THE SEAWAY CURRENT

Newsletter of the Seaway Section of the Mathematical Association of America

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THE SEAWAY CURRENT

The Seaway Current is published twice per year by the Seaway Section of the Mathematical Association of America (MAA) for the benefit of its members. Its pages are open to all members of the MAA and, by invitation to others, for the exchange of information and opinion. Contributed announcements, articles, and editorials are welcome and should be sent to the editor.

Material may be submitted to the editor by e-mail. Opinions expressed in this newsletter are those of the editor or of individual contributors and do not necessarily represent the views of the MAA or of the Seaway Section.

Editor

Elizabeth Wilcox, Asst. Professor Department of Mathematics Oswego State University of NY tel. 315-312-6586 elizabeth.wilcox@oswego.edu

Rochester Institute of Technology will host the Fall 2016 meeting, October 21-22.

RIT's School of Mathematical Sciences is home to programs in applied mathematics, applied statistics, computational mathematics, and actuarial science. The School emphasizes understanding mathematical principles and a broad base of mathematics, while offering specializations in areas such as statistical forecasting, digital encryption, and mathematical modeling. (School of Mathematical Sciences)

Special Notice: Registration must be faxed, emailed, or mailed to Dr. Raluca Felea and received no later than October 10. Head to the meeting website for registration and accommodations information.

Thank you RIT for hosting our meeting!

FALL 2016: THE INVITED SPEAKERS



Friday Banquet Speaker: Bruce Pitman, University of Buffalo

Title: I Don't Know Where I'm Gonna Go When the Volcano Blow

Abstract:

The prediction of many natural hazards, such as volcanic eruptions, earthquakes, and tsunamis can be estimated using field data and high performance computer simulations. However the computational work

involved in these simulations is very large, and the challenges of combining field data with simulations are significant. Important in predicting the hazard impact is an understanding of the uncertainty present in these models and their input parameters. In order to be effective in hazard warning, time to prediction is critical. This talk will address all these aspects of hazard prediction, within the context of volcanic eruptions.

Biography: E. Bruce Pitman is a Professor in the Department of Materials Design and Innovation at the University at Buffalo. Pitman earned his Ph.D. from Duke in 1985, and was a post-doctoral fellow at the Courant Institute before joining UB's Math Department in 1989. He has been Vice-Provost, Associate Dean, and just completed an appointment as Dean of the College of Arts and Sciences at Buffalo. He is the author of some 75 peer reviewed papers on topics ranging from the constitutive relations for granular materials to Hopf bifurcation in a model of blood flow in the kidney. For the past 15 years he has been studying volcanic eruptions, including airborne ash clouds and overland pyroclastic flows, and hazard predictions.

SPRING MEETING: March 31 - April 1 at the State University of New York at Oswego

Cristina Gomez, Ithaca College (Randolph Lecture)

Title: Mathematics for All

Abstract:

Mathematics education as a professional field started in the last part of the 19th century and since mathematicians and educators have worked together to support the improvement of students' mathematical learning. But sadly, the widespread beliefs in our society that only few are "good" at math, that is ok not to excel in math, or that math is "natural" prevails. Segregation by achievement level in mathematic classrooms is common in almost every school, even in early grades, resulting in inequities in the experiences students have in the classroom. As a result, the number of students selecting mathematics or mathematics-related careers is low and, more alarming, the number of students of color and women in mathematics is even lower. What can we, as future mathematicians or as mathematics faculty, do to promote a more positive view of mathematics?



Biography: Cristina Gomez earned her Ph.D. from the University of Wisconsin-Madison in 2000. She is the coordinator of the teaching option at the mathematics department at Ithaca College where she has taught since 2006. She has been working with mathematics teachers for over 30 years, teaching methods courses for elementary and secondary teachers and organizing professional development workshops for in-service teachers. She is interested in teachers' pedagogical knowledge needed for teaching mathematics for understanding and has worked with faculty at mathematics departments to create content courses for elementary teachers. In New York State, she has participated in the Mathematics Masters Teachers Program and in the Common Core Test Standard Setting Panels. She has presented her work in regional, national and international conferences.

Patrick X. Rault, University of Arizona South and SUNY Geneseo

Title: Numerical Ranges over Finite Fields: A Discrete Analogue of a Complex Problem



Abstract:

Mathematics includes the diverse areas of algebra, analysis, and geometry. Studying the interplay between these areas can lead to striking breakthroughs in our understanding of the deep structure of mathematics. Given a square matrix, we can calculate its determinant, trace, eigenvalues, and eigenvectors to deduce its core structural properties. A lesser known core invariant of the matrix is a set of complex numbers known as its numerical range. If *A* has complex entries, then the numerical range of *A* is a convex set of complex numbers which contains the eigenvalues of *A*. While these complex numerical ranges have been completely classified for $n \times n$ matrices with n < 5, little is known in higher dimensions. When we consider these matrices over finite fields, new simplifications and complications arise. History tells us that the study of these analogous problems can provide new insight on the original problem. Here we will discuss the pioneering work on these finite field numerical ranges by undergraduates at SUNY Geneseo, as well as some

new generalizations using the machinery of number theory. It is foreseeable that a complete classification of finite field numerical ranges could be accomplished in the coming decade, which could in turn shed light on what a classification for complex matrices would look like.

Biography: Dr. Patrick X. Rault is an Associate Professor at the State University of New York College at Geneseo, currently on leave at the University of Arizona South. Patrick is a 2008 Project NExT Fellow of the MAA and recipient of the 2015 Henry L. Alder Award presented by the Mathematics Association of America. Patrick has done research in number theory

and matrix analysis. In 2013, Patrick co-founded the Upstate New York Inquiry-Based Learning Consortium. For his work on bridging the gap between research and the classroom he was awarded with the Council on Undergraduate Research's inaugural Faculty Mentoring Award for Outstanding Mentoring of Undergraduate Students in Research. His textbook, *A TeXas Style Introduction to Proof*, will be published by the MAA this spring.

Tim Chartier, Davidson College

Title: Mime-matics

Abstract:

In Mime-matics, Tim Chartier explores mathematical ideas through the art of mime. Whether creating an illusion of an invisible wall, wearing a mask covered with geometric shapes or pulling on an invisible rope, Dr. Chartier delves into mathematical concepts such as estimation, tiling, and infinity. Through Mime-matics, audiences encounter math through the entertaining style of a performing artist who have performed at local, national and international settings.

Biography: Dr. Tim Chartier specializes in data analytics. He frequently consults on sports analytics questions, including projects with ESPN Magazine, ESPN's Sport Science program, NASCAR teams, the NBA, and fantasy sports sites. Tim is 2nd Vice President of the MAA. In 2014, he was named the inaugural Math Ambassador for the MAA, which also recognized Dr. Chartier's ability to communicate math with a national teaching award. His research and scholarship were recognized with the prestigious Alfred P. Sloan Research Fellowship. He's published *When Life is Linear: From Computer Graphics to Bracketology* (MAA) and *Math Bytes: Google Bombs, Chocolate-Covered Pi, and Other Cool Bits in Computing* (Princeton University Press). Through the Teaching Company, he taught a 24-lecture series entitled "Big Data: How Data Analytics Is Transforming the World."



In K-12 education, Tim has worked with Google and Pixar on their educational initiatives. Dr. Chartier has served as a resource for a variety of media inquiries, including appearances with Bloomberg TV, NPR, the *CBS Evening News, USA Today*, and *The New York Times*.

FALL 2016: SPECIAL EVENTS

Micro-Course – *R Markdown for beginners: Formatted documents that update through code* **Taught by:** Rob Rolleston, Xerox Corporation **Fee:** \$15 Friday, October 21, 2:30 - 5:30

Description: R Markdown is a file format for making dynamic documents with R. An R Markdown document is written in markdown (an easy-to-write plain text format) and contains chunks of embedded R code (see Introduction to R Markdown). Rather than just commenting your code, the paradigm is to create a live formatted document, with embedded code, that can be executed and updated as your data changes. In this tutorial we will introduce the concept of "Reproducible Research", and how to achieve the goal of helping others understand the process and thoughts which lead to your conclusions.

We will be working through several examples to create interactive HTML pages, and show how to produce PDF documents and presentations slide decks. Participants should have a working knowledge of R, and we will use the R-Studio IDE. Some cursory knowledge of HTML5 & CSS3 is helpful but not necessary. Participants should bring their own laptops and may want to pre-install the packages; "markdown", "DT", "leaflet", and optionally "ggplot1", "dplyr", and "tidyr".

Learn more about Rob and see samples of his work at rob.rolleston.homewebsite.info.



Seaway Estimathon

Friday night, following the banquet speaker at the Double Tree Hotel Ballroom Hosted by Blair Madore, SUNY Potsdam

Description: Come one, come all to the first ever Seaway MAA ESTIMATHON! Teams will use their mathematical powers to estimate numerical constants reflecting "real life" values. The best estimators will receive prizes and most importantly the glory of the win. Faculty and students can participate. Each team must contain at most one faculty member and members from at least three different colleges.

Panel on Careers Using Mathematics

Saturday 11:10 - 12:05, Thomas Gosnell Hall, Room 2150

Organized by Keiko Dow, D'Youville College

Description: Representatives from business or industry will come together on a panel so that participants can ask them questions about their career path. Panelists include representatives from Xerox, Paychex, Apple, MedAmerica, and Nielsen. This session is designed for students! If your students struggle to see what their future beyond college might look like, listening to these panelists (and asking questions) may prove enlightening.

Seaway NExT Discussion: Re-Energizing Your Career at All Stages

Saturday 11:10 - 12:05, Thomas Gosnell Hall, Room 2300

Organized by Nathan Reff, The College at Brockport

Description: The Seaway NExT discussion session is open to anyone who would like to join the conversation, share their experiences and learn something new. The purpose of the session is to provide a faculty development networking opportunity with a focused theme. This year, the topic is "Re-Energizing Your Career at All Stages," so it is safe to say everyone should have something interesting to share!

Workshop on Leadership in the Mathematical Sciences Saturday 2:05 - 3:00, Thomas Gosnell Hall, Room 2305 Hosted by Mihail Barbosu, Rochester Institute of Technology *Topics:*

Tenure and Promotion Process and Criteria Handling Difficult Situations

Inquiry Based Learning (IBL) Special Session

Saturday 1:35 - 3:00, Thomas Gosnell Hall, Room 2300 Organized by Patrick Rault, University of Arizona South & SUNY Geneseo

- Yousuf Georg (Nazareth College), 1:35-2, *A Departmental Transition to Inquiry-Based Learning* **Abstract**: Over the past three years the Mathematics Department at Nazareth College has transitioned to using Inquiry-Based Learning in virtually every class we teach. We will discuss how this transition began, what supports made it possible, as well as what teaching and learning looks like in the department today.
- Perry Y.C. Lee (Kutztown University of Pennsylvania), 2:05-2:30, *Giving Students the Opportunity to Effectively Communicate Mathematical Ideas Through Active Learning* Abstract: Learning requires doing, and only through inquiry is learning achieved. We begin by discussing the use of active learning across mathematics curriculum. We submit that students understand by both asking and answering questions; by engaging; and, by explaining to one's self and one's peers' concepts. Active learning creates a dynamic learning environment which enables students to understand mathematics.

 We continue by presenting both the successes and the failures in using active learning. We focus on how active learning, namely, inquiry-based learning (IBL), through speaking effectively forges students' confidence, and motivates students to hone their precise use of language to communicate math. IBL encourages students to delve deeply into concepts rather than shallowly be trained to regurgitate information.

We conclude with remarks about the results of an assessment study that the author and a colleague have been conducting in College Algebra for the past two years.

- Ryan Gantner (St. John Fisher College), 2:35-3, I can't spell "Seaway" without "IBL"
- Abstract: In the past few years there have been several sessions, workshops, guests, and activities at our Seaway meetings focused on Inquiry-Based Learning in mathematics (IBL). Much of this has been driven by the Upstate New York Inquiry-Based Learning Consortium (UNY IBL), a grant-funded program with a charge to develop and maintain

a network of IBL practitioners across the region. As our grant period begins to draw to a close we must step back and assess what the impact has been and where we go from here. With input from you (the audience and members of the Seaway Section) we begin to draw up the next stages of this process so that we can maintain a purposeful presence at Seaway meetings into the future that is both useful and appealing.

A NOTE FROM THE SECTION CHAIR – FALL 2016

As the weather turns to fall once again, those of us in academia may find ourselves going through the same routine we have several times before. Writing syllabi. Preparing courses (though perhaps new ones). Writing notes. Meeting students (hopefully some new ones). Reading as much as possible, though not as much as we would like. Falling behind on our e-mails. Falling behind on our grading. Staying up later than we would like. Getting up earlier than we would like. Falling even further behind on our grading. Being rewarded with the joy of witnessing mathematical discovery in our students.



Yes, it can become routine. But it becomes more enjoyable when the routine gets mixed up a bit. That's why we try new things like volunteer for new committees, join new organizations, volunteer in our community, take our families camping, go for hikes and bike rides, walk in the sunshine, or get a new

puppy. It's the change of routine that helps us continue to stay focused and energized for the things that are repetitive. And even if the repetitive things are enjoyable and positive, sometimes it's nice to mix it up.

I've been coming to MAA Seaway meetings since 2007. And I've been involved in the leadership of the Seaway Section in some form since 2008. It seems to me that the Seaway meetings have fallen into a routine. Friday banquet. Banquet speaker. Two talks Saturday, then either Randolph or Gehman depending on the time of year. Then lunch, followed by contributed talks and anything "special" that we want to put in the conference. NExT is on Friday afternoons in the Spring. It's not a bad routine, but it is a routine nonetheless. Having said my spiel about routines, you may anticipate my conundrum. Therefore, when I became Chair of the Section, I took it upon myself to examine these routines. In particular, are we doing things the way we've always done them because it's the way we've always done them? Or are we doing things the way we've always done them because that's the best way to do them? If it's the latter – fantastic! But if it's only the former, then perhaps we should think about whether we can be open to new ideas as a section.

To this end, at the Spring 2016 Seaway meeting at SUNY Geneseo a survey was administered. The survey asked questions about a variety of topics with a broad theme of "routine". There were 56 surveys turned in, which is a response rate of under 50% (there were around 200 people at the conference and more than 100 at the closing talk). One of the changes of routine that was made at the Geneseo meeting was moving one of the plenary talks to the end of the conference. The survey results showed that respondents were fairly ambivalent to this change (some really liked it, some really disliked it, most responses were in the middle but slightly favorable). We do understand there is likely a sampling bias on this question; those opposed to the change were more likely to leave before the talk started and not turn in a survey. We will continue the closing keynote for the Fall 2016 meeting at RIT and reevaluate to see if this is a tradition worth keeping.

The survey also asked several questions about the time footprint of the meeting. In general there was significant hesitance to moving the conference time (earlier on Friday, later on Saturday, or making the conference on Saturday and Sunday). We gathered some suggestions for workshop topics and asked people what motivated them to come to the conference. The most common responses here were either about networking or about attending the contributed and/or student talks (depending on whether the survey was filled out by a faculty member or student).

Also at the Spring 2016 meeting I facilitated a brainstorming session on ideas for the future. As a result of that session we have a micro-course (smaller than a mini-course!) at this fall's meeting, as this was an idea that was met with enthusiasm. I will also put out a call for volunteers for committee members to begin work to create a Seaway Distinguished Lecturer, which was another idea which was met with enthusiasm. Finally, it became evident in discussions that our undergraduate population could be better served programmatically at our meetings. In response, a panel on Careers Using Mathematics is aimed at that population for the Fall 2016 meeting.

While these small changes do not constitute dramatic shifts in the way things operate, they do represent a measured approach to examining the status quo. If nothing else, maybe we'll find that the way we had been doing things really was the best way all along! Therefore, I ask that you keep an open mind and keep sending us suggestions for new and interesting things to do. I hope your fall is filled with aspects both novel and routine, both of which are thoroughly enjoyable. And I look forward to seeing you at RIT in October.

Ryan Gantner, St. John Fisher College Section Chair

REPORTS & MINUTES SINCE SPRING 2016

1. GOVERNOR'S REPORT – FALL 2016 James Conklin, Seaway Section Governor

Shortly after its founding (101 years ago!), the MAA was officially incorporated with the filing in Illinois of an Articles of Incorporation. Recent changes in U.S. and Illinois law regarding non-profit organizations necessitated an update of the Articles of Incorporation and the Association's Bylaws. Discussions about to update these new Bylaws to meet communication and governance challenges have been a major focus of the Board of Governors for the past few years. This work culminated in a proposal that the Board of Governors approved with broad consensus at its August meeting at MathFest in Columbus. The proposal will now go to a vote of the general membership.

Please watch for an upcoming issue of FOCUS which will give the motivation and details of the new proposed governance structure. This proposed changes would create a nine-member Board of Directors [roughly mirroring the current membership of the Executive Committee of the Board of Governors – President, Vice-President, Secretary, etc.] and a large Congress [roughly the membership of the current Board of Governors, including representatives from all of the Sections]. The Board of Directors will have oversight and fiduciary responsibility; the Congress will have representative and communication responsibilities.

Following current bylaws, the vote will take place at the business meeting at the Joint Meetings in Atlanta (Saturday, Jan. 7, 11:10 in Atrium Ballroom, Marriott). Please attend and vote if you can; an e-mail invitation to attend this meeting will go out to all MAA members. Please watch for the upcoming FOCUS article and please don't hesitate to contact me (conklin@ithaca.edu) if you have any questions.

In other news coming out of the MathFest meeting, it was decided to abandon the liaison method of communication at the national level in favor of direct e-mail communication. We can still maintain the liaison system for Seaway Section communications if we wish. Finally, please strongly consider the benefits of Departmental Membership for your department which includes memberships for all of your undergraduate and graduate mathematics students. Letters describing the Departmental Memberships are being sent to all department chairs.

Jim Conklin, Ithaca College Seaway Section Governor

2. Report from the Chair of the Section – Fall 2016

- (a) A memo was circulated to the executive board on 5/18/16 detailing the results of the survey administered at the Spring 2016 Seaway meeting at Geneseo. This was followed by a formal response to this and the visioning session, circulated to the executive board 6/6/16. The response gives suggestions for future action, including:
 - i. The RIT meeting should have a closing keynote should logistics allow for it.
 - ii. The RIT meeting should have a micro-course.
 - iii. A call be put out to create a committee to begin working on a Seaway Distinguished Lecturer position.
 - iv. Possible panel on undergraduate careers at a future meeting.
 - All of these have been done except for (iii), which will be done at this meeting.
- (b) As mentioned above, there will be a call made this meeting for a committee to form a Seaway Distinguished Lecturer.
- (c) We have once again been asked to fund a Project NExT fellow. This was not met with widespread enthusiasm by

the membership at last year's visioning session.

- (d) A call should be put out to find a Public Information Officer, with the renewed charge of establishing a social media presence for our Section, establishing a logo and look, and working with the webmaster to create a unified digital presence for the Section which enables us to effectively communicate with our members.
- 3. TREASURER'S REPORT FALL 2016 Gary Towsley, Seaway Section Treasurer

Balance as of 3/01/2016		\$15,144.57
Spring Meeting at SUNY Geneseo		
Meeting Receipts	\$6,899.82	
Meeting Expenses	\$6,550.00	
Net		\$349.82
Speaker Expenses, Honoraria		\$657.60
Balance as of 9/15/2016		\$14,836.79

It should be noted that the subvention check and the \$250.00 for travel reimbursement for a section officer to attend MathFest have not arrived yet. They should both be in our account by October 1 according to the MAA. The subvention check will be somewhere in the neighborhood of \$1200.

4. THE EXECUTIVE COMMITTEE MEETING – April 15, 2016

Present: Ryan Gantner (Chair), Jonathan Cox (1st Vice-Chair), John Maceli (at-large), Steve Kilner (2nd Vice-Chair), Gary Raduns (Secretary), Jim Conklin (Governor), Charlie Ragozzine (past-chair).

Absent: Gary Towsley.

The meeting was called to order around 3:15 pm.

The **minutes** were approved with the correction of the spelling of Steve Kilner.

The Seaway Section **Governor**, Jim Conklin, provided a written report and noted pending changes in the governance structure of the association and continued discussion in the Governor's meetings of the "value question" for membership. According to reports to the Governors, "core membership" is increasing.

Gary Towsley provided a written **treasurer's report**. Of note, the Section provided some "relief" totaling \$1000 for the Fall 2015 meeting to the mathematics department at St. Lawrence University for expenses usually taken on by the host institution. Discussion ensued regarding how much financial support the Section should provide local organizers. One suggestion emerged: to keep the meal costs closer to the actual cost but increase the registration fee with a portion of the increase to help offset the host's costs.

First Vice Chair expressed thanks to the local organizers, especially for the additional logistics required for a closing plenary lecture. Plenary lectures for this meeting are Bob Rogers for the banquet, Andrew Simoson, Carl Lutzer and L. C. Kappe (Gehman Lecture). A survey will be given to help evaluate response to a closing plenary lecture and to gauge reaction to other programming suggestions. Online registration to permit credit card payments seemed to work well except for the necessity of a one-cent registration fee for students (no way to get free). As of April 13, approximately 219 had registered for the meeting including 120 undergraduates. Speakers planned for the Fall 2016 at Rochester Institute of Technology are Tim Chartier (MAA Visitor), Patrick Rault (Alder Award), Christina Gomez (Randolph Lecture), and Bruce Pittman as banquet speaker.

Chair's Report. The Chair distributed a list of Seaway Section Committees, subject to the outcome of elections at the Business Meeting. Ryan also noted the additional support to St. Lawrence University of the Fall 2015 meeting. The Executive Council also had brief discussion on whether to create a budget line for Seaway NExT (prompting questions of remaining external funds for Seaway NExT and the paper trail related to the initial grant).

New Business focused on discussion of ideas for expanding the activity of the Section. Ideas included: collaboration with HRUMC (Spring 2019 or later), adopt the St. Lawrence Univ. - Potsdam research conference, mico-courses

(small fee), sponsoring MAA Project NExT fellow, hosting a larger scope undergraduate research conference, a Seaway Section Distinguished Lecturer program.

The Executive Committee Meeting adjourned at 4:55 pm.

Respectfully submitted,

Gary L. Raduns, Jr. Seaway Section Secretary

5. THE EXTENDED EXECUTIVE COMMITTEE MEETING – April 15, 2016

The Extended Executive Committee convened at 5:10 pm.

Minutes of the Fall 2015 Extended Executive Committee meeting were approved with no objections.

The chair provided a summary of the activity in the preceding Executive Committee meeting and distributed the committee list (pending election outcomes tomorrow).

The Program Committee reported as above on the speakers for today's meeting, plans for future locations and speakers.

Student Program Committee chair Dave Brown sent a report highlighting thirty student presentations at this meeting and trends in the number of presentations over the past few years. The past four fall meetings have included 13, 13, 13, and 8 presentations respectively; the past few spring meetings 23, 16, 18, 36 and this year 30 student presentations.

The Randolph Lecture Committee reports that Christina Gomez of Ithaca College will be the Randolph Lecturer at the Fall 2016 Meeting at RIT, October 21-22.

The Gehman Lecture Committee reports that Louise-Charlotte Kappa will present the Gehman Lecture at this meeting. The committee is working to identify the next Gehman Lecturer.

Educational Policies Committee had no report.

Patti Frazer Lock will be recognized at this meeting as the recipient of the Clarence Stephens Distinguished Teaching Award. Nominations for the next recipient will be due February 1, 2017.

The Nominating Committee reports nominations for the following positions with elections to be held at the Business Meeting tomorrow.

- Chair-Elect: Jonathan Cox
- First Vice-Chair: Cheryl Chute Miller
- Second Vice-Chair: Steve Kilner
- Secretary: Gary Raduns
- At-Large Member: Jeff Johannes

Liaison Coordinator, Jeff Johannes reports that despite our efforts, we still do not have liaisons for many schools, primarily among the Community Colleges and the colleges and universities in Canada. The Association's liaison program is more or less defunct. Seaway Current editor had no report.

Seaway NExT. Matt Koetz is concluding his service as chair of Seaway NExT and will be succeeded by Nathan Reff. Seaway NExT sponsored an IBL Workshop today with approximately 20 participants.

Webmaster had no report.

In further discussions the group talked about future directions, whether to continue the closing keynote speaker, and reiterated a desire for a shorter Randolph lecture with ample discussion time following.

The Extended Executive Committee adjourned at 5:40 pm.

Respectfully submitted,

Gary L. Raduns, Jr. Seaway Section Secretary

6. THE BUSINESS MEETING – April 16, 2016

The Business Meeting of the Seaway Section convened at 9:50 am, April 16, 2016.

Hearing no objection the minutes of the Fall 2015 Business Meeting were approved.

The following officers were elected by acclamation:

- Chair-elect, Jonathan Cox (2016-17, to serve as chair 2017-2019, and past-chair 2019-2020)
- First vice-chair, Cheryl Chute Miller (2016-2018)
- Second Vice-Chair, Steve Kilner (2016-2018)
- Secretary, Gary Raduns (2016-2019)
- At-large, Jeff Johannes (2016-2018)

Chair, Ryan Gantner highlighted a visioning discussion to be held this afternoon to discuss ways to expand the activity of the Section.

Governor Jim Conklin reported on January Board of Governor's meeting highlighting ongoing discussion of changes to the Governance Structure of the MAA.

Treasurer Gary Towsley presented a brief report highlighting balances and a small loss on the last meeting. Opening balance (9/15/2015): \$15,663.41. Closing balance (3/01/2016): \$15,144.57.

The first vice-chair reported on registrations for this meeting (219, including 120 undergraduates). Venues have been lined up for the next five meetings including RIT for October 21-22, 2016 and SUNY Oswego for Spring 2017. Keynote speakers for this fall meeting are Robert Rogers (banquet speaker), Luise-Charlotte Kappe (Gehman Lecture), Andrew Simoson, and Carl Lutzer. Speakers for the Fall 2016 meeting have been arranged: Tim Chartier (MAA Visitor), Patrick Rault (Alder Award), Christina Gomez (Randolph Lecture), and Bruce Pittman as banquet speaker.

The Student Program Committee reported 120 undergraduates registered to attend and 30 undergraduate presentations. The Committee expresses its thanks to Elizabeth Wilcox for filling in as host of the student math competition.

The Randolph lecture committee reports Christina Gomez of Ithaca College as the Randolph Lecturer for the Fall 2016 Section Meeting.

The Gehman Lecture Committee selected Luise-Charlotte Kappe as the Gehman Lecturer for today's meeting and is considering a few possibilities for next spring.

The Distinguished Teaching Award Committee recognized Patti Frazer Lock as this year's recipient of the Clarence Stephens Distinguished Teaching Award. The committee welcomes nominations by February 1 and notes that recent nominees remain in the nomination pool.

The meeting adjourned at 10:03.

Respectfully submitted,

Gary L. Raduns, Jr. Seaway Section Secretary

Monroe Community College:

The Department welcomed Claudio DiMarco as our newest full-time faculty member. Claudio, who has a Ph.D. in Mathematics from Syracuse University, joined us from the University of Pittsburgh at Bradford.



Monroe Community College

Several full-time faculty members and adjunct faculty members received promotions:

- Promoted to Associate Professor: Donald Cater and Michael Wagner
- Promoted to Assistant Professor: Matthew Williams
- Promoted to Adjunct Professor: Kevin Krueger, Cindy Smith, Mary Beth Strohm, and Olga Tsukernik
- Promoted to Adjunct Associate Professor: Carlo Atene
- Promoted to Adjunct Assistant Professor: Joshua Brodersen, Carrie Gaida, and Sean Horan

David Jehle was honored in May as the eleventh recipient of the Department's annual award for Adjunct Excellence in Teaching. He was chosen from over 70 adjuncts by a committee which included past recipients, the adjunct coordinators, and the department chair.

In April, Steve Kilner was elected as Second Vice-Chair of the MAA Seaway Section.

Also in April, Rachel Santiago and Karen Wells presented at the NYSMATYC Annual Conference in Kingston. Their two joint presentations on high impact practices were "Writing in Math? Seriously?" and "Collaboration to Save the Day."

Dick Stewart retired on January 1 after 13 years of teaching.

We were saddened by the death of two colleagues. Pamela Keyes passed away on January 19 at the age of 69. She had retired from full-time teaching a few years ago, but was still active as an adjunct faculty member. Kevin Krueger, an adjunct faculty member who taught statistics, died on August 6 at the age of 54. (Submitted by Patricia Burgess)

Roberts Wesleyan College:

The Computer Science, Mathematics and Physics Department moved back into the newly renovated (and renamed) Merlin G. Smith Hall. Facilities for the department include student collaboration space (aka "The Space") lined by faculty offices,



electronics laboratory, computer science laboratory, general and advanced physics laboratories and an optics laboratory. The department also has use of two adjacent computer classrooms that can be combined for a total of 40 student workstations. The space allocated is nearly double the space we had scattered throughout Merlin G. Smith Science Center prior to the renovation and gathers the faculty, student space, and labs together on one floor. The faculty and students are thrilled with the beautiful renovations and the potential for increased interaction in our labs and The Space.

Merlin G. Smith Hall was first dedicated in 1970 and named in honor of Dr. Merlin G. Smith. Dr. Smith was President of the College from 1933 to 1957 and a mathematician and astronomer. Dr. Smith presided through the transition from a seminary (high school also offering the equivalent of the first two years of college) to a junior college to a baccalaureate institution. Roberts Wesleyan College marks its 150th anniversary this year and now offers masters degrees in number of areas and (beginning this year) its first doctoral program (Psy. D. in Clinical-School Psychology). (Submitted by Gary L. Raduns, Jr.)

St. Bonaventure University:

St. Bonaventure University (SBU) is delighted to welcome Christine Uhl to its faculty beginning in the fall of 2016. Christine completed her Ph.D. in mathematics at the University of North Texas in May.



On May 20 and 24, 2016, Chris Hill directed a "geometry barn raising" at Allegany-Limestone Central School (ACLS). Linda Dodd-Nagel?s 67 8th-grade math students used Zometool to build a model of a three-dimensional projection of a four-dimensional figure called a *runcitruncated 600-cell*. The structure contains 12,540 pieces and stands six and a half feet tall. The project was made possible by a generous donation by SBU alum Robert Crowley, Class of '71. In the photo in Figure 1, the students, Linda, and Chris surround the remarkable structure in the ALCS library. For more about the project, please see the department's webpage. (Submitted by Chris Hill)



Figure 1: Allegany-Limestone Central School students surrounding a Zometool runcitruncated 600-cell.(Taken by Danny Bush using an ultra-wide-angle lens.)

SUNY Fredonia:

New Chair: Dr. Julia Wilson has taken the helm as chair of the department starting Fall 2016. Dr. Wilson joined the department as Assistant Professor in 2000. She received tenure and promotion to Associate Professor in 2007. She has served on the University Senate, the CCC Committee, and the Planning and Budget Committee, in addition to various ad hoc committees and task forces, and she currently sits on the Sustainability Committee. Dr. Wilson has published several papers in her research area of geometric topology, and has more recently published articles on math and music. Dr. Wilson is excited about the potential for growth in several of the department?s programs, and she is very appreciative of the support she has received from the students and faculty, especially from former chairs Dr. Joseph Straight and Dr. Nancy Boynton. Dr. Straight steps down this year after six years as chair, having formerly served as chair from 1998-2004, while Dr. Boynton served from 2004-2010.

Dr. Rogers inducted into NYS Mathematics Educators' Hall of Fame: Dr. Robert Rogers will be inducted into the New York State Mathematics Educators' Hall of Fame on September 23, 2016, in Suffern, NY. The Hall of Fame is administered by the New York State Association of Mathematics Supervisors, and inductees are chosen based on their extraordinary contributions to the advancement of mathematics education in New York State.

Dr. Rogers joined the department as Assistant Professor in 1987. He received tenure and promotion to Associate Professor in 1993. He was promoted to Full Professor in 2003, and he received the SUNY Distinguished Teaching Professor rank in 2015. He has published extensively on analysis, the history of mathematics, mathematics education, and STEM education. He has mentored seven students in undergraduate mathematics research and is a faculty advisor for the SUNY Fredonia Problem Solving Group, which regularly submits solutions for publication in journals. He is the Editor of the *New York State Mathematics Teachers' Journal*, and has coauthored the book *How We Got from There to Here: A Story of Real Analysis*, available through the SUNY Open Textbook Program. He is a Past President of the Association of Mathematics Teachers of



New York State and is a former Chair and Governor of the Mathematical Association of America – Seaway Section. He is a recipient of the SUNY Fredonia President's Award for Excellence in Teaching, the MAA-Seaway Section's Distinguished Teaching Award, and the MAA-Seaway Section Meritorious Service Award. Dr. Rogers regularly visits middle and high schools to provide STEM outreach for students, and he speaks at a number of mathematics and mathematics teachers' conferences about utilizing both history and STEM to teach mathematical ideas.

Dr. Cox on sabbatical: Dr. Jonathan Cox is on sabbatical for the Fall 2016 semester. He is conducting research into a form of pedagogy called Inquiry-Based Learning (IBL), and developing course materials implementing IBL. IBL is a problem-based approach to teaching mathematics which aims to develop in students the ability to investigate problems independently. It does this by posing a carefully constructed sequence of tasks and problems for students to explore and solve. There is a significant and growing body of evidence demonstrating that IBL is more effective than the traditional lecture method by a variety of measures. Dr. Cox has already implemented the IBL approach in MATH 341 Geometry, and he is preparing those materials for dissemination. He is also preparing IBL materials for MATH 381 History of Math, and he eventually plans to develop materials for the University Calculus sequence and for MATH 210 Mathematical Structures and Proofs, possibly incorporating aspects of the JUMP Math method of John Mighton.

Dr. Kwong accepts editorial position: Dr. Harris Kwong has accepted an invitation to take over the editorship of the Elementary Problems Section of *The Fibonacci Quarterly*. His work in this capacity will appear in the first issue of 2017. *The Fibonacci Quarterly* is the primary publication of the Fibonacci Association, with a focus on the Fibonacci number sequence and related mathematics. Dr. Kwong has had many articles appear in *The Fibonacci Quarterly*, as well as other journals. (Submitted by Nancy Boynton)

University of Rochester:

A consistent number of current and former departmental members were awarded research-funding grants from various organizations: Xuwen Chen, Giorgis Petridis, and Thomas Tucker from NSF; Alex Iosevich, Jonathan Pakianathan, and Dinesh



Thakur from NSA; Irina Bobkova, John Doyle, Dan-Andrei Geba, Allan Greenleaf, and Sevak Mkrtchyan from Simons Foundation.

In 2016, Naomi Jochnowitz received the M. Gweneth Humphreys award from the Association for Women in Mathematics for mentorship of undergraduate women in mathematics.

Michael Gage and Arnold Pizer received the 2016 AMS Award for Impact on the Teaching and Learning of Mathematics for the creation and development of WeBWorK, one of the first web-based systems that assigns and grades homework problems in mathematics and science courses.

Carl Mueller was named to the 2016 class of Fellows of the Institute of Mathematical Statistics "for his fundamental and influential contributions in stochastic partial differential equations and measure-value diffusions; and for his important services to the community." This distinction complements the ones for Frederick Cohen, Allan Greenleaf, Alex Iosevich, and Doug Ravenel, who were previously named fellows of the AMS.

Alex Iosevich was named the Student Associations' Professor of the Year Award in the Natural Sciences at University of Rochester for the 2014-2015 academic year.

Freshman Zachary Polansky won an honorable mention in the 2015 William Lowell Putnam Competition. Moreover, the University of Rochester team composed of David Fink, Bai Lin, and Brian McDonald was ranked 17th among the 447 teams registered for the contest.

John Harper retired at the end of the 2015-2016 academic year after a career at Rochester spanning almost 40 years and was granted emeritus status. John was an integral part of the topology research group and served as the master of ceremony for the department at many occasions. (Submitted by Dan-Andrei Geba)

SEAWAY SECTION of the MATHEMATICAL ASSOCIATION OF AMERICA 2016 FALL MEETING October 21-22 of The Dechester Institute of Technology (DIT)

October 21-22 at The Rochester Institute of Technology (RIT) <u>PROGRAM</u>

Friday afternoon, James E. Gleason Hall, Room 2149

2:30 – 5:30pm Micro-course: Rob Rolleston, Xerox Corporation, R Markdown For Beginners: Formatted Documents That Update Through Code

Friday afternoon, Thomas Gosnell Hall, Room 3000

4:30 - 6:00pm Meetings of the Executive Committee and Extended Executive Committee

Friday evening, Double Tree Hotel Ballroom

- 6:00 7:00pm Social Hour (cash bar) and Registration
- 7:00 8:30pm Banquet
- 8:30 9:30pm Bruce Pitman, University of Buffalo, I Don't Know Where I'm a Gonna Go When the Volcano Blow
- 9:30 10:30pm Seaway Estimathon, hosted by Blair Madore, SUNY Potsdam

Saturday morning, Thomas Gosnell Hall, Outside of Room 1250

8:00 - 8:40am Registration and Breakfast

Saturday morning, Thomas Gosnell Hall, Room 1250

- 8:40 8:45am Welcome address by Dr. Jeremy Haefner, RIT Provost and Senior Vice President for Academic Affairs
- 8:50 9:40am Randolph Lecture: Cristina Gomez, Ithaca College, Mathematics for All
- 9:40 10:05am Business Meeting
- 10:10 11:00am Patrick X. Rault, University of Arizona South & SUNY Geneseo, Numerical Ranges over Finite Fields: A Discrete Analogue of a Complex Problem

11:10am –12:05 pm Panel on Careers Using Mathematics and Contributed Talks (schedule on back)

Saturday Noon, Golisano Institute of Sustainability, CIMS

12:05 - 1:30pm Lunch in Rooms 2210/2220/2230/2240

Saturday afternoon, Thomas Gosnell Hall

1:30 – 3:00pm Contributed Talks (schedule on back) and Student Talks (schedule on green sheet in your folder)

Saturday afternoon, Thomas Gosnell Hall, Room 1250

3:10-4:00pm Tim Chartier, Davidson College, Mime-matics

NEXT MEETING: March 31-April 1, 2017, at SUNY Oswego

Contributed Talk Schedule

Thomas Gosnell Hall, Room 1250

11:10-12:05 Panel on Careers Using Mathematics, organized by Keiko Dow, D' Youville College
1:35-2:30 Jonathan Hoyle, Apple, Forensic Mathematics and the World Trade Center Project
2:35-3:00 Caitlyn Cunningham, Le Moyne College, The Role of Smell in Selecting a Mate: A Case Study of Statistical Collaboration

Thomas Gosnell Hall, Room 2300

11:10-12:05 NExT Workshop: *Re-Energizing your career at all stages*, organized by Nathan Reff, SUNY Brockport
1:35-3:00 IBL Workshop, organized by Patrick Rault, University of Arizona South & SUNY Geneseo
1:35-2:00 Yousuf George, Nazareth College, *A Departmental Transition to Inquiry-Based Learning*2:05-2:30 Perry Y.C. Lee, Kutztown University of Pennsylvania, *Giving Students the Opportunity to Effectively Communicate Mathematical Ideas Through Active Learning*2:35-3:00 Ryan Gantner, St. John Fisher College, *I can't spell "Seaway" without "IBL"*

Thomas Gosnell Hall, Room 2305

11:10-11:35 Olympia Nicodemi, SUNY Geneseo, The Science that's in the Music
11:40-12:05 James Marengo, RIT, Rao-Blackwell, Sufficiency, and the Taxicab Problem
1:35-2:00 Darren Narayan, RIT, The STEM Real World Applications of Mathematics Project
2:05-3:00 Workshop on Leadership in the Mathematical Sciences, organized by Mihail Barbosu, RIT

Thomas Gosnell Hall, Room 2355

11:10-11:35 Jonathan Lopez, Canisius College, A classification of small operators using graph theory 11:40-12:05 Peter Maceli, Canisius College, Coloring Graphs and their Complements

1:35-2:00 Stephen Viggiano, RIT, Properties of First-Order Rational Generators of Archimedean Copulas

2:05-2:30 Nikolai Krylov, Siena College, On the subgroup generated by solutions of Pell's equation and elements of order 2 in the corresponding quotient group

2:35-3:00 Sam Northshield, SUNY Plattsburgh, Functions of Matrices and Sylvester's formula

Thomas Gosnell Hall, Room 2365

11:10-11:35 Peter Mercer, Buffalo State College, *The Levin-Steckin and Clausing inequalities, united*

- 11:40-12:05 Kazuo Yamazaki, University of Rochester, Ergodicity of equations in fluid mechanics with noise
- 1:35-2:00 Antonio Mastroberardino, Penn State Erie, *Tear Film Dynamics: Modeling the Glycocalyx as a Poroelastic Region.*
- 2:05-2:30 Ephraim Agyingi, RIT, Simulation of biofilm formation on a cutaneous wound
- 2:35-3:00 Gabriel Prajitura, SUNY Brockport, The perils and paradoxes of addition

Thomas Gosnell Hall, Room 2130

11:10-11:35 Katelynn Kochowski, University of Virginia, Fluid Limit for a Batched Processor Sharing Queue

- 11:40-12:05 Katelynn Kochowski, University of Virginia, Mathematicians in the Community: Enriching Middle School Mathematics Education
- 1:35-2:00 **Paul Seeburger**, Monroe Community, College *Playing with Multivariable Calculus Concepts Wearing 3D Glasses*.

2:05-2:30 David Perkins, Hamilton College, From the Euler expansion to the Cantor Set

2:35-3:00 Carl Lutzer, RIT, A curious feature of best fit

Student Talk Schedule

Thomas Gosnell Hall, Room 1154

1:30 - 1:42	Poppy Immel, RIT Star tracking Algorithm for Fast Autonomous Spacecraft Navigation
1:45 - 1:57	Amber Dubill, RIT Developing a Mathematical Model for Satellite Orbit Determination
2:00 - 2:12	Jesse Clark-Stone, Clarkson University Optimal Design of a Chemical Remediation System for Water Resources
2:15 - 2:27	Huiwen Zhang, Nazareth College Multifractals and the Market
2:30 - 2:42	Nicole Hill, RIT Asymptotic Approximant Solution to the Sakiadis Problem
2:45 - 2:57	Marissa Meehan, SUNY Brockport Divisibility Tests as Dynamical Systems

Thomas Gosnell Hall, Room 1174

1:30 - 1:42	Sabrina Tomassetti, SUNY Oswego Challenging Baloglou's Conjecture
1:45 - 1:57	Cherlyse Alexander-Reid, SUNY Brockport How Much Cream Cheese Can One Have on a Bagel?
2:00 - 2:12	Kyler Anderson & Jonathan Backus, SUNY Oswego Counting Consistent Matrices Over a Finite Field
2:15 - 2:27	Jennifer Johannes, SUNY Brockport When is the Surface Area of Revolution Equal to the Volume on Every Interval?
2:30 - 2:42	Joanna McKinney, SUNY Oswego MacDonald Polynomials for Fillings of Integer Partition Diagrams

Thomas Gosnell Hall, Room 1300

1:30 - 1:42	Stephanie Allen, SUNY Geneseo Change-point Detection Methods for Body Worn Video: Forecasting & Histogram Comparison
1:45 - 1:57	John Steiner, SUNY Brockport Maximal Moment Distributions of Character Sums
2:00 - 2:12	Gabrielle Angeloro, SUNY Geneseo Cusp Density in Nested Octahedral Links
2:15 - 2:27	Michelle Piwonski, SUNY Brockport A New Bound for the Maximum Laplacian Eigenvalue of an Oriented Hypergraph
2:30 - 2:42	Jenna Zomback, SUNY Geneseo Coloured Unlinking

Thomas Gosnell Hall, Room 2154

1:30 - 1:42	Joseph Currier, SUNY Brockport Algebraic Methods for Solving Pell's Equation
1:45 - 1:57	Jessica Steidle, SUNY Geneseo Modelling a Freeform Surface for Illuminating Mark Rothko's Green on Blue
2:00 - 2:12	Adam Krause, SUNY Brockport L'Hospital's Rule in the Case of Iterations of Functions when the Limit is Taken at a Fixed Point
2:15 - 2:27	Marleah Roseman, SUNY Fredonia Periodic Points of Tent Maps
2:30 - 2:42	Christine Izyk, SUNY Brockport The Second and the Third Significant Digit in Geometric Progressions

Contributed Talks

1.Ephraim Agyingi, RIT

Simulation of biofilm formation on a cutaneous wound

Cutaneous wounds can be contaminated with bacteria that are able to grow into a colony and subsequently lead to an infection. A colony or group of colonies residing on the wound may in due process grow into a biofilm. The biofilm may be formed by a single bacteria species or a mixture consisting of many species of bacteria. We use the Eden model of a growing cluster to simulate biofilm formation from adjacent colonies when they exhibit a cooperative behavior towards each other on a wound surface.

2.Caitlyn Cunningham and Theresa White, Le Moyne College

The Role of Smell in Selecting a Mate: A Case Study of Statistical Collaboration

Effective statistical collaboration requires the extensive input of both the statistician and the originating scientist. In this talk, we will describe in detail the process of a statistical collaboration, from initial data analysis to eventual model building and publication. Data was collected on two separate surveys relating to smell awareness and romantic interest, and administered to the same set of subjects consisting of men and women, both heterosexual and homosexual. The eventual goal was to understand the way in which awareness of odors affects the value a person places on odor when selecting a mate, and the way sex and sexual orientation might influence this. The final analysis seeks to provide the clarity of interpretation necessary for the eventual audience of psychological and olfaction researchers, while accounting for the statistical complexity of the data, and involves one-way and two-way ANOVA, multinomial logistic regression and principal components analysis. This talk is suitable for undergraduates, and is intended to be understood by those without a statistical background.

3.Jonathan Hoyle, Apple

Forensic Mathematics and the World Trade Center Project

Fifteen years ago, 2,606 people were killed from the 9/11 attacks on the World Trade Center. The victim identification process was the largest and most complex forensic project in history. This presentation will describe the events of September 11th from a forensic perspective and detail the Mathematics of DNA victim identification. These include DNA Fingerprinting, Kinship Analysis and other genetic applications of Forensic Mathematics.

4.Katelynn Kochalski, University of Virginia

Fluid Limit for a Batched Processor Sharing Queue

We consider a sequence of single server queues operating under a service policy that incorporates batches into processor sharing. Assuming the limiting system is critical, we find a fluid limit for the measure-valued processes that describe each system in the sequence.

5.Katelynn Kochalski, University of Virginia

Mathematicians in the Community: Enriching Middle School Mathematics Education

The math topics we typically focus on in middle and high school classrooms aren't necessarily the ones that promote the most excitement or curiosity about mathematics. How can we get young students to recognize that math is much more than they learn in the K-12 education? The UVa Math Ambassadors, an outreach program at the University of Virginia, tries to do just that. By sending graduate students into local middle school classrooms to lead fun math-based activities that use higher level math concepts, we expose students to a range of new mathematics in an age-appropriate way. We'll discuss the program, its primary objectives, and some of our activities.

6.Nikolai Krylov, Siena College

On the subgroup generated by solutions of Pell's equation and elements of order 2 in the corresponding quotient group

Equivalence classes of solutions of the Diophantine equation $a^2 + mb^2 = c^2$ \$ form an infinitely generated abelian group G_m under the operation induced by complex multiplication, where m is a fixed square-free positive integer. Solutions of Pell's equation $x^2 - my^2 = 1$ generate a subgroup P_m of G_m. I will show how the sequence of decreasing convergents of the continued fraction expansion of $\sqrt{2}$ generates elements of order 2 in the quotient groups $\frac{G_m}{P_m}$ for certain m. To do that I will use a homomorphism $f_m : G_m \to Cl(Q[\sqrt{-m}])$ into the ideal class group of the imaginary quadratic field $Q[\sqrt{-m}]$, and show that $P_m \subseteq \ker(f_m)$, when the ring of integers of the real quadratic field $Q[\sqrt{m}]$ has units of norm -1.

7.Jonathan Lopez, Canisius College

A classification of small operators using graph theory

Given a real n x m matrix X, its operator norm is a measure of the way that X lengthens vectors in the maximal case. We consider a matrix "small" if it has non-negative integer entries and its operator norm is less than 2. These matrices correspond to bipartite graphs with spectral radius less than 2, which can be classified as disjoint unions of Coxeter graphs. Our goal here is to see these known results as part of a general program of classification of "small" objects. This is joint work with Terrence Bisson.

8.Carl Lutzer, RIT

A Curious Feature of Best Fit

Least-squares regression is used to find the line of "best fit" for data that exhibit a linear relationship, as one might see in scientific experimental data. It's well known that repeating any one of the data points will make the line of best fit move toward the repeated point. In this talk we use linear algebra to explore the how and why of a less-well-known fact: the regression line not only moves, it pivots.

9.Peter Maceli, Canisius College

Coloring graphs and their complements

Nordhaus and Gaddum showed that for any graph the sum of its chromatic number together with the chromatic number of its complement is at most one more than the number of vertices in the graph. The class of graphs which satisfy this upper bound with equality have long been understood, however not much beyond this initial case is known in terms of characterizing graphs via this sum of complementary chromatic numbers. In this talk, we will discuss how adopting a more structural approach to this general problem leads to an interesting method of graph decomposition, which in turn allows one to generalize and extend several previous results.

10.James Marengo, RIT

Rao-Blackwell, Sufficiency, and the Taxicab Problem

Suppose that there an unknown number theta of taxicabs operating in the vicinity of a certain location, and that they are clearly numbered from one to theta. One observes the number on each of n taxicabs as they pass by this location, where n is a known positive integer. How can these observations be used to estimate theta? Sufficiency is a fundamentally important concept in mathematical statistics which has to do with summarizing data without losing information about the unknown parameter of interest. We will discuss this concept, along with the associated geometry in the Rao-Blackwell theorem to derive an estimator of theta which is optimal in the sense that it has minimum variance in the class of unbiased estimators of theta. The talk will be accessible to a student who has some background in statistical inference.

11. Antonio Mastroberardino, Penn State Erie

Tear Film Dynamics: Modeling the Glycocalyx as a Poroelastic Region.

The human tear film is a complex fluid structure composed of an aqueous layer, an outermost lipid layer, and the glycocalyx, a forest of large transmembrane mucins that provide stability to the ocular surface. We formulate a thin film model based on lubrication theory and mixture theory in order to understand the dynamics between the aqueous layer and the glycocalyx, which we treat as a poroelastic region.

12.Peter Mercer, Buffalo State College

The Levin-Steckin and Clausing inequalities, united.

We show how to obtain two inequalities about convex functions, due to V.I. Levin & S.B. Steckin (1960) and A. Clausing (1980), by a single argument. The idea is to optimize a suitable linear function on a certain compact set in an infinite dimensional space. The approach will be gentle, making the general ideas accessible to most undergraduate mathematics students.

13.Darren Narayan, RIT

The STEM Real World Applications of Mathematics Project

Traditional undergraduate curricula seldom offer students concrete real-world applications of mathematics. As a result, students graduate asking themselves the question, "What else can I do with a mathematics degree besides teach?" One of the goals of the STEM Real World Applications of Mathematics Project is to create a library of modules where students connect classroom concepts with real world applications. A series of examples will be presented including how discrete mathematics can be used to analyze the Atlanta metro system, and how graph theory can be used to gauge functional connectivity of the human brain.

14.Olympia Nicodemi, SUNY Geneseo

The Science that's in the Music

I will share some thoughts about a course that I am developing in conjunction with an NEH grant application focused on Humanities Connections to the STEM disciplines. My contribution will focus on Science and Music. After looking at the broader outlines of the project and the course, I will focus on one topic, namely the musician who was Galileo's father.

15.Samuel Northshield, SUNY Plattsburgh

Functions of matrices and Sylvester's formula

As an undergraduate, I was struck by the fact that matrices act like numbers and, in particular, many functions extend naturally to matrices. Sylvester's formula expresses a function of a matrix in terms of how that function acts on the eigenvalues of the matrix. We give a short proof of this result and a novel application or two. Note: This talk is accessible for undergraduates.

16.David Perkins, Hamilton College

From an Euler expansion to the Cantor Set"

While poking around Euler's expansion of $P(x) = (1+x)(1+x)^2(1+x)^3(1+x)^4$ and its connection to binary numbers, I wondered if it could be tweaked to say something about ternary numbers. I discovered that it could, and further, that I could link the result to the Cantor set. I will show what I discovered, and we can decide if it's interesting. The only prerequisite is algebra, so the content is absolutely accessible to an undergraduate audience.

17.Gabriel Prajitura, SUNY Brockport

The perils and paradoxes of addition

We will discuss several paradoxical and dangerous addition properties like commutativity and associativity.

18. Paul Seeburger, Monroe Community College

Playing with Multivariable Calculus Concepts Wearing 3D Glasses.

A tour of an NSF-funded project that seeks to develop geometric intuition in students of multivariable calculus. CalcPlot3D, an online exploration environment, allows students (and instructors) to create and freely rotate the graphs of functions of two variables, contour plots, vectors, plane and space curves, vector fields, parametric surfaces, implicit surfaces, etc. 3D glasses can be used for a real 3D perspective! Come get a pair and try it out! This JavaScript web app works on smart phones, tablets, and regular computers. A series of concept explorations is also being created, including topics in multivariable calculus, differential equations, and linear algebra. Each allows students to "play" with the concepts visually to develop their geometric understanding. http://web.monroecc.edu/calcNSF/.

19.Stephen Viggiano, RIT

Properties of First-Order Rational Generators of Archimedean Copulas

Copulas characterize the dependence structure between two or more random variables; a joint distribution function (DF) may be written in terms of the copula and the marginal DFs. Archimedean copulas are an interesting sub-class of copulas that originally came from study of probabilistic metric spaces, and now find wide application in many fields.

Archimedean copulas possessing first-order rational generating functions will be discussed in this presentation. These form a simple single-parameter family, and generate bivariate copulas ranging from the Frechet lower bound to a copula with modest positive association (tau = 1/3).

Level sets, scatter plots, code for simulation, and strategies for fitting the copula to bivariate empirical data will be discussed.

20.Kazuo Yamazaki, University of Rochester

Ergodicity of equations in fluid mechanics with noise

In the theory of turbulence, ergodicity, namely the energy transfer through nonlinearity to the small scales and the existence of a unique statistical steady state, is often assumed. However, due to the work of various mathematicians in the last two decades, the analysis through rigorous proofs on ergodicity has seen remarkable progress. In this talk we review recent results on the ergodicity of nonlinear partial differential equations in fluid mechanics with noise, such as the stochastic Navier-Stokes equations.

Student Talk Abstracts

Cherlyse Alexander-Reid, SUNY Brockport

How Much Cream Cheese Can One Have on a Bagel?

Abstract: If we cut the bagel with a knife revolving about the circular axis of the bagel we divide it into two intertwined Mobius like surfaces. We will show how big is the area of the cut in this case compared to the one obtained in the usual way to slice the bagel.

Stephanie Allen, SUNY Geneseo

Change-point Detection Methods for Body Worn Video: Forecasting & Histogram Comparison

Abstract: Detecting change-points in time series data enables us to find salient changes in the underlying distribution of the series. Video-change point detection can be especially difficult because the frames must be represented in compact forms in order for change-point algorithms to be effective. We discuss univariate and multivariate change-point detection methods, which can be applied to frame representations. For univariate data, we develop a "future window technique" in order to use forecasting methods in the context of change-point detection and, for multivariate data, we pair this "future window technique" with histogram comparison methods. We apply these methods to LAPD body-worn video in work done with a student research team at the Institute for Pure and Applied Mathematics on the UCLA campus.

Kyler Anderson & Jonathan Backus, SUNY Oswego

Counting Consistent Matrices Over a Finite Field

Abstract: We present a brief definition of what it means for a matrix to be consistent, or to have solutions. We then consider finite fields, and form matrices whose entries are taken from such a field. We introduce two distinct methods for enumerating consistent matrices, and then posit some conjectures that follow from this analysis.

Gabrielle Angeloro, SUNY Geneseo

Cusp Density in Nested Octahedral Links

Abstract: This research studies link invariants on a specific class of hyperbolic links. We focus on nested octahedral links, and outline the process of augmenting and nesting a link. To study hyperbolic links, we will geometrically realize the complement of a link as hyperbolic polyhedra. We complete this process using a cell decomposition given by Purcell. Finally, we present a result concerning cusp density of the aforementioned class of links.

Jesse Clark-Stone, Clarkson University

Optimal Design of a Chemical Remediation System for Water Resources

Abstract: In Situ Chemical Oxidation (ISCO) for remediation of contaminated groundwater is a common method for cleaning up groundwater contaminated by chlorinated and recalcitrant compounds. For certain sites, oxidant encapsulated in paraffin wax cylinders is well indicated. The release of oxidant from the cylinders, groundwater flow, and contaminant-oxidant interaction is modeled based upon well-understood concepts of hydrogeology, field tests, as well as laboratory tests. Two different simulators approach the solving of the resulting system of PDEs in different ways, one using finite difference approximation and the other using a Radial Basis Function coallocation method (RBFcm). Verification of the models and a sensitivity analysis of site parameters have been conducted with an eye towards creating a tool to optimize the placement of cylinders and cost of clean-up.

Joseph Currier, SUNY Brockport

Algebraic Methods for Solving Pell's Equation

Abstract: We will examine the connection between Pell's equation and algebraic number theory. Furthermore, we will look at one method for solving Pell's equation which relies on modern algebra, in particular, ring theory. Lastly, we will look at some examples of interesting problems.

Amber Dubill, RIT

Developing a Mathematical Model for Satellite Orbit Determination

Abstract: In this presentation we discuss the evolving concept of mathematical modeling for satellite orbit determination. The model depends on the mission of the satellite and the range of accuracy desired. These constraints lead to various approximations concerning the Earth and the perturbations acting on the satellite. The model discussion leads to an exploration of the correct model to use for a CubeSat.

Nicole Hill, RIT

Asymptotic Approximant Solution to the Sakiadis Problem

Abstract: An accurate solution method is provided for the Sakiadis problem, a nonlinear ordinary differential equation whose power series solution diverges. The Sakiadis problem describes the motion of a flat plate moving through a stationary fluid. Numerical solutions for this problem have been calculated, but an exact analytical solution has not been found. Using an asymptotic approximant, an analytical solution is found that correctly limits to two regions of the exact solution while maintaining accuracy in between. The method is capable of predicting unknown properties inherent to the problem with a higher precision than previously reported.

Poppy Immel, RIT

Star Tracking Algorithm for Fast Autonomous Spacecraft Navigation

Abstract: In this paper we present a star tracking algorithm that will further develop into an autonomous spacecraft navigation system. The algorithm addresses three goals: star detection, star tracking, and attitude determination. First, stars are detected by thresholding an acquired image and each object detected is checked to determine if it is star-like. Then we identify groups of three stars in each image, such that the change in attitude can be easily computed. The stars are tracked from one image to the next using a SSS triangular congruency algorithm, which matches the triangle of stars in the previous image.

Christine Izyk, SUNY Brockport

The Second and the Third Significant Digit in Geometric Progressions

Abstract: Benford's law governs the distribution of the first significant digit of a geometric progression. We will show that the second and the third digits have by far more regular distribution.

Jennifer Johannes, SUNY Brockport

When is the Surface Area of Revolution Equal to the Volume on Every Interval?

Abstract: We will determine all positive functions for which the surface area of revolution is equal to the volume when the rotation is done over all possible intervals.

Adam Krause, SUNY Brockport

L'Hospital's Rule in the Case of Iterations of Functions when the Limit is Taken at a Fixed Point

Abstract: We will discuss what the use of L'Hospital's rule reduces to in the case of self composition of functions and the limit taken at a fixed point.

Joanna McKinney, SUNY Oswego

MacDonald Polynomials for Fillings of Integer Partition Diagrams

Abstract: This summer at the Marshall REU 2016 we investigated symmetry in a particular MacDonald polynomial. This polynomial is defined using statistics on fillings of integer partition diagrams. We conjecture that the polynomials are equal when we take the conjugate of the diagram and flip the variables in the polynomial. We suspect this is true because it is for a similar polynomial \tilde{F}_{μ} .

I will go over a few statistics we have used on the fillings we looked at, the progress we have made on our conjecture, and a structural lemma that I found.

Marissa Meehan, SUNY Brockport

Divisibility Tests as Dynamical Systems

Abstract: Potentially, every iterative process is a dynamical system. We will show how this works in the case of several divisibility tests based on iterations.

Michelle Piwonski, SUNY Brockport

A New Bound for the Maximum Laplacian Eigenvalue of an Oriented Hypergraph

Abstract: An oriented hypergraph is a hypergraph where each vertex-edge incidence is given a label of +1 or -1. Using this incidence labeling the adjacency and Laplacian matrices can be defined. In this work, a new lower bound for the Laplacian spectral radius is found that generalizes known bounds for both graphs and oriented hypergraphs.

Marleah Roseman, SUNY Fredonia

Periodic Points of Tent Maps

Abstract: For integers m and n with 0 < m < n and m and n relatively prime, we consider the function on [0, n] whose graph consists of the segments from (0, 0) to (m, n) and (m, n) to (n, 0). We consider the problem of finding periodic points of this function.

Jessica Steidle, SUNY Geneseo

Modelling a Freeform Surface for Illuminating Mark Rothko's Green on Blue

Abstract: Lighting conditions are a major concern in the art world. Poor lighting can distract viewers, alter the emotional impact of art, and even permanently damage multi-million dollar pieces of artwork. The proposed solution is to illuminate a painting with an optical system consisting of an LED source and freeform optic to create a uniform spatial and spectral distribution of light. Illuminating a rectangular painting on the wall using a light on the ceiling is what makes this a challenging problem. Freeform optics have more degrees of freedom and so can be used to solve complicated lighting problems such as this, but are challenging to design and manufacture. The optical design software LightTools, assuming a point source, can generate a point cloud representation of the required freeform surface. Zernike, Chebyshev, and Legendre polynomials, as well as monomials, were used to create a variety of polynomial representations of this surface in MATLAB. These representations were then evaluated by the quality of their fit to the point cloud as well as by the resulting spatial distributions of light. This will ideally lead to the manufacturing and testing of this system, followed by its use in The University of Arizona Museum of Art.

John Steiner, SUNY Brockport

Maximal Moment Distributions of Character Sums

Abstract: Given a set of numbers and an integer k, the k-th moment of the set of numbers is simply the sum of the k-th powers of the elements in the set. In the presentation we will see the maximal moment distribution over some subsets of fixed complex roots of unity. We will analyze the moment values for some prime numbers with k > 2. This leads to questions such as how many values are in the distribution, what are these values, and can we provide any bounds on these numbers?

Sabrina Tomassetti, SUNY Oswego

Challenging Baloglou's Conjecture

Abstract: Baloglou's original tiling color conjecture was disproven by one type of pentagonal tiling. Today, 16 types of pentagonal tilings have been discovered. These tilings are the current focus in our question: Without having adjacent tiles of the same color, and preserving the symmetry of these patterns, how many colors are needed in a pentagonal tiling like this? I will explain this question more thoroughly and discuss some ideas on how we might answer it.

Huiwen Zhang, Nazareth College

Multifractals and the Market

Abstract: This presentation will illustrate how fractals can be used to describe the stock market. I will introduce Mandelbrot's multifractal model and make comparisons to modern portfolio theory.

Jenna Zomback, SUNY Geneseo

Coloured Unlinking

Abstract: The study of unknotting and unlinking reaches back to the infancy of knot theory, and even into its prehistory with tales of untying the Gordian knot. For physical links with different components, there is an important distinction to be made concerning which crossings are being modified. There are three different types of crossings in links with two components: self-crossing in the first component, self crossing in the second component, and crossing between components. Previous work by Peter Kohn has mostly not made this distinction between the different types of crossings. In this talk we restrict our attention to unlinking two component links with both components unknotted by changing crossings within, not between, components.