Allegheny Mountain Section Newsletter

PennState Behrend

SPRING SECTION MEETING AT PENN STATE BEHREND

Don't miss the spring 2018 Allegheny Mountain Section meeting April 6-7 at Penn State Behrend in Erie, Pa!

Several changes have been made to our schedule this year. The former pizza party will be a **FREE PIZZA DINNER** for students which will take place concurrently with the banquet Friday evening. The pizza dinner will then transition into the student problem-solving competition. Since we expect more students to be dining on campus, we will be starting the student talks earlier in the evening. Additionally, in place of the pizza party, we will have a dessert reception for all students and faculty. This means we will still have the informal gathering following the student talks that so many of us have always enjoyed.

We have several exciting talks lined up as well. Ken Ono from Emory University – Pólya Lecturer, will be speaking Friday afternoon. On Saturday morning we will hear from Annalisa Crannell from Franklin & Marshall College and our closing talk will be given by Michael Dorff from Brigham Young University. Their talk titles and abstracts can be found on pages 9 and 10.

Also, don't miss the Section NExT workshop conducted by Annalisa Crannell Friday afternoon and the Section Business Meeting Saturday morning - everyone is welcome to attend.

You can see the full meeting schedule on page 8. We hope to see you in Erie!

SECTION REPRESENTATIVE TO THE MAA CONGRESS:
Pam Wovchko

Pam Wovchko of West Virginia Wesleyan College, Representative to the MAA Congress

"As I listened to reports from different councils, I realized how much work is done in the committees and councils. Please consider volunteering for a committee or council."

Report from the MAA Congress meeting at JMM 2018.

At the January Congress meeting, we received leadership reports, discussed the MAA Core Values, talked about the role of section representatives, and considered minor bylaw changes.

While much of the reports involved normal business, there were some outstanding accomplishments/ improvements that I will share with you. With much excitement, the *Guide to Evidence-Based Instructional Practices in Undergraduate Mathematics* was released and can be downloaded from the MAA website. Please encourage your colleagues to take a look at the guide. In other news, the MAA successfully bid to host the International Mathematical Olympiad in the U.S.A. in 2021. To learn more about what the MAA is doing, browse through the MAA website; there is a plethora of resources available to you. Check out the Math Careers Section, nominate a colleague for an MAA award, or go to the Programs and Communities section for curriculum resources, grant opportunities, and more!

As I listened to reports from different councils, I realized how much work is done in the committees and councils. Please consider volunteering for a committee or council. You need to be a member of the MAA, but you don't necessarily have to attend the national meetings, as some committees do most of their work via electronic communication. Please go to the link https://www.maa.org/about-maa/governance/council-and-committees-list to see a description of the committees and to complete a form to volunteer. Your help is needed.

Once again, do not forget about the revised departmental membership. Benefits include: one MAA faculty membership, an UNLIMITED number of full-time student memberships (students are not required to be mathematics majors), $100 off every hosted WeBWorK course, and more. Departmental membership prices are as low at $500. For more information go to: https://www.maa.org/membership/membership-categories/departmental-membership-benefits

Have a great spring semester. I hope to see you in Erie.

FROM THE CHAIR:
Tim Flowers

I interviewed for my job at IUP in the spring of 2010. On that interview, my soon-to-be colleague Kimberly Burch talked to me about the Allegheny Mountain Section. She told me about the annual spring meetings and the Section NExT activities. So, when I arrived in western PA that fall, I was already excited about joining the MAA and getting involved in our section. I had the advantage of already being familiar with the MAA (see my letter from last fall's newsletter), but that personal connection from a colleague pushed me to get involved.

This is an example of another way that we can all help expand the mission of our section and the Association – invite our newer colleagues to get involved. And the Spring Meeting is the perfect place to start. When you invite them, also give some advice about how your local campus culture would have them proceed on missing classes for a day. Early career faculty and our adjunct/temporary faculty colleagues can benefit tremendously from our section meeting, but are often very hesitant to miss any Friday classes. (If that is you, please ask around your department for suggestions).

We are excited to head back to the Erie area for our Spring Meeting and we look forward to a great meeting on April 6 and 7 at Penn State Behrend. We have a fantastic lineup of plenary speakers this year. Annalisa Crannell returns to our section to speak again and she will give the Section NExT workshop. MAA President-Elect, Michael Dorff will also be with us. In addition, this is our year to host one of the MAA's Pólya Lecturers, Ken Ono. We have a Pólya Lecture in our section only once every five years, so you will not want to miss this meeting!

We are also excited to make some changes to our programming for students this year, which we think, will be an improvement and help get more of them connected (see front page).

I am going to try one other new thing this year, taking a suggestion from one of the other MAA sections. On Saturday morning, I will host a short session during the faculty talks for members and attendees to provide feedback and ideas about our section. All ideas – small tweaks to grand dreams and everything in between – will be welcome. Check your registration folder for more information.

Have a wonderful semester. I look forward to seeing you in Erie.

Tim Flowers of Indiana University of Pennsylvania, Section Chair

"This is an example of another way that we can all help expand the mission of our section and the Association – invite our newer colleagues to get involved. And the Spring Meeting is the perfect place to start."

SEEKING NOMINATIONS FOR AWARD RECIPIENTS

2018 Allegheny Mountain Section Distinguished Teaching Award

The criterion for the Annual Allegheny Mountain Section Distinguished Teaching Award is a record of extraordinary success in teaching, a record of teaching effectiveness that can be documented, and an ability to foster curiosity and generate excitement about mathematics. It is preferable to have an award recipient whose teaching influence extends beyond their own institution. The nominee should be a member of the MAA, must teach at an institution within the section, and should have at least five years of teaching experience in a mathematical science.

Teaching is to be interpreted in its broadest sense, not necessarily limited to classroom teaching (it may include activities such as preparing students for mathematical competitions at the college level, for example, the Putnam Prize Competition or the Mathematical Contest in Modeling, or attracting students to become majors in a mathematical science or to become Ph.D. candidates).

Please send your nomination, with a description of how the nominee meets the criterion, by March 5, 2018 to:

Dan Shifflet
dshifflet@clarion.edu
Clarion University
Department of Chemistry, Mathematics, and Physics
840 Wood Street
Clarion, PA 16214

2018 Allegheny Mountain Section Service Award

The criterion for the Annual Allegheny Mountain Section Service Award is a consistent record of excellence in service to the section over a period of time. In this context "service" is interpreted in a broad sense to include holding office, coordinating contests, organizing sessions, acting as a panelist, speaking at sessions, acting as the coordinating host for a meeting, or participating in any other activity that contributes to the well-being of the Section. Please send your nomination, with a description of how the nominee meets the criterion, by March 5, 2018 to:

Kim Roth
roth@juniata.edu
Juniata College
Department of Mathematics
1700 Moore Street
Huntingdon, PA 16652

2018 Allegheny Mountain Section Mentor Award

The Mentor Award has been a part of the Allegheny Mountain Section since the year 2000. A nominee should have made significant contributions to the development of undergraduate students in mathematics as scholars. This includes, but is not limited to, encouraging student participation in MAA activities and advising students who make presentations at the Section meetings. Please send your nomination with a description of how the nominee meets the criteria, by March 5, 2018 to :

David Prier
prier001@gannon.edu
Gannon University
Department of Mathematics
162 W. Sixth Street
Erie, PA 16541

SECTION NExT REPORT:
Kim Roth, Juniata College and John Tolle, Penn State DuBois

Our Spring 2018 Section NExT Workshop, titled "Inquiry and Engagement in an Interactive Classroom," conducted by Annalisa Crannell of Franklin & Marshall College, takes place Friday, April 6 at Penn State Behrend, kicking off the Spring Section Meeting April 6-7. The workshop may especially be of interest to newer faculty, and lunch is provided. If you are not on the Section NExT email list already, you can sign up by contacting Kim Roth (roth@juniata.edu) or John Tolle (jut14@psu.edu). Also contact us if you are interested in attending a future meeting, or if you have a new colleague in mathematics whom you'd like to receive emails about Section NExT activities.

The abstract for the workshop is as follows: "Interactive Engagement in the classroom can take many forms: Inquiry Based Learning, Think-Pair-Share, Flipped classrooms, and more. And beyond being a totally trendy pedagogical innovation, interactive engagement increasingly has demonstrated improved outcomes in student learning and retention of mathematics and science. In this workshop/lecture, we'll explore ways to structure an IBL activity, or even an entire IBL course. In addition, we'll learn how the speaker wound up using IBL to teach a class on isomorphisms of quotient groups in a bagel shop. "

SECTION EXECUTIVE COMMITTEE ELECTION

The following three officers will be elected during the business meeting at the 2018 spring section meeting at Penn State Behrend: Chair-Elect, Second Vice-Chair, and Secretary. The nominating committee, consisting of Henry Escuadro (Chair), Tim Flowers and Tami Lakins, is pleased to present the following candidates for these positions.

Chair-Elect

Pam Richardson
Melissa Sovak
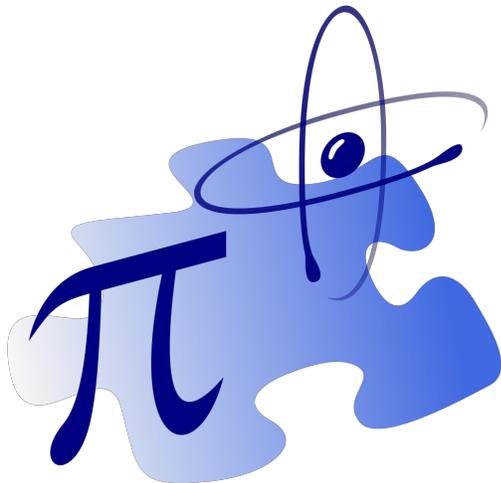John Tolle

Second Vice-Chair

Stacey Levine

Secretary

Kimberly Burch

CANDIDATE BIOGRAPHIES

Pamela Richardson, Westminster College — Candidate for Chair-Elect

Pamela Richardson earned her Ph.D. in Mathematics from the University of Virginia. She is an Associate Professor of Mathematics and Co-director of the Drinko Center for Undergraduate Research at Westminster College. She has significant experience in governance at Westminster, serving on many committees, as Vice Chair of the Faculty, and as an Associate Trustee. Pam has been an active member of the MAA since she was an undergraduate and is also a long-time member of the AMS, the AWM, and the Council on Undergraduate Research. In the Allegheny Mountain Section of the MAA, she served as Puzzle Czar, Coordinator of Student Programs, and Co-coordinator of Section NExT. At the national level, she serves as Chair of the Committee on Undergraduate Student Activities (CUSA), Chair of the Invited Address Committee for JMM 2019, member of the Council on Programs and Students, and member of the AMS-MAA Joint Invited Address Committees for JMM 2019 and JMM 2020. She also served previous terms on CUSA and the Committee on Minicourses. Pam enjoys her work in the MAA and is looking forward to many more years as an active member.

Melissa Sovak, California University of Pennsylvania — Candidate for Chair-Elect

Melissa Sovak is a tenured associate professor at California University of Pennsylvania. She has served for a term as Vice-Chair of the section. Melissa has a Ph.D. in statistics from the University of Pittsburgh and an M.S. in Computational Mathematics from Duquesne University. She has served as the organizer for several state-wide and local conferences and workshops at Cal U. Melissa is also the program coordinator for Cal U's PSM in Applied Mathematics graduate program and Cal U's new BS in Statistics and Data Science program.

John Tolle, Penn State DuBois — Candidate for Chair-Elect

John Tolle (Ph.D. 1996, University of Kentucky) is Instructor in Mathematics at Penn State DuBois, and presently co-coordinator of Section NExT for the Allegheny Mountain Section. He has been a member of MAA for 15 years, involved in the Allegheny Mountain Section for all of those years, giving many talks at section meetings, and in recent years, bringing a few students along. Three of those students subsequently switched their majors from engineering to mathematics. Tolle has been a section officer in the past, serving as Second Vice Chair and First Vice Chair, and has also served his campus on the Enrollment Management Team, the Campus Green Team, and as Faculty Congress Chair and Secretary.

CANDIDATE BIOGRAPHIES

Stacey Levine, Duquesne University — Candidate for Second Vice-Chair

Stacey Levine if a full professor at Duquesne University. She earned her Ph.D. in Mathematics from the University of Florida in 2000 and her research is in PDEs, variational methods, and sparse models with applications in image processing. Stacey has been fortunate to have supervised over 20 undergraduate research projects at Duquesne. These students have presented 76 local, regional, and national talks and posters, four won MathFest presentation awards (2 SIAM, 1 MAA, 1 PME), and twelve have co-authored refereed conference proceedings, full journal articles, cited technical reports, and/or publicly available software. She was honored with the MAA Allegheny Section Mentor Award in 2012 and has has twice served on this Award Committee. Stacey is currently serving a second term as the Program Director for the SIAM Activity Group on Imaging, and in this capacity she co-organized the SIAM Conference on Imaging Science (SIAM-IS) in 2010 and will co-organize SIAM-IS 2020. Stacey and her students have greatly benefitted from regularly participating in the spring MAA Allegheny Section meeting, and she welcomes the opportunity to serve. this active and productive section.

Kimberly Burch, Indiana University of Pennsylvania — Candidate for Secretary

Kimberly Burch received her Ph.D. in graph theory in 2002 from the University of Pittsburgh. She is an Associate Professor of mathematics at Indiana University of Pennsylvania where she enjoys doing research with students whenever possible. Her research interests include chemical graph theory, the effectiveness of online homework systems, using automated response systems for real time classroom assessment, and using graph theory in recreational mathematics. Dr. Burch has served as the Secretary of the Allegheny Mountain Section of the MAA since 2012 and has been an active member of the section since 2005.

BEHREND MEETING SCHEDULE

ALLEGHENY MOUNTAIN SECTION
MAA Annual Meeting, April 6 & 7, 2018
Penn State Behrend, Erie, PA

Schedule of Events

Friday, April 6, 2018

11:30 - 12:30	Section Officer's Meeting
12:30 - 1:30	Section NExT Lunch
1:30 - 3:30	Section NExT Workshop
2:00 - 4:00	Registration
2:00 - 3:45	Book Exhibits
3:55	Welcome from Penn State Behrend
4:00 - 5:00	**Pólya Lecture - Dr. Ken Ono, Emory University**
	Why does Ramanujan, "The Man Who Knew Infinity", matter?
5:00 - 5:45	Registration
5:15 - 6:30	Dinner and Awards
5:30 - 6:15	Student Pizza Dinner
6:15 - 7:00	Student Problem Competition
6:40 - 9:30	Book Exhibits
7:15 - 9:10	Student Talks
9:15 - 10:00	Dessert Reception

Saturday, April 7, 2018

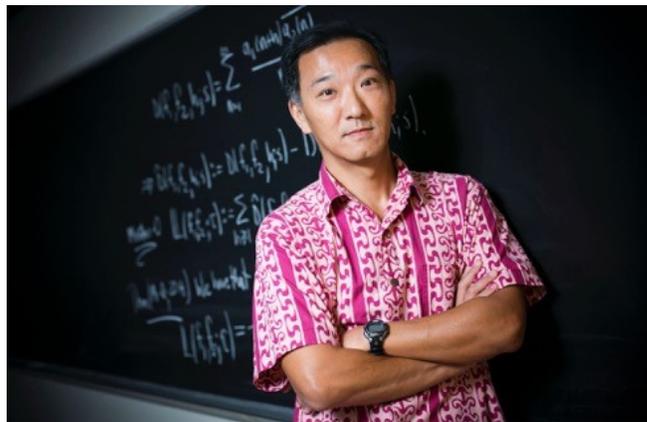|	
7:30 - 8:45	Breakfast
8:00 - 8:45	Section Business Meeting
8:00 - 9:00	Registration
9:00 - 10:00	**Invited Address - Dr. Annalisa Crannell, Franklin & Marshall**
	Drawing conclusions from drawing a square
10:00 - 11:45	Book Exhibits
10:15 - 11:30	Faculty Talks
11:45 - 12:45	**Invited Address - Dr. Michael Dorff, Brigham Young**
	How mathematics is making Hollywood movies better.
12:45	Closing Remarks

Be sure to register and make your hotel reservations soon! Detailed information can be found on the Allegheny Mountain Section's conference website: http://sections.maa.org/allegheny/annual_meeting_2018/meeting2018.htm

INVITED SPEAKERS: TALK TITLES & ABSTRACTS

Ken Ono

Title: Why does Ramanujan, "The Man Who Knew infinity", matter?

Abstract: Ramanujan's work has has a truly transformative effect on modern mathematics, and continues to do so as we understand further lines from his letters and notebooks. In this lecture, some of the studies of Ramanujan that are most accessible to the general public will be presented and how Ramanujan's findings fundamentally changed modern mathematics, and also influenced the lecturer's work, will be discussed. The speaker is an Associate Producer of the film The Man Who Knew Infinity (starring Dev Patel and Jeremy Irons) about Ramanujan. He will share several clips from the film in the lecture.

Annalisa Crannell

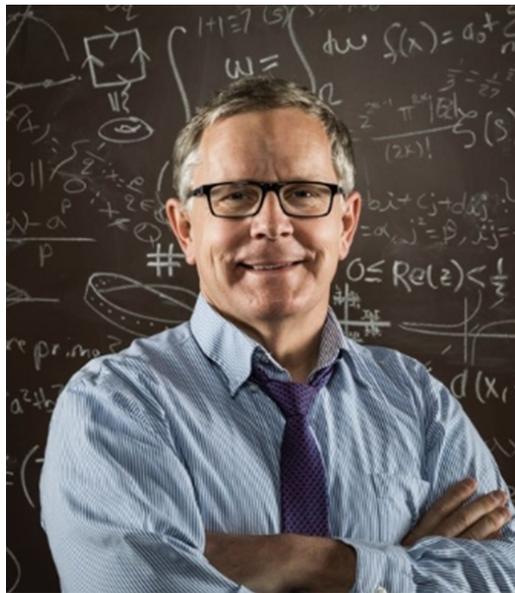**Title:** Drawing conclusions from drawing a square.

Abstract: Those of us who teach projective geometry often nod to perspective art as the spark from which projective geometry caught fire and grew. This talk looks directly at projective geometry as a tool to illuminate the workings of perspective artists. One of the surprising results of using this tool is that it implies that every quadrangle (whether convex or not) is the perspective image of a square. We will describe implications of this result for computer vision, for photogrammetry, for applications of piece-wise planar cones, and of course for perspective art and projective geometry.

MAA
MATHEMATICAL ASSOCIATION OF AMERICA

Michael Dorff

Title: How mathematics is making Hollywood movies better.

Abstract: What's your favorite movie? *Star Wars? Avatar? The Avengers? Frozen*? What do these and all the highest earning Hollywood movies since 2000 have in common? Mathematics! You probably didn't think about it while watching these movies, but math was used to help make them. In this presentation, we will discuss how math is being used to create better and more realistic movies. Along the way we will discuss some specific movies and the mathematics behind them. We will include examples from Disney's 2013 movie *Frozen* (how to use math to create realistic looking snow) to Pixar's 2004 movie *The Incredibles* (how to use math to make an animated character move faster). Come and join us and get a better appreciation of mathematics and movies.

UPCOMING MEETING

MAA MathFest
August 1 - 4, 2018 in Denver, CO
Registration begins February 12

SECTION FACULTY NEWS

Shelly Bouchat (IUP) presented "Linear Algebra: A Flipping Success" in a special session on flipped classrooms ("MAA Session on Flipped Classes: Implementation and Evaluation") at the Joint Mathematics Meetings. She also served as an invited panelist on the panel "Out in Mathematics: Professional Issues Facing LGBTQ Mathematicians".

SECTION STUDENT NEWS

Undergraduate Mathematics Day

Two of Shelly Bouchat's (IUP) students presented their projects at the University of Dayton on Undergraduate Mathematics Day.
Victoria Jakicic presented "Magic Polygons and Their Properties" and **Lewis Dominquez** presented "Representations of Real Numbers Using a Finite Sum of Elements From an Open Set".

Student Presentations at the Joint Mathematics Meetings

Victoria Jakicic (IUP)
Title/Abstract: Zeros of Newform Eisenstein Series on $\Gamma_0(q_1q_2)$. During a Research Experience for Undergraduates at Texas A&M in the summer of 2017, we examined the zeros of newform Eisenstein series $E_{\chi_1,\chi_2,k}(z)$ of weight k on $\Gamma_0(q_1q_2)$, where χ_1 and χ_2 are primitive characters modulo q_1 and q_2, respectively. In this talk, we will use the Fourier expansion to examine the zeros where the imaginary part is greater than $\sqrt{k}$.

Xueyi Lei (W&J)
Title/Abstract: Construction and Completion of a Latin Square. An n × n Latin square is an n × n array of n symbols, where each symbol occurs once in each row and column. We show several ways to construct a Latin square using permutations and the group structure of Z_n. We also investigate the completion of several types of partial Latin squares using the Marriage Theorem.

Catherine L McAdoo and **Greg Lu** (W&J)
Title/Abstract: Partition of Integers Through Euler and Beyond. Our study is inspired by Euler's generating function for integer partitions. With the Ferrers Diagram as a graphical representation of partitions, we investigate some variations of the original Euler's generating function and their corresponding effects on the several types of partitions and their counts p(n). Further on, we outline and explain a few identities of integer partitions. In some of these identities we observe that the graphical representations provide clearer visualization of the partition process and thus offer insights on the proofs, which are backed by algebraic proofs through bijection.

Samuel C Schaub and Ryan S Higginbottom (W&J)
Title/Abstract: Properties of a generalized determinant. In this talk we define a determinant for any (not necessarily square) matrix. This function shares many properties with the traditional determinant, including results about nonzero determinants and linearly independent vectors. We will discuss which of the familiar statements in the Invertible Matrix Theorem have analogues for non-square matrices via this generalized determinant.

Denver Stahl and Roman Wong (W&J)
Title/Abstract: Any Which Way You Split. The splitting problem is an effective way to illustrate the concept of strong induction. We start by splitting a pile of n objects into two piles of r and s objects, respectively. We then compute the product r × s. We repeat this process for the smaller piles, splitting each into 2 piles any which way we want until we are left with n piles of 1 object. Finally, we calculate the sum of all these products, $\sum r \times s$. It is a surprising discovery that this sum of products is always the same for a given n regardless of how the piles are split in the process. Can we generalize this problem to splitting into 3 piles? 4 piles? What about k piles? Can we find a method of splitting such that, no matter how we split, we find an invariant? In this talk, we delve into this generalization and provide an answer to these questions.

Shulai Yang (W&J)
Title/Abstract: Square Roots of 2 × 2 Matrices. The square root of a 2 × 2 matrix A is a matrix B such that $B^2 = A$. We show how the diagonalization method and the Cayley-Hamilton Theorem can be used to find the square root of a 2 × 2 matrix. Along the way, we can determine what matrices have square roots and how to count them.
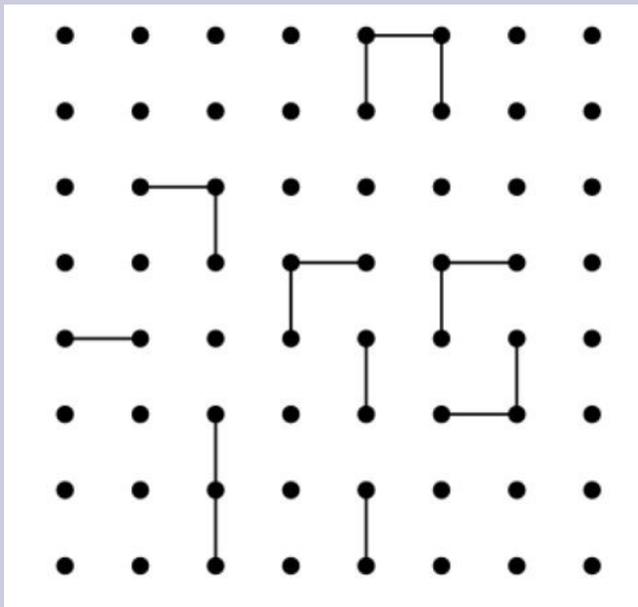
FOUND MATH

MAA Found Math Photo:
submitted by Joseph Petrillo

Spiral staircase in the Old Point Loma Lighthouse in San Diego, California

Found Math is a photo gallery of mathematical images on the MAA website.

https://www.maa.org/community/columns/maa-found-math

SPRING PUZZLE
ROUND TRIP

To complete the puzzle, connect the dots with lines (horizontal or vertical only) so that each dot is visited only one time and the lines form a single connected loop.

Puzzle from http://innoludic.com

Hint: There is only one possibility for each dot located in the corners of the puzzle.

Do you have any exciting news you would like to share? If so, please send it to me! We would love to hear what you and/or your students are doing within our section.

Newsletter Editor

Kim Jones

Washington & Jefferson College

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