circle community, see mathematical outreach demonstrations and materials, and learn from contributed talks about Math Circles, visit our booth or attend one of the SIGMAA-MCST sessions.

Pearson
(BOOTHS 13-14)

A leader in mathematics and statistics educational solutions, Pearson provides course content from respected authors. Pearson's online courses within MyMathLab and MyStatLab have helped millions of students succeed since 2001. See us online at www. pearsonhighered. com.

WebAssign
(BOOTH 20)

WebAssign is a flexible and fully customizable online instructional system that puts powerful tools in the hands of teachers, enabling them to deploy assignments, instantly assess individual student performance, and realize their teaching goals. Adopted by all major academic publishers, integrated with more than 900 science and math textbooks, and enhanced with a robust selection of independently developed original content, WebAssign makes it easy for faculty to enrich the teaching and learning experience.

EXHIBIT HALL HOURS:

Wednesday, August 3,   6:00 PM - 8:00 PM (Grand Opening Reception)
Thursday, August 4,   9:00 AM - 5:00 PM
Friday, August 5,   9:00 AM - 5:00 PM
Saturday, August 6,   9:00 AM - 12:30 PM

Sponsors & Exhibitors (continued)

Other Exhibitors

MAA Pavilion

Books
Membership
Competitions
WeBWorK-Online Homework Source
PicMath

Exhibitors

American Association of Two Year Colleges (BOOTH 27)

American Institute of Mathematics (BOOTH 21)

American Mathematical Society (BOOTHS 1-4)

Association for Women in Mathematics (BOOTH 36)

Basic Books (BOOTH 17)

Budapest Semesters in Mathematics Education (BOOTH 41)

Cambridge University Press (BOOTH 5)

Castle Point Learning Systems LLC (BOOTH 7)

Freeman/Macmillan (BOOTH 22)

Hawkes Learning (BOOTH 33-34)

Maplesoft (BOOTH 19)

Math in Moscow (BOOTH 42)

McGraw-Hill Education (BOOTH 6)

National Association of Math Circles (BOOTH 38)

National Science Foundation (BOOTH 35)

National Security Agency (BOOTH 16)

Oxford University Press (BOOTH 18)

Pearson (BOOTH 13-14)

Princeton University Press (BOOTH 23)

SIGMAA-MCST (BOOTH 39)

Springer Nature (BOOTH 15)

Taylor & Francis Group (BOOTHS 25-26)

Think Through Math (BOOTH 24)

WebAssign (BOOTH 20)

Wiki Education Foundation (BOOTH 8)

Wiley (BOOTH 37)

Worldwide Center of Mathematics (BOOTH 40)

Commercial Presentations

Hawkes Learning

Thursday, August 4, 1:00 p.m. – 2:30 pm
Columbus Convention Center, Ohio Center Board Room

Customize the Pathway to Student Success with Hawkes

Accelerate students through their pathways with NEW integrated courses:
Beginning Statistics Plus Integrated **Review**
Viewing Life Mathematically Plus Integrated Review

- Provide curriculum-level math content
- Integrate applicable review skills
- Target remediation needs for just-in-time supplementation of foundational concepts
- Allow for further customization with new instructor tools and features

Attend Hawkes Learning's presentation and enter to win one of three $50 Amazon gift cards!

McGraw Hill Education

Thursday, August 4, 3:30 p.m. – 5:00 pm
Columbus Convention Center, Ohio Center Board Room

Increasing Student Success through Proper Math Placement and Remediation

Data shows that students are well served by an accurate placement test combined with an opportunity to remediate areas of weakness and to demonstrate improved skills through subsequent placement testing. With an effective placement program, institutions can improve course preparedness and retention. During our workshop, Rich Kolasa, Director of Math Placement and Matt Swinand, Sr. Placement Consultant from ALEKS will discuss the impact ALEKS Placement, Preparation, and Learning (PPL) has had on student success at institutions across the country.

Rich Kolasa, *Director of Math Placement at ALEKS / McGraw-Hill Education*

Matt Swinand, *Sr. Strategic Placement Consultant at ALEKS / McGraw-Hill Education*

Food and Beverage in the Exhibit Hall

Battelle South Concession Stand
(Breakfast, snacks and lunch for purchase)
Thursday, August 4: 9:00 am-3:00 pm
Friday, August 5: 9:00 am-3:00 pm
Saturday, August 6: 9:00 am-12:00 pm

Strawberry Fields Cart
(Snacks and smoothies for purchase)
Thursday, August 4: 11:00 am-4:00 pm
Friday, August 5: 11:00 am-4:00 pm

Coffee Breaks
(Complimentary)
Thursday, August 4: 10:00-10:30 am, 3:00-3:30 pm
Friday, August 5: 10:00-10:30 am, 3:00-3:30 pm
Saturday, August 6: 10:00-10:30 am

Commercial Presentations (continued)

Pearson

Friday, August 5, 1:00 p.m. – 2:30 pm
Columbus Convention Center, Ohio Center Board Room

Success in Mathematics: Balancing Fundamentals, Application, and Attitude

Imagine there was basketball team that never played in a scrimmage or a game --a team that only practiced dribbling, passing, and shooting. Or, on the other hand, a team that only played games without attention to skills. Strictly playing games may be fun, but this approach could also lead to a very disappointing season. Both practice and playing time are needed to be successful.

Being successful in mathematics is similar to sports in the sense that students need to master fundamental skills to fully understand, model, and solve real problems. At the same time, having the chance to apply these skills to solve interesting problems can give a student the same satisfaction that a great athletic performance in a game affords and can be a catalyst to their future success. This presentation will discuss ways to achieve the perfect balance between fundamentals and applications in order to give students the best of both worlds. Analogies from the world of sports will be used to develop a balanced approach to applied calculus and finite mathematics classes and will also include easy-to-implement strategies and examples in Pearson's MyMathLab.

Maplesoft

Friday, August 5, 3:30 p.m. – 5:30 pm
Columbus Convention Center, Ohio Center Board Room

A Practical Approach to Placement Testing

Join the MAA and Maplesoft for an in-depth session on placement testing and the Maple T.A.-MAA Placement Test Suite. This session will include detailed information on running placement testing programs and creating testing instruments. It will also provide discussion time where experts can answer your questions. Specifically, this session will cover:

Overview
- Choosing the right test and setting cut scores
- Using data to verify and improve your placement program

Research
- Testing concepts versus skills
- Performance data on CCR and APCR
- Report on the URSIP project

Demonstration
- Student and placement test administrator experience
- Setting policies and delivering the tests
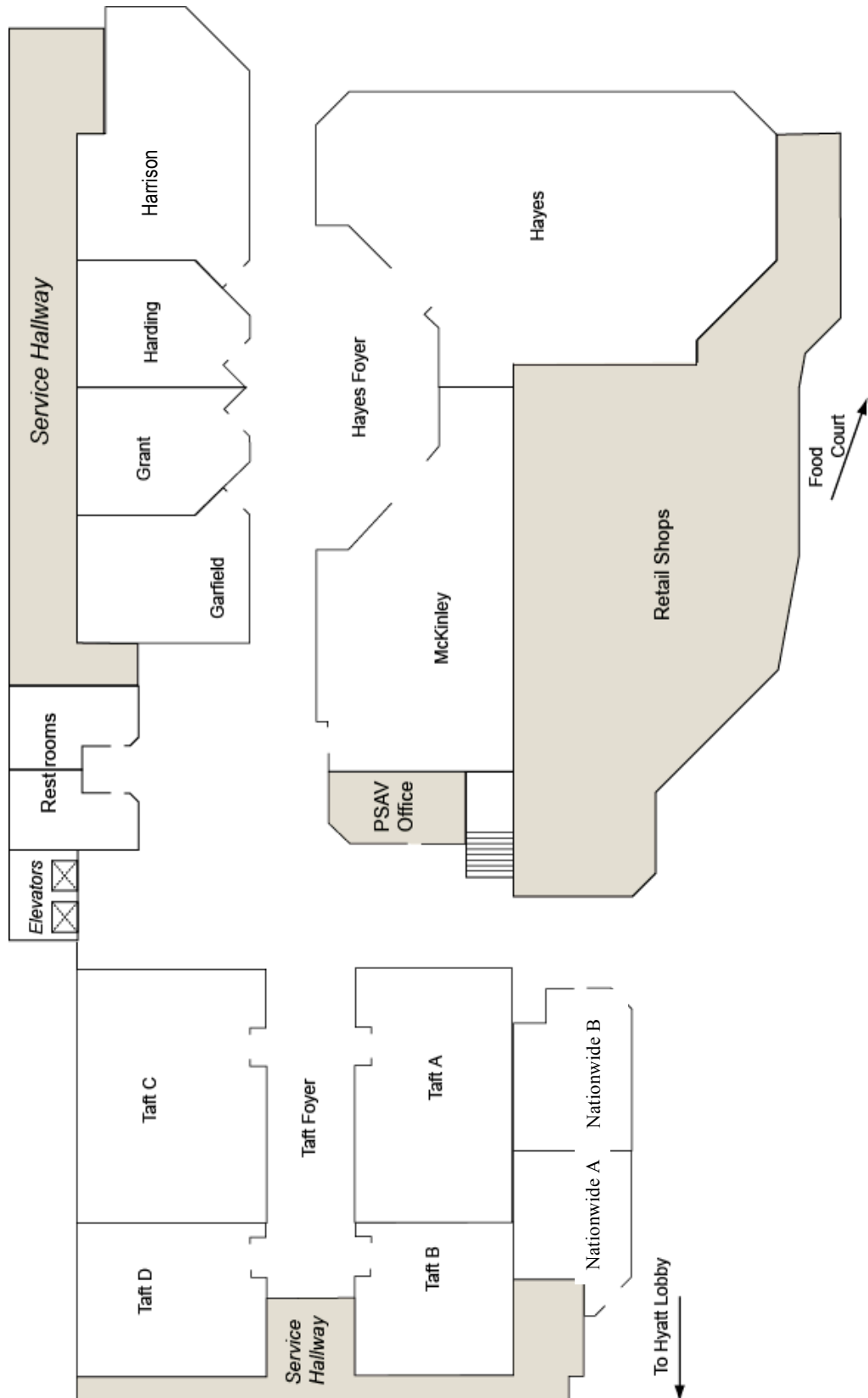- Gathering data and viewing results

Breakout sessions for further discussions

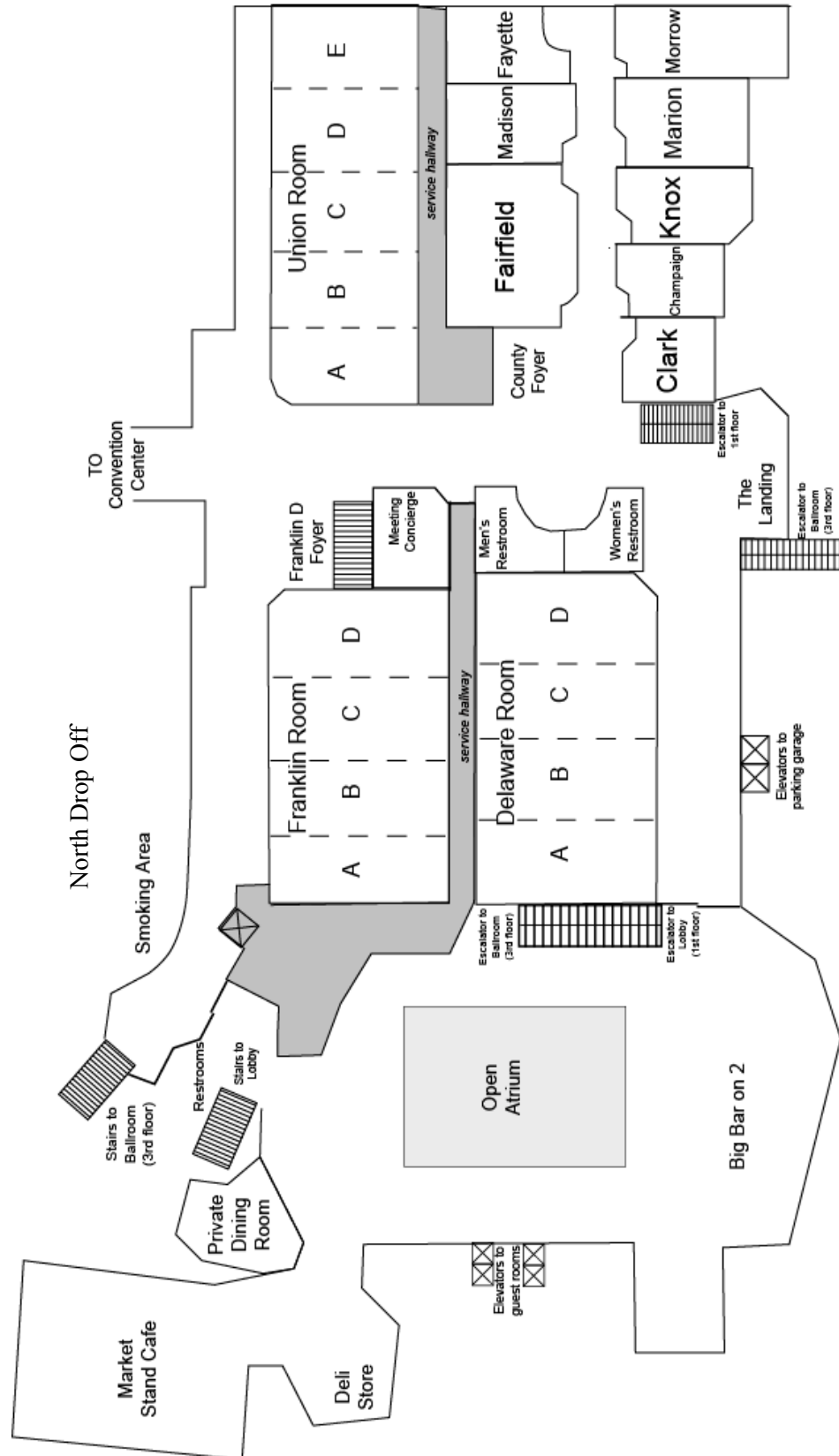**Bernard Madison**, *Professor of Mathematics, University of Arkansas*

Marilyn Carlson, *Professor and Director of Research Innovations in Mathematics and Science Education, Arizona State University*

Louise Krmpotic, *Senior Director, Digital Learning and Business Development, Maplesoft*
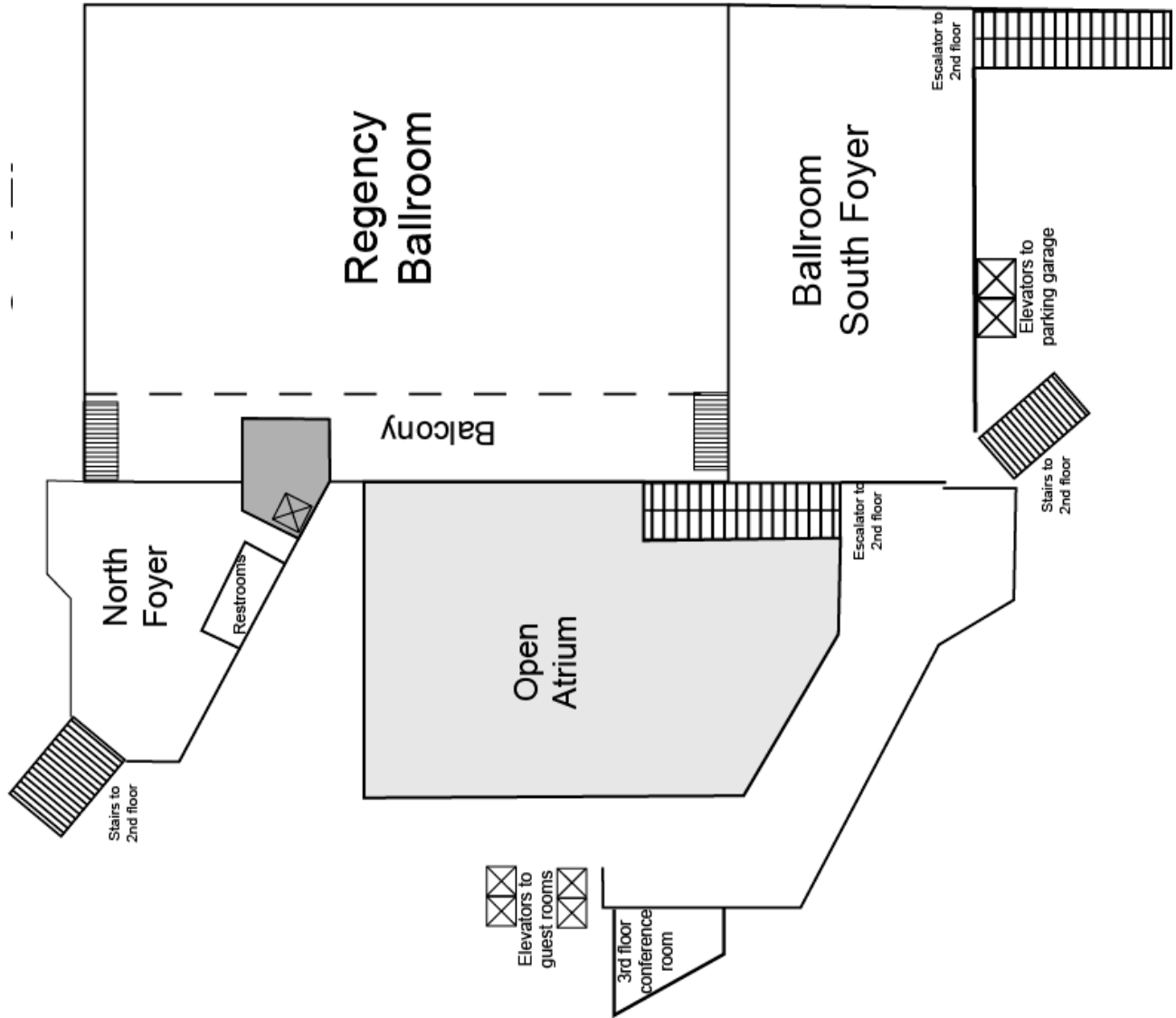
Hyatt Regency Columbus Floor Plan: First Floor

HYATT REGENCY

Service Hallway

Harrison

Harding

Grant

Garfield

Hayes

Hayes Foyer

Food Court

McKinley

Retail Shops

Restrooms

Elevators

PSAV Office

Taft C

Taft D

Taft Foyer

Service Hallway

Taft A

Taft B

Nationwide B

Nationwide A

To Hyatt Lobby

Hyatt Regency Columbus Floor Plan: Second Floor

HYATT
REGENCY

Hyatt Regency Columbus Floor Plan: Third Floor

Regency Ballroom

Ballroom South Foyer

Escalator to 2nd floor

Elevators to parking garage

Stairs to 2nd floor

Balcony

North Foyer

Restrooms

Escalator to 2nd floor

Open Atrium

Stairs to 2nd floor

Elevators to guest rooms

3rd floor conference room

HYATT REGENCY

Greater Columbus Convention Center Floor Plan: Exhibit Hall

Food and Beverage in the Exhibit Hall

Battelle South Concession Stand

(Breakfast, snacks and lunch for purchase)

Thursday, August 4: 9:00 am - 3:00 PM

Friday, August 5: 9:00 am - 3:00 PM

Saturday, August 6: 9:00 am - 12:00 PM

Strawberry Fields Cart

(Snacks and smoothies for purchase)

Thursday, August 4: 11:00 am - 4:00 pm
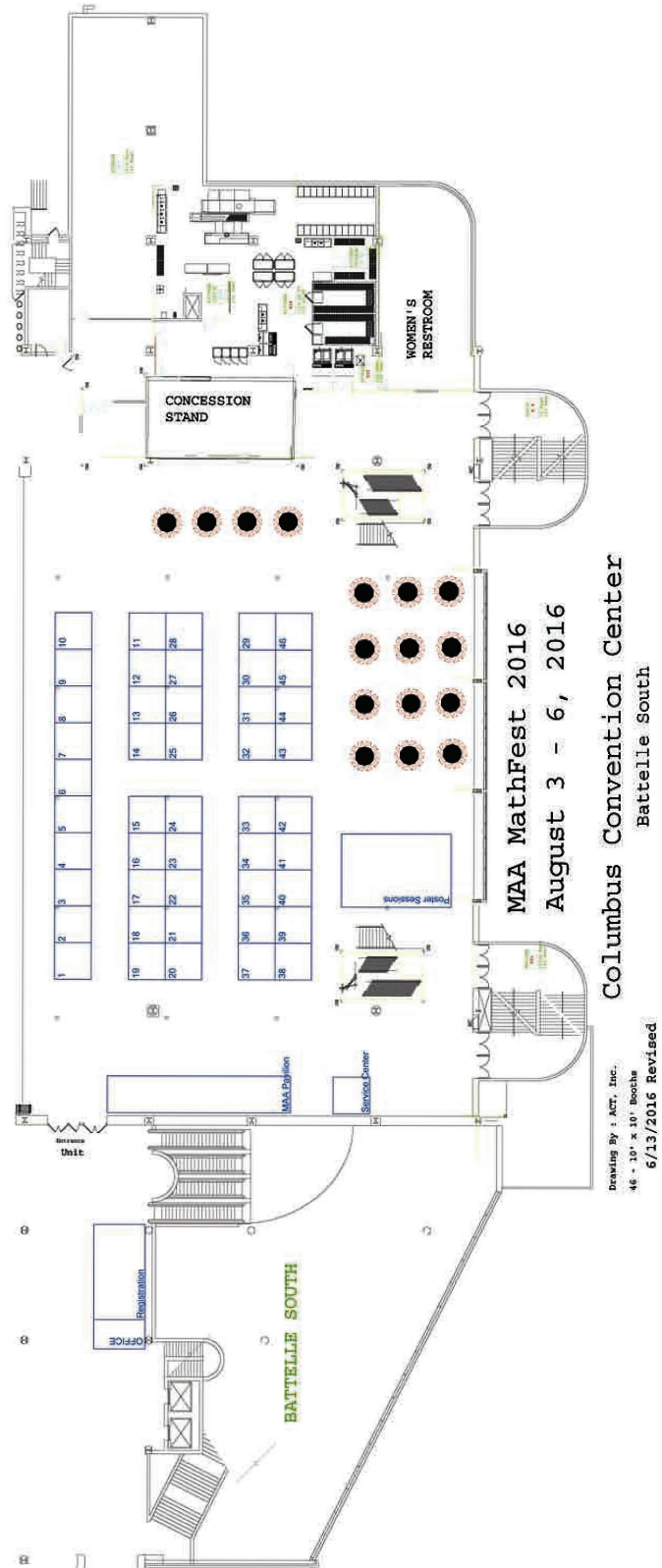
Friday, August 5: 11:00 am - 4:00 pm

Coffee Breaks

(Complimentary)

Thursday, August 4: 10:00 - 10:30 am, 3:00 - 3:30 pm

Friday, August 5: 10:00 - 10:30 am, 3:00 - 3:30 pm

Saturday, August 6: 10:00 - 10:30 am

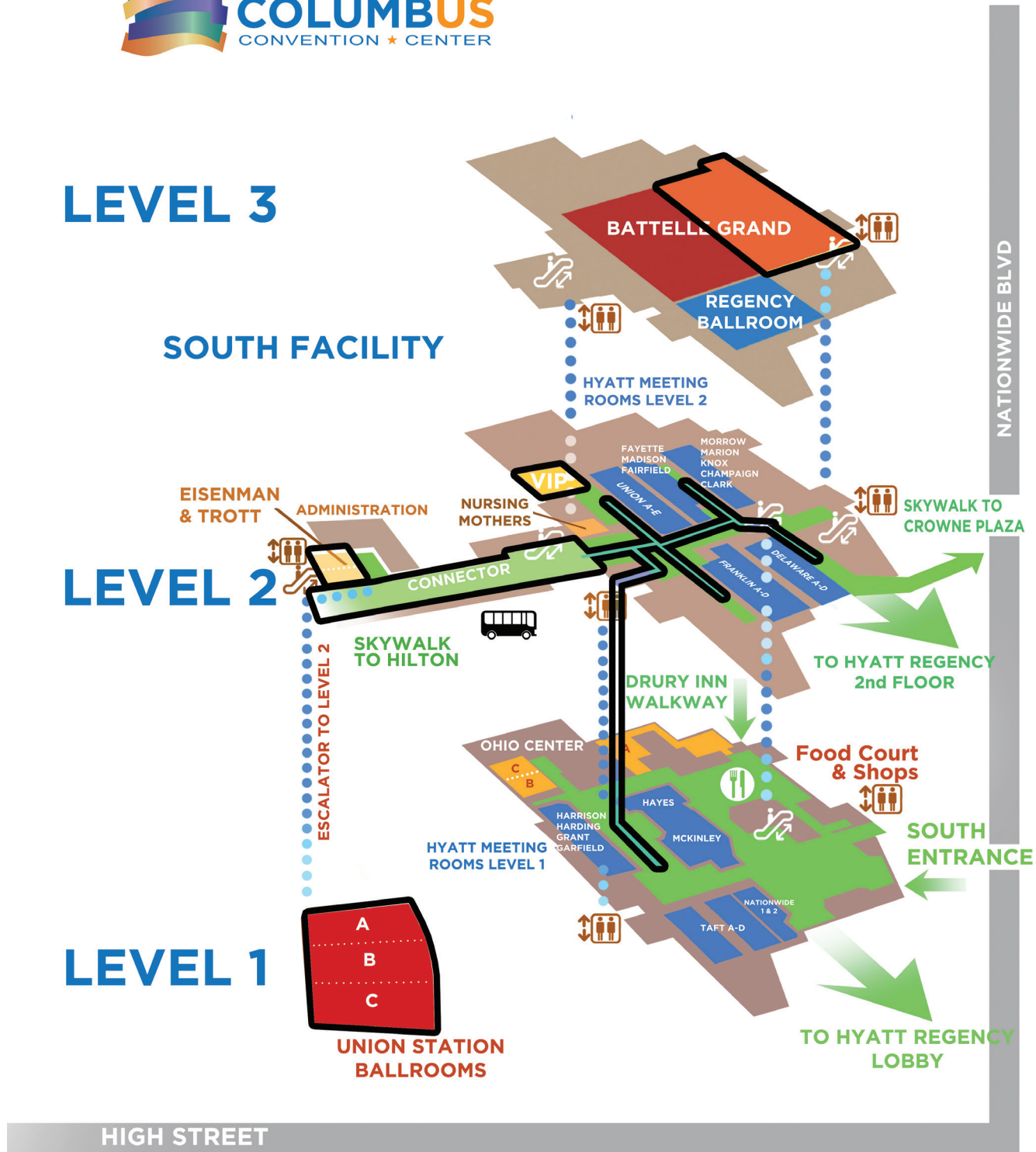# Hyatt Regency Columbus & Convention Center Space at a Glance

GREATER
COLUMBUS
CONVENTION ★ CENTER

LEVEL 3

SOUTH FACILITY

BATTELLE GRAND

REGENCY BALLROOM

NATIONWIDE BLVD

HYATT MEETING ROOMS LEVEL 2

LEVEL 2

FAYETTE MADISON FAIRFIELD

MORROW MARION KNOX CHAMPAIGN CLARK

VIP

EISENMAN & TROTT

ADMINISTRATION

NURSING MOTHERS

UNION A-E

SKYWALK TO CROWNE PLAZA

CONNECTOR

FRANKLIN A-D

DELAWARE A-D

ESCALATOR TO LEVEL 2

SKYWALK TO HILTON

DRURY INN WALKWAY

TO HYATT REGENCY 2nd FLOOR

OHIO CENTER

C
B

Food Court & Shops

HAYES

HARRISON HARDING GRANT GARFIELD

MCKINLEY

SOUTH ENTRANCE

HYATT MEETING ROOMS LEVEL 1

LEVEL 1

A
B
C

NATIONWIDE 1 & 2

TAFT A-D

UNION STATION BALLROOMS

TO HYATT REGENCY LOBBY

HIGH STREET

Notes

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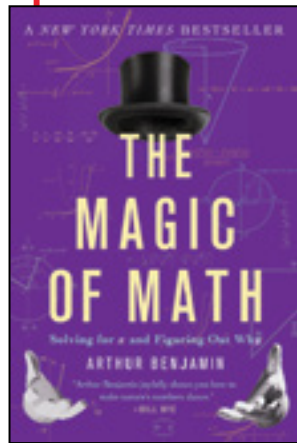
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Notes

Math from BASIC

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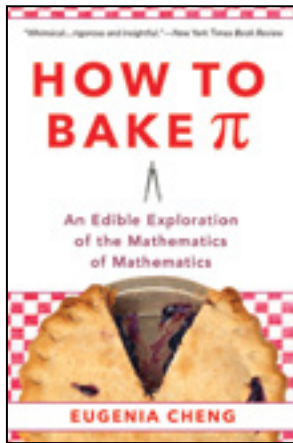### Love and Math
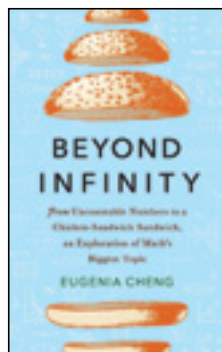The Heart of Hidden Reality
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