

THE SEAWAY CURRENT

Newsletter of the Seaway Section of the Mathematical Association of America

Volume 39, Number 2

Spring, 2016

SUNY Geneseo will host the Spring 2016 meeting, April 15 - 16.

Combining a strong traditional mathematics major with opportunities for student research, a very successful secondary education program, and preparation in applied mathematics and statistics, the Department of Mathematics is committed to helping each Geneseo student achieve his or her goals, both before and after Geneseo. (Department of Mathematics webpage, <http://www.geneseo.edu/math>).

Special Notice: Registration is available online and participants can pay via credit card! Head to the meeting website, <http://www.geneseo.edu/seaway>, for registration and accommodations information.

Thank you SUNY Geneseo for hosting our meeting!

The Invited Speakers

Friday Evening – The banquet speaker

Robert Rogers, State University of New York at Fredonia



Title: After All, It's Just Algebra!

Abstract:

Basic algebra, as taught in high school, took over 3000 years to develop; long before the development of equations, variables, and symbol manipulation. We will take a fun look at some of my favorite problems from this evolution along with solutions that don't rely on relatively modern techniques. We might gain some insight into why algebra remains a sticking point for some of our students.

Biography:

Bob Rogers received his B.S. in Mathematics with Certification in Secondary Teaching from Buffalo State College, his M.S. in Mathematics from Syracuse University, and his Ph.D. in Mathematics from SUNY Buffalo, specializing in functional analysis/operator theory. He is currently a SUNY Distinguished Teaching Professor of Mathematics at SUNY Fredonia. His current interests are in analysis, STEM education, and the history of mathematics as it applies to mathematics education. He is former chair and governor of the MAA Seaway Section and a past president of the Association of Mathematics Teachers of NYS. He is a recipient of the SUNY Fredonia President's Award for Excellence in Teaching, the Seaway Section's Clarence F. Stephens Distinguished

Teaching Award, and the MAA Meritorious Service Award - Seaway Section. He is currently the Editor of the NYS Mathematics Teachers' Journal and an active member of the NYS STEM Education Collaborative and Western NY STEM Hub.

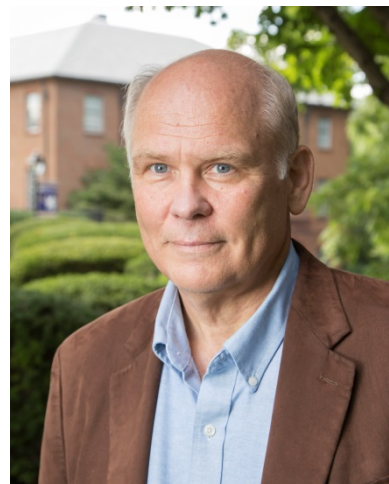
Saturday morning invited speakers:

Andrew Simoson, King University

Title: Continued Fractions and the Solar Eclipse

Abstract:

From the Stern-Brocot tree for generating all fractions between 0 and 1, starting with only 0 and 1, we deduce a maverick greedy continued fraction algorithm to generate fractions approximating any given irrational, and sketch why this algorithm is equivalent to the analysis of what is called strange Strang figures or signatures, the set of points $(n, \sin(2\pi xn))$ where x is a specific irrational number, over the set of integers n . We then apply the algorithm, sketching how to predict the next solar or lunar eclipse.



Biography:

Andy Simoson earned a PhD from the University of Wyoming in 1979, and has been teaching at a small liberal arts college in the hills of eastern Tennessee since then, except for two Fulbright appointments to Africa: the University of Botswana in Gaborone in 1990-91, and the University of Dar es Salaam in Tanzania on the Indian Ocean in 1997-98. He is the recipient of two MAA writing awards: the Polya Award for *Pursuit Curves for the Man in the Moone*, and the Chauvenet Prize for *The Gravity of Hades*. He has published two books with the MAA: *Hesiod's Anvil* about falling and spinning through heaven and earth, and *Voltaire's Riddle* about Voltaire being a champion of Newton's *Principia* and an overview of the mathematics behind the twin French Academy expeditions in the 1730's to the polar and equatorial regions to settle once and for all Newton's claim about a flattened earth. Andy is the proud grandfather of a 6 month's old baby girl.

Luise-Charlotte Kappe, Binghamton University (Gehman lecturer)



Title: Finite Coverings: A Journey through Groups, Loops, Rings and Semigroups

Abstract:

A group is said to be covered by a collection of proper subgroups if each element of the group belongs to at least one subgroup in the collection: the collection of subgroups is called a covering of the group. If the set of subgroups is finite, we say the group has a finite covering. Many questions raised in the context of finite coverings of groups, such as conditions for a group to have a finite covering by abelian subgroups or determining the minimal number of subgroups needed to cover the group, make sense in other algebraic structures too.

In my talk I will report on my journeys through groups, loops, rings and semigroups, on what I discovered there about finite coverings together with several fellow travelers and on some discoveries which might still lie ahead.

Biography:

Luise-Charlotte Kappe is a native of Germany, where she studied at the Universities of Erlangen and Freiburg. She obtained her Ph.D. under the direction of Theodor Schneider in the area of transcendental numbers and is now working in group theory in a variety of areas. These include commutator calculus, subnormality and finiteness conditions, and several others. She experienced that applying other areas of mathematics like graph theory and combinatorics is very helpful to reach one's goals. The same thing holds for GAP as a research tool, in particular for constructing examples and extrapolating from the insight gained through them.

In 1963, she and her husband Wolfgang immigrated to the US. After spending five years at Ohio State University, they moved to the State University of New York at Binghamton. After raising two sons, she "raised" fourteen Ph.D. students. In 1999 she received an NSF grant to develop a pilot program for the preparation of future mathematics faculty. Since 2004 she is Professor Emerita. She is still active in research and every fall she teaches a course on a topic she likes.

From 1994-2000 Dr. Kappe served the section as First Vice-Chair, Chair-Elect, Chair, and Immediate Past-Chair, and from 2003 to 2006 she was the Governor of the section. She has served on and chaired a variety of committees in the section, and was a founding member of the Seaway NExT Advisory Committee. In 2002 she gave the post-banquet talk at the section's spring meeting, "It's a Wonderful Life! - Observations on a Career as a Mathematician." Dr. Kappe is the recipient of the 2003 MAA Certificate of Meritorious Service.

Carl Lutzer, Rochester Institute of Technology



Title: Hammering Home Undergraduate Mathematics

Abstract:

Grab a hardcover book from your shelf. Really, this is an "audience participation" abstract, so grab a book. I'll wait. (If you have a rubber band available, put it around the book.) Now stand up and hold the book in your hands so that the cover is parallel to the ground and you can read the title. The book has three natural axes, the longest of which is parallel to its spine. It's easy to spin the book about this long axis. With

a little more effort, you can catch it after one revolution and find that you can still read the title. (Try it!) The short axis of the book extends from the front cover to the back cover, perpendicular to the spine. Spinning about this axis is also easy. However, something strange happens when you try to spin the book about its medium-length axis, which is perpendicular to the other two, extending across the width of the book from its spine to its fore edge: the book twists in the air! When I first encountered this physical phenomenon, I saw it with a hammer, in which the twist is apparent when you compare the orientation before you toss and after you catch the hammer. (You can try this at home, but be careful! Maybe wear a helmet.) In this talk I'll use multivariable calculus, differential equations, and linear algebra to provide mathematical insight into this twisting phenomenon.

Biography:

Carl Lutzer has always been interested in ways that the physical world informs our understanding of mathematics, and vice versa. He earned his Ph.D. at the University of Kentucky where his dissertation (under the direction of Peter Hislop) focused on the mathematics of electrical impedance tomography. Since then he has been a faculty member at the Rochester Institute of Technology, where he has participated in several applied research projects including the study of micro-electromechanical systems (MEMS), mobile ad-hoc networks (MANETS), and a method of using partial differential equations to determine the health of the human eye based on light-scattering data. RIT has also been a place where Dr. Lutzer has been able to continue

pursuing his interest in teaching; in 2006 he won the MAA's Carl B. Allendoerfer Award for Expository Excellence, and in 2013 Dr. Lutzer earned the university's Eisenhart Award for Excellence in Teaching.

Special Events

Seaway NExT Workshop

Friday, April 15, 1 - 4/4:30, South Hall 328

Organized by Matt Koetz, Nazareth College, and Nathan Reff, SUNY Brockport

Description: This is a free workshop and all faculty are welcome to attend. This spring the workshop topic is Inquiry-Based Learning (IBL) of multivariable calculus and discrete mathematics. The workshop leaders are David Clark, IBL expert and professor emeritus at SUNY New Paltz, and Ted Mahavier, IBL expert and professor at Lamar University (Texas). Faculty interested in joining the workshop should contact Nate Reff (nreff@brockport.edu) by Monday, April 4.

Team Trivia Tournament

Friday night, following the banquet speaker

Hosted by Blair Madore, SUNY Potsdam

Description: Students and faculty from different colleges form teams to answer a series of mathematical trivia challenges. There will be prizes! For rules and guidelines, see

<http://www.geneseo.edu/seaway/student-information>.

Visioning Session on the Future of the Seaway Section

Saturday afternoon, April 16

Organized by Ryan Gantner, St. John Fisher College

Sit down with the Chair of the Seaway Section to discuss initiatives for the future. What should we do at future meetings? Workshops? Mini-courses? Fun events? Charity fundraisers? Technology training? Something radically different? What should we do outside of the meetings? Bring your own ideas for the future as we brainstorm things that can be done as well as their benefits, drawbacks, and constraints.

Workshop on Leadership in the Mathematical Sciences

Saturday afternoon, April 16

Hosted by Mihail Barbosu, Rochester Institute of Technology

Topics:

Tenure and Promotion Process and Criteria

Handling Difficult Situations

Elections of the Section

During the Business Meeting on Saturday, elections for the Section Officers Executive Committee will take place. The nominations brought forth by the nominations committee, appointed by the Section Chair, are as follows:

Chair-Elect: Jonathan Cox (SUNY Fredonia)

First Vice-Chair: Cheryl Miller (SUNY Potsdam)

Program Chair: Cheryl Miller (SUNY Potsdam)

Second Vice-Chair: Steve Kilner (Monroe Community College)

Secretary: Gary Raduns (Roberts Wesleyan College)

At-large member: Jeff Johannes (SUNY Geneseo)

Additional nominations will be taken during the Business Meeting.

REPORTS

1. Treasurer's Report – Spring 2016 – Gary Towsley

Seaway Section of the Mathematical Association of America

1. Balance as of 9/15/2015	\$15,663.41
2. Fall Meeting at St. Lawrence University	
Meeting Receipts	\$8,583.09
Meeting Expenses	\$8,551.93
Net	\$61.16
3. Speakers Expenses, Honoraria	\$100.00
5. MAA – Proceeds of Book Sale	\$25.74
6. Travel Support for Section Officer	\$250.00
7. Balance as of 3/01/2016	\$15,144.57

2. Minutes of the Executive Committee meeting, November 6-7, 2015

Present: Ryan Gantner, John Maceli, Charlie Ragozzine, Jim Conklin, and Jonathan Cox.

The committee approved the minutes of the Executive and Extended Executive Committee meeting of April 17-18, 2015. The minutes of the Business meeting are delayed due to the Secretary's office re-location.

Ryan Gantner, chair, deferred his report until New Business.

Gary Towsley attended the Governor's Meeting at MathFest in place of newly elected Jim Conklin. Gary welcomed Jim as our new governor and briefly reviewed his written report. The committee discussed some of the options under consideration for reorganization of the governance of the Association.

Gary Towsley also presented a written Treasurer's report. The report indicated an opening balance of \$16,710.29 on 3/1/2015 and \$15,663.41 on 9/15/2015 including a net -\$2072.52 for the meeting at Colgate University. The treasurer noted that this 'loss' for our anniversary meeting was expected.

First Vice Chair, Jonathan Cox, presented a written report featuring an outline of activities for this weekend's meeting, future venues, and a look ahead to the spring meeting at SUNY Geneseo.

Invited speakers at this meeting:

- Richard Cleary (Banquet speaker)
- Erica Flapan (Polya Lecturer)
- Hossein Shahmohamad (2013 Clarence Stephens Award recipient)
- Laura Person (Randolph Lecture)

Future Venues:

- April 15-16, 2016 SUNY Geneseo
- October 21-22, 2016 RIT
- March 24-25, 2017 SUNY Oswego
- Fall 2017 SUNY Broome
- Spring 2018 SUNY Brockport
- Fall 2018 Univ. of Toronto, Mississauga

Plans for Geneseo:

- Bob Rogers (Banquet speaker)
- Luise-Charlotte Kappe (Gehman Lecture)
- Margaret Morrow (2015 Clarence Stephens awardee)
- One additional to be determined

The Executive Committee would like to try concluding the Spring 2016 meeting with an afternoon invited speaker, but will not hold organizers to this if an appropriate speaker cannot be identified or if there are logistical obstacles.

Margaret Morrow has stepped down as editor of the Seaway Current. Ryan assembled the Current for this meeting and is searching for a new editor.

New Business

1. Charlie Ragozzine brought up two concerns regarding the Association:
 - a. Incorrect dues information was provided on printed dues notices.
 - b. Concerns regarding the sale of MAA mailing lists to publishers. That this is occurring is evidenced by a particular misspelling of names that only occurred with the MAA but now shows up in advertising material from publishers. Does the MAA have a privacy policy, and is there an opt-out for release to third parties?
2. Discussion of SUNY Seamless Transfer and Discrete Mathematics:
 - a. Some SUNY Mathematics Departments have put forth resolutions to not put Discrete Mathematics on the seamless transfer list. These courses are frequently used as introduction to proof courses at the 4-year institutions and have pre-requisites. At the 2-year campuses the course is oriented to a different audience with no pre-requisites.
3. Sandeep would like to step down as Second Vice Chair (term would end Spring 2017).
 - a. Ryan has had conversations with Steve Kilmer of Monroe Community College and he is prepared to accept nomination. An election to complete the term will be held in Spring 2016.
4. John Maceli would like to step down as the at-large member of the executive committee. Nominations will be sought.

The Executive Committee meeting adjourned at 4:25 and moved into the Extended Executive Committee Meeting.

Respectfully submitted,

Gary Raduns
Seaway Section Secretary

3. Minutes of the Extended Executive Committee, November 6-7, 2015

Present: Ryan Gantner, John Maceli, Charlie Ragozzine, Jim Conklin, and Jonathan Cox, Jane Cushman and Bob Rogers.

Student Program Report:

- The program will feature about 8 student papers and a panel for students on undergraduate research experiences.
- Team Trivia makes a return at this meeting, hosted by Blair Madore.

Gehman Lecture Committee: Written report. L.C. Kappe will present “Finite coverings: a journey through groups, loops, rings, and semigroups” as the Spring 2016 Gehman Lecturer.

Randolph Lecture Committee: The committee has an invitation out for the next Randolph Lecture.

Education Policy Committee: No report.

Distinguished Teaching Award Committee: No report, but a reminder that nominations are due February 1.

Nominations Committee: There are a number of current vacancies and positions to be filled at the spring meeting: Second vice-chair (nominee already identified), first vice-chair, at-large, and chair elect. It is also noted that the secretary and treasurer are past due for election/re-election.

The Extended Executive Committee also had discussion of crazy ideas—activities of the section perhaps beyond the semi-annual meeting, or to modify the meeting structure. Among the thoughts generated:

- a. Tie in local features and attractions with the meeting.
- b. Ask Randolph lecturer to speak only 35 minutes to allow 15 minutes of discussion before breaking for lunch or the next speaker.
- c. Invite more speakers who are early in their career.
- d. A summer conference or workshop, perhaps modeled on the summer topology festival at Cornell University.
- e. Mini-course or micro-course.
- f. How to engage more graduate students in the Section?
- g. Ask the Public Information Officer to take on social media role for the Section?

The Extended Executive Committee meeting adjourned at 6:02.

Respectfully submitted,

Gary Raduns
Seaway Section Secretary

4. Minutes of the Business Meeting, November 7, 2015

Called to order at 10:44 with approximately 20 in attendance.

Governor’s Report: Announcing the Association’s ongoing operating deficits and discussion of changes in the governance structure of the Association.

Secretary Report: None beyond the minutes as distributed.

Treasurer’s Report:

- Balance 3/1/2015: \$16,710.29
- Balance 9/15/2015: \$15,663.41
- The Section is in good financial health.
- The deficit, -\$2,072.52, for the meeting at Colgate University was less than anticipated.
- Follow-up discussion from the floor encouraged Section to support Project NExT participants from the Section in the National NExT program.

Program Chair Jonathan Cox thanked the local organizing team and program committee, especially local organizer Patti Fraser Lock. He also thanked Bob Rogers for his work arranging the next six locations:

- April 15-16, 2016 SUNY Geneseo
- October 21-22, 2016 RIT
- March 24-25, 2017 SUNY Oswego
- Fall 2017 SUNY Broome
- Spring 2018 SUNY Brockport
- Fall 2018 Univ. of Toronto, Mississauga

Speakers already identified for the Spring 2016 meeting are Bob Rogers, Luise-Charlotte Kappe, and Margaret Morrow.

The Student Program Committee highlighted student activities for the remainder of the day and presented a gift of appreciation to Blaire Madore for hosting the Team Trivia contest Friday night.

The Randolph Lecture Committee commented on Laura Person as the Randolph Lecturer at this meeting and solicits recommendations for the next year. The Randolph Lecture focuses on teaching and mathematics education with a primary focus on speakers from within the Section.

The Gehman Lecture Committee announced L. C. Kappe as the Spring 2016 Gehman Lecturer.

There was no report from the Education Policies Committee.

The Distinguished Teaching Award Committee solicits nominations (due Feb. 1).

The Nominating Committee solicits nominees for Second Vice-Chair, Chair-Elect, First Vice-Chair, and At-Large member of the Executive Committee. There are also a number of committee positions open.

Jeff Johannes, Liaison Coordinator indicated that we have liaisons for less than $\frac{1}{2}$ the schools in the Section. The gaps are primarily in Ontario and in the two-year colleges.

The position of Seaway Current editor is currently vacant.

Seaway NExT is recruiting participants. Also, Matt Koetz is stepping down as chair of the committee.

The Business meeting adjourned at 11:08.

Respectfully submitted,

Gary Raduns
Seaway Section Secretary

Section Notes

The Euler Society:

The Euler Society's 2016 conference is scheduled to take place from July 25-26 at Adelphi University in Garden City, NY. Information on the Euler Society's past conferences is available on their web site (<http://www.eulersociety.org>). The Euler Society is a history of math/science group, focusing mainly on the 18th century, and would be happy to welcome attendees or speakers from the Seaway Section that may want to come

down to the New York metro area for our conference. Feel free to contact Dr. Erik Tou (etou@uw.edu), Secretary of the Euler Society, with questions.

Upstate New York Inquiry-Based Learning Consortium:

The Seaway Section has had a number of events aimed at promoting Inquiry-Based Learning (IBL) techniques at their recent meetings. If you are interested in learning more about this teaching method you may be interested in a four-day IBL workshop to be held at Nazareth College in summer 2017. Funded by an NSF IUSE grant, the Nazareth workshop is one of the PRODUCT project workshops run through the Academy of Inquiry-Based Learning (iblworkshop.org) of California Polytechnic University. The workshop will be delivered by members of the Upstate New York IBL Consortium. While the dates and details are still TBA, we encourage you to look for this as the time draws nearer. If you would like to be certain you don't miss the registration deadlines (the summer 2016 PRODUCT workshops filled up very quickly), send e-mail indicating such to uny.ibl@gmail.com.



SUNY Broome C.C. Mathematics Department:

Tairi Mead is chairing the committee that has just finished creating a mathematics AS degree program for SUNY Broome. There will be a track for prospective math majors, and one for prospective statistics majors. This program has the great advantage of pulling together numerous courses that we already offer, preparing students more effectively for their upper undergraduate mathematics/statistics endeavors. We are looking for articulation agreements.

Luis Moreno's new textbook on real analysis is available at the MAA.org website. It is geared to lift students off from Calculus II into the level of learning and constructing proofs, investigating functions, series, modes of convergence, metric spaces and the infinite. "An Invitation to Real Analysis" has 600 exercises, many graphs and diagrams, and enrichment projects. Please consider it at the meeting at Geneseo!

Timmy Bremer presented a beginner's workshop in the spring on solving Rubik's cube. His quite adept at solving them and has a collection which includes cubes from 2x2x2 up to 7x7x7, a void cube, tetrahedral puzzles with 2, 3, and 5 layers, as well as a gear ball, an Impossiball, and a Square-1.

Tom Reid is presenting at the upcoming NYSMATYC conference in Kingston. The talk is entitled "There is Time for Fun in Math Class". He will present some tried and true fun examples and activities that take little class time but get the students talking, involved, and interested (one of them is a card trick using sequences).

The Department has begun implementing a new developmental math program that is a self-paced or "emporium" model, headed by Jean Krichbaum. Our program is condensed to two courses each containing six modules. The first course is a basic arithmetic and beginning algebra course. The second is an elementary algebra course. The results so far are encouraging. Full implementation of the program will commence in Fall 2016.



SUNY Fredonia Mathematical Sciences Department:

The Mathematical Sciences Department at Fredonia is very proud that Bob Rogers has been promoted to Distinguished Teaching Professor. As the Seaway Section knows well, he has been very involved in the leadership of the section. He has also been very involved in the leadership of the Association of Mathematics Teachers of New York State and has been the editor of the *New York State Mathematics Teachers Journal* for many years. He has worked hard to improve mathematics education at all levels for more than 25 years. In addition, he does a great job of teaching our students and has done outreach activities with students at several different high schools in the state.

After a second six-year stint as department chair, Joe Straight will be stepping down at the end of the summer and Julia Wilson will take over. Joe has provided strong leadership for the department and now will give his full attention to teaching our students. Julia will now provide us with exciting new leadership.

SUNY Potsdam Mathematics Department:

We are pleased to announce an Event Honoring Clarence F. Stephens on May 20th, 2016. We will celebrate his life and legacy and unveil a bronze plaque in his honor.



We were sorry to say good-bye to faculty member Derek Habermas, who has relocated to South Carolina, and who continues to teach mathematics and work in mathematics publishing. Derek was with our department from 2006-2015.

Department members Victoria Klawitter and Blair Madore were pleased to have their NYSED MSP grant renewed—which allows them to run summer workshops helping regional teachers get better acclimated with the Common Core standards.

The Department was pleased to be awarded a \$15,000 grant from Santander Bank in support of students studying Mathematical Origins in Mexico.

Department Alumnus Doug Van Nort (BA/MA SUNY Potsdam, MFA RPI, PhD Music Technology McGill) was awarded a five-year Canada Research Chair in Digital Performance. This is a \$500,000 grant spread over 5 years and is roughly equivalent to the US MacArthur Genius grant. In 2015 Doug joined York University's School of the Arts, Media, Performance & Design. He is cross-appointed to the Digital Media Program and the Department of Theatre.

SUNY Oswego Mathematics Department:

We are proud to announce that SUNY Oswego mathematics and meteorology double major Tyler Pelle of Sparta, New Jersey, has been awarded the SUNY Chancellor's Award for Student Excellence. Additionally, Tyler has won the Louis R. DeRitter Senior Award from SUNY Oswego's Math Department.



The department is also pleased to welcome Sarah Mall Hanusch, starting with the Fall 2016 semester. Sarah is joining us from the University of Texas at Austin, after earning a PhD in Mathematics Education with a specialization in undergraduate education. Sarah also earned a M.S. in mathematics with a specialization in 4-dimensional topology and mathematics education.

Fall Meeting:

October 21-22, 2016, at Rochester Institute of Technology, Rochester, NY.

Links

Seaway Section Website: <http://people.rit.edu/maacway/>

Governance: <http://people.rit.edu/maacway/governance.html>

MAA: <http://www.maa.org/>

The Seaway Current

The Seaway Current is published twice per year by the Seaway Section of the Mathematical Association of America 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 by e-mail (elizabeth.wilcox@oswego.edu). Presently, this newsletter is produced using Microsoft Word, which can import plain text files or files produced by most standard word-processing software.

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
Department of Mathematics
Oswego State University of New York
Tel: 315-312-6586
E-mail: elizabeth.wilcox@oswego.edu

SEAWAY SECTION of the MATHEMATICAL ASSOCIATION OF AMERICA

2016 SPRING MEETING

April 15-16 at SUNY GENESEO

PROGRAM

Friday afternoon, South Hall 328

1:00 – 5:00 **Seaway NExT Workshop:** IBL Multivariable Calculus and Discrete Mathematics facilitated by **Ted Mahavier**, Lamar University, and **David Clark**, SUNY New Paltz

Friday afternoon, South Hall 309

3:00 – 6:00 Meetings of the Executive Committee and Extended Executive Committee

Friday evening, Valley Oak Events Center, Geneseo Quality Inn

6:00 – 7:00 Social Hour (open bar)

7:00 – 8:30 Banquet

8:30 – 9:30 **Robert Rogers**, State University of New York at Fredonia *After All, It's Just Algebra*

9:30 – 10:30 **Team Trivia Tournament**, hosted by **Blair Madore**, SUNY Potsdam

Saturday morning, Newton Hall 202

8:40 – 8:45 Welcome address by **Carol Long**, Provost, SUNY Geneseo

8:50 – 9:40 **Andrew Simoson**, King University *Continued Fractions and the Solar Eclipse*

9:40 – 10:05 **Business Meeting**

10:10 – 11:00 **Gehman Lecture: Luise-Charlotte Kappe**, Binghamton University *Finite Coverings: A Journey through Groups, Loops, Rings and Semigroups*

Saturday morning, Bailey Hall

11:10 – 12:05 **Contributed Talks (schedule on back) and Student Talks (schedule on green sheet in your folder)**

Lunch, Mary Jemison Dining Hall: 12:05 – 1:30

Saturday afternoon, Bailey Hall

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

Saturday afternoon, Newton Hall 202

3:10 – 4:00 **Carl Lutzer**, Rochester Institute of Technology *Hammering Home Undergraduate Mathematics*

Meeting Website <http://www.geneseo.edu/seaway>

NEXT MEETING: OCTOBER 21-22, 2016, at RIT

Contributed Talk Schedule

Bailey Hall 102

- 11:10-11:35 **Patti-Frazer Lock**, St. Lawrence University
2015 MAA Curriculum Guide: What Are the Recommendations For a Mathematics Major?
- 11:40-12:05 **Ryan Gantner**, St. John Fisher College *The future of the Seaway Section visioning session*
- 1:30-2:25 **Workshop on Leadership in the Mathematical Sciences**, organized by **Mihail Barbosu**, RIT
Tenure and Promotion Process and Criteria; Handling Difficult Situations
- 2:30-3:00 Student talks (See the schedule on the green sheet in your folder for details.)

Bailey Hall 101

- 11:10-12:05 **SUNY Fredonia Teachers' Masters Capstone Projects**
Middle and High School Student Misconceptions in School Mathematics
- *Are You Mental? An Analysis of Middle School and College Students' Mental Mathematical Abilities in Real World Contexts* **Ellie Brion**, SUNY Fredonia
 - *The In-Crowd: A Study of Student Preferences When Calculating the Area of Irregular Polygons* **Carah Bradford**, SUNY Fredonia
 - *The Great Divide: An Examination of Middle School Students', College Students', and Adults' Ability to Complete Long Division* **Steve Sturm**, SUNY Fredonia
- 1:30-2:25 **SUNY Fredonia Teachers' Masters Capstone Projects**
College Student Misconceptions in Secondary School Mathematics
- *Just Double the Tax: College Students' Exploration of Numeric and Word Percent Problems* **Emily Tronolone**, SUNY Fredonia
 - *Writing Radical Wrongs: A Study of College Student's Misconceptions Pertaining to Computations with Radicals and Rational Exponents* **Collene Sikora-Press**, SUNY Fredonia
 - *Compose Yourself: It's Just a Function! A Study of College Students' Understanding of Composition Functions* **Madison Cole**, SUNY Fredonia
 - *A Picture is Worth...College Students' Performance on Isomorphic Visual vs. Non-visual Regents Level Geometry Problems* **Dylan Leitner**, SUNY Fredonia

Bailey Hall 103

- 11:10-11:35 **Nicholas Devin**, Binghamton University
Braids and tree pairs: a mathematician's toolkit for tying knots
- 11:40-12:05 **Sam Northshield**, SUNY Plattsburgh *Some Combinatorial Trees*
- 1:30-1:55 **Howard Bell**, Brock University *Some commutativity conditions: an homage to Luise Kappe*
- 2:00-2:25 **Yozo Mikata**, Bechtel *ID Phononic Metamaterials*
- 2:30-2:55 **James Marengo**, RIT *Bugs chasing Bugs*

Bailey Hall 104

- 11:10-11:35 **Andrzej Kedzierawski**, SUNY Geneseo *Inverse Problems related to the heat equation*
- 11:40-12:05 **Laura M. Muñoz** and **Niels F. Otani**, RIT
Applications of a Mathematical Model of Cardiac Action Potential Dynamics
- 1:30-1:55 **Julia Wilson**, SUNY Fredonia *The Jordan Curve Theorem: A History*
- 2:00-2:25 **John Harris**, D'Youville College *Real Dynamics of the Tent Function*
- 2:30-3:00 Student talks (See the schedule on the green sheet in your folder for details.)

Student Talk Schedule**Bailey Hall, Room 202**

- 11:10 - 11:22 **Anh Nguyen, SUNY Potsdam**
Son Nguyen, Nagoya University
Morley's Miracle
- 11:25 - 11:37 **Amy Defnet, Hamilton College**
Deck of Cards + Math = MAGIC
- 11:40 - 11:52 **Taylor Jones, SUNY Potsdam**
Lawrence Wong, SUNY Potsdam
Heronian Arithmetic Progression Triangles
- 1:30 - 1:42 **Kenny Roffo, SUNY Oswego**
A New Cube
- 1:45 - 1:57 **Mitchell Holbrook, Alfred University**
Statistics and Stock Market Valuation
- 2:00 - 2:12 **Charity Willet, Ithaca College**
Even-sided Magic Polygons
- 2:15 - 2:27 **Justin Mader, Ithaca College**
Odd-sided Magic Polygons
- 2:30 - 2:42 **Steven Rossi, Utica College**
Finding a Unique Solution to Radon-Kaczmarz Puzzles

Bailey Hall, Room 203

- 11:10 - 11:22 **Rebecca Buranich, SUNY Brockport**
Math in Motion: A Study on Arts Integration in the Classroom
- 11:25 - 11:37 **Amber Dubill, RIT**
Tyler Walton, RIT
On the Dynamics of Artificial Satellites: Designing Good Orbits with Bad Perturbations
- 11:40 - 11:52 **Saul Almanzar, Ithaca College**
Lines and Ellipses in Taxicab Geometry
- 1:30 - 1:42 **Patrick Marris, Hamilton College**
A Mathematical Model for Molecular Motion
- 1:45 - 1:57 **Toryn Avery, Ithaca College**
Inequivalent Nets of Polyhedra
- 2:00 - 2:12 **Alex Jones, Hamilton College**
A Mathematical Model for Insect Growth: The Biological Underpinnings
- 2:15 - 2:27 **Stephanie Allen, SUNY Geneseo**
Factors Influencing the Ratio of SNAP Participants to Poor People in US Counties
- 2:30 - 2:42 **Lauren King, Hamilton College**
Color Distinguishing of Complete Graphs

Bailey Hall, Room 204

- 11:10 - 11:22 **Chen Sitong, Hamilton College**
The Simpson's Paradox
- 11:25 - 11:37 **Ryan Bianconi, Ithaca College**
Applications of the L_2 Transform to Dawson's Integral
- 11:40 - 11:52 **Benjamin Oltsik, Hamilton College**
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- 2:30 - 2:42 **Daniel Tjie, Ithaca College**
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The Aesthetics of Fractal Geometry: Exploring the Human Fascination With Fractals

Bailey Hall, Room 102

- 2:30 - 2:42 **Karen Davila, SUNY Potsdam**
Aime Kikoma, SUNY Potsdam
An Optimal Basketball Free Throw
- 2:45 - 2:57 **Zach Ward, SUNY Oneonta**
Inversions and their Applications

Bailey Hall, Room 104

- 2:30 - 2:42 **Nathan Lamson, Hamilton College**
Steven Stone, Hamilton College
The Quantification of Qualitative Data: How Arbitrary Coding Produces Varying Results
- 2:45 - 2:57 **Risheng Zeng, Hamilton College**
A Probability and Statistics Misconception

Contributed Talks

1. **Howard Bell**, Brock University

Some commutativity conditions: an homage to Luise Kappe

A talk at a Seaway Section meeting resulted in a fruitful collaboration with Luise Kappe. I shall discuss some results obtained with her, including results on rings in which every set of pairwise noncommuting elements is finite.

2. **Nicholas Devin**, Binghamton University

Braids and tree pairs: a mathematician's toolkit for tying knots

From the moment we put on our shoes in the morning, knots are a part of our everyday lives. In the lives of mathematicians, a knot is an embedding of a circle into $\mathbb{R}^3$ --intuitively, a mathematical knot must have its ends connected together to form a closed loop. A link is similar to a knot, but with any finite number of components (think, for example, of the Olympic rings). In this talk, I will open up a knot building "toolkit" containing two types of mathematical objects, and we will see how exactly to use these tools to form knots and links. The old, classical members of the toolkit are braids. The new additions to the toolkit, thanks to a discovery by Vaughan Jones (2014), are elements of Thompson's group F , a mysterious group whose elements can be represented as pairs of finite binary trees. But can we always find the right tool to build any desired knot? And is it possible to tell when two braids, or two tree pairs, will produce the same knot? For braids, these questions were answered in the affirmative several decades ago. For tree pairs, however, little is known about their full potential as knot-tying tools. I will introduce some of what we know, and some of what we hope to know in the future.

3. **Ryan Gantner**, St. John Fisher College

The future of the Seaway Section visioning session

Sit down with the Chair of the Seaway Section to discuss initiatives for the future. What should we do at future meetings? Workshops? Mini-courses? Fun events? Charity fundraisers? Technology training? Something radically different? What should we do outside of the meetings? Bring your own ideas for the future as we brainstorm things that can be done as well as their benefits, drawbacks, and constraints.

4. **John Harris**, D'Youville College

Real Dynamics of the Tent Function

Given a closed interval I , a continuous function $f: I \rightarrow I$, and a point c in I , the “orbit of c under f ” is the sequence: $\{c, f(c), f(f(c)), f(f(f(c))), \dots\}$. The point c is called “ n -periodic” if $f^n(c) = c$ for some $n \geq 1$; the smallest such n is called the “least period of c ”. We note that the Intermediate Value Theorem implies that f will always have a point c of period 1 (a fixed point).

In 1964, Sharkovski published theorems that describe the possible periods of a function f . One of the implications is that if f has a point of least period 3, then it must have points of every other period. In this talk, I will show how the truncated tent functions can be used to illustrate the Sharkovski Realization Theorem.

5. **Andrzej Kedzierawski**, SUNY Geneseo

Inverse Problems related to the heat equation

Many mathematical problems in science, technology and medicine can be viewed as inverse problems and expressed by differential equations. In particular, we present the inverse problem related to the heat equation; the backward heat conduction problem of calculating the initial temperature from the measurement of the final temperature. The backward heat conduction problem is difficult to solve since it is severally ill-posed. We solve this by converting the problem into the Fredholm integral equation of the first kind which we solve using Tikhonov's regularization method. We illustrate our theoretical method with numerical examples. Exposing students to inverse problems allows us to introduce and explore fundamental mathematical ideas and provide an opportunity to integrate science with mathematics.

6. **Patti Frazer Lock**, St. Lawrence University

2015 MAA Curriculum Guide: What Are the Recommendations For a Mathematics Major?

The MAA publishes a Curriculum Guide every 10 years or so, and the most recent came out in 2015. This Guide is aimed specifically at recommendations for students majoring in mathematics and the mathematical sciences. We review the recommendations in the Curriculum Guide and discuss the many resources available to accompany the Guide. We welcome an interactive conversation about the recommendations!

7. James Marengo, RIT

BUGS CHASING BUGS

Suppose a bug is situated at each of the vertices of a regular n -gon. When we start the clock, each bug chases the next bug at the same constant speed in such a way that, at every instant, each bug is moving directly toward the bug that he or she is chasing. It turns out that, after a finite amount of time, the bugs will converge at the center of the n -gon, and the problem is to calculate the length of the path traversed by each bug. This is a fairly standard problem in calculus, and we will discuss the details. But the more interesting questions that we will investigate is whether it is possible to solve this problem without the use of calculus.

This talk should be accessible to any student who has had first-year calculus.

8. **Yozo Mikata**, Bechtel

1D Phononic Metamaterials

Phononic metamaterials have been studied for a long time with various different focuses. Especially since the pioneering work of Liu et al. [1] in 2000, the idea of local resonance, which was exploited in [1], has been extensively studied. Some of those studies are Huang and Sun [2], Liu et al. [3] and Wang et al. [4]. The latter studies [3, 4] are related to an earlier work by Camley et al. [5], Delph et al. [6], and Sun, et al. [7]. In this talk, binary 1D metamaterials will be discussed in relation to local resonance. Particular attention will be focused on the effect of the geometrical parameters of the material periodicity on the dispersion characteristics of SH waves. Numerical results will be given on 2-layer cell and 3-layer cell systems.

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9. **Sam Northshield**, SUNY-Plattsburgh

Some combinatorial trees

We look at several countable sets and ways that their elements can be arranged as nodes of a tree. In particular, we consider the following trees: Kepler's tree, the Stern-Brocot tree, the Calkin-Wilf tree, a tree of Pythagorean triples, and others. The tree structure allows for an explicit enumeration of the underlying set; in this way we give several enumerations of the positive rationals.

10. **Laura M Muñoz** and **Niels F Otani**, RIT

Applications of a Mathematical Model of Cardiac Action Potential Dynamics

In this study, we examined the Luo-Rudy dynamic (LRd) model, a 17th-order nonlinear ODE model of the action-potential dynamics of a cardiac cell, as a basis for reconstructing important electrophysiological variables that are difficult or impossible to measure during in vitro experiments, yet are thought to be critical to the formation of dangerous arrhythmias. The LRd model was linearized about a fixed point, which was identified with a Newton-Krylov solver. To determine whether measurements of any individual dynamical variable were sufficient to estimate the remaining variables, we analyzed a model property called observability. The observability results showed that measurements of cellular membrane potential, which are relatively easy to obtain in vitro, were sufficient for estimating the other dynamical variables in the model. The linearized model was augmented with process and measurement noise, after which a Kalman filter was designed and shown, in Matlab simulation tests, to reduce the norm of the estimation error covariance. Closed-loop estimation methods, such as Kalman filtering, constitute a promising approach for allowing researchers to gain a more complete understanding of the dynamical behavior of cardiac cells.

11. **Julia Wilson**, SUNY Fredonia

The Jordan Curve Theorem: A History

The Jordan Curve Theorem is one of those easy-to-state, hard-to-prove theorems at the foundation of planar geometry. Jordan's original proof was dismissed as deeply flawed, but those criticisms are now being called into question. The history of proofs of this theorem and its generalizations spans more than a century. We'll survey this history, with special emphasis on recent work by Thomas Hales.

Teachers' Masters Capstone Projects in Secondary and College Mathematics

Session Organizer, Keary Howard, SUNY Fredonia

Abstract:

These sessions are highlighted by the presentation of research results from secondary school mathematics teachers Masters theses. Topics and presenters include:

Session 1 (55 minutes)

Middle and High School Student Misconceptions in School Mathematics

Are You Mental? An Analysis of Middle School and College Students' Mental Mathematical Abilities in Real World Contexts. Ellie Brion, SUNY Fredonia

The In-Crowd: A Study of Student Preferences When Calculating the Area of Irregular Polygons. Carah Bradford, SUNY Fredonia

The Great Divide: An Examination of Middle School Students, College Students, and Adults Ability to Complete Long Division. Steve Sturm, SUNY Fredonia

Session 2 (55 minutes)

College Student Misconceptions in Secondary School Mathematics

Just Double the Tax: College Students' Exploration of Numeric and Word Percent Problems. Emily Tronolone, SUNY Fredonia

Writing Radical Wrongs: A Study of College Student's Misconceptions Pertaining to Computations with Radicals and Rational Exponents. Collene Sikora-Press, SUNY Fredonia

Compose Yourself: It's Just a Function! A Study of College Students' Understanding of Composition Functions. Madison Cole, SUNY Fredonia

A Picture is Worth...College Students Performance on Isomorphic Visual vs. Non-visual Regents Level Geometry Problems. Dylan Leitner, SUNY Fredonia

Student Talk Abstracts

Stephanie Allen, SUNY Geneseo

Factors Influencing the Ratio of SNAP Participants to Poor People in US Counties

Abstract: The Supplemental Nutrition Assistance Program (SNAP) helps millions of people across the United States fight food insecurity and hunger. However, the “ratio of SNAP participants to people in poverty” varies from county to county and, for some counties, this statistic is less than 1.0, which means not all poor people utilize SNAP benefits. There has been research done on the factors behind individual and/or household SNAP participation, which has found state SNAP policies, demographic characteristics, economic conditions, and other variables to be significant in predicting participation. Furthermore, other research has looked at SNAP usage at a spatial level to determine if usage in surrounding areas and if a place’s location influence its SNAP usage. Informed by this research, my research utilizes independent variables studied in both the individual and spatial analyses to identify the significant factors influencing counties’ ratio of SNAP participants to poor people. This dependent variable is worth studying because it is a spatial variable that focuses directly on the people who should be able to use SNAP. The research employs a multiple linear regression model to analyze the influences of independent variables concerning demographics, unemployment, State SNAP policies, and others on the ratio. In particular, the study would like to discover why the state of California and the upper and middle Mid-West in 2010 reported noticeably lower ratios when compared to the rest of the country.

Saul Almanzar, Ithaca College

Lines and Ellipses in Taxicab Geometry

Abstract: We will describe the Taxicab metric and how lines and ellipses manifest themselves in this metric. We will compare these to their Euclidean counterparts.

Toryn Avery, Ithaca College

Inequivalent Nets of Polyhedra

Abstract: A net is a planar polygonal figure that can be folded to form a polyhedron. I am interested in the inequivalent nets of *deltahedra*, or polyhedra triangulated by equilateral triangles. Specifically, we will be looking at the two possible eight-sided deltahedra, each of which we call octahedra. We will distinguish the two possible octahedra as regular and non-convex. *Inequivalent* means that there is no way for any of the nets to be transformed into one of the other nets via a rigid motion. In order to categorize inequivalent nets of each polyhedron, we define a *spine* to be the main stack of the polyhedra’s corresponding two-dimensional shape in a net. Typically, the spine of a net is the stack with the most connected triangles. We will also use Euler’s Theorem to prove multiple other propositions and theorems that assist us in categorizing our nets. Euler’s Theorem states: $|F| - |E| + |V| = 2$, where $|F| = \#$ of faces, $|E| = \#$ of edges, and $|V| = \#$ of vertices of a polyhedron. These results apply to all polyhedra triangulated by equilateral triangles. Another feature of deltahedra that we use to categorize nets is the *degree of a vertex*, which is the number of edges incident to that vertex.

Ryan Bianconi, Ithaca College*Applications of the $\mathcal{L}_2$ -transform to Dawson's Integral*

Abstract: Provided are the definitions for Dawson's Integral and the $\mathcal{L}_2$ -transform, respectively:

$$\text{daw}(x) = \int_0^x e^{y^2-x^2} dy,$$

$$\mathcal{L}_2\{f(x); y\} = \int_0^\infty x e^{-x^2 y^2} f(x) dx.$$

We introduce a differential operator and a convolution product for the transform. Using the transform and its properties, we obtain results about Dawson's integral. Our operational techniques simplify the complicated calculations.

Rebecca Buranich, SUNY Brockport*Math in Motion: A Study on Arts Integration in the Classroom*

Abstract: My research explores how placing dance and whole body movements into an elementary classroom help children better understand and develop a greater appreciation of basic mathematical concepts. More specifically, it looks at what effect the muscle memory that is developed while moving has on retaining information in a scholastic setting. It focuses on the integration of pattern recognition, symmetry, and basic geometry at an elementary level to improve mathematical thinking in children through the methods of the Multiple Intelligences Theory and Arts Integration.

Karen Davila, SUNY Potsdam**Aime Kikoma, SUNY Potsdam***An Optimal Basketball Free Throw*

Abstract: As a basketball player you want to achieve the optimal free throw. Many people believe that a "good shot" comes from practice but the optimal free throw really depends on math. The free throw is determined by two variables, which are, the angle of release and the velocity of the ball. We analyze, following Mr. Seppala-Holtzman, the two different types of free throw shots, a swish shot and a bounce shot. Using physics and numeric methods on how the two given variables result in the optimal shot for a basketball player.

Colin Day, Hamilton College*The Aesthetics of Fractal Geometry: Exploring the Human Fascination With Fractals*

Abstract: While it is widely known that fractal behavior can be found in many elements of nature such as coastlines, mountain ranges, rivers, ferns and trees, humans have been exhibiting fractal behavior for thousands of years. From ancient Indian kolam patterns dating back over four thousand years to indigenous African architecture, humans have been creating fractals long before they understood the underlying mathematics.

Amy Defnet, Hamilton College*Deck of Cards + Math = MAGIC*

Abstract: To some, math is magical in and of itself; my job today is to illuminate this relationship for those of whom this is not readily apparent. Using principles encountered in undergraduate mathematics, I will explain a magical card trick in which I correctly guess a set of randomly-selected cards from a deck. These principles include binary notation, de Bruijn sequences, and a little graph theory. With a set of basic mathematical skills and a mediocre memory, you too can impress the dinner guests by becoming a magical mathematician.

Amber Dubill, RIT

Tyler Walton, RIT

On the Dynamics of Artificial Satellites: Designing Good Orbits with Bad Perturbations

Abstract: This presentation originates from the Artificial Satellites course offered at RIT this semester. The distinctive features of this course rely on its interdisciplinary nature, as well as the combination of theoretical concepts and experiential learning activities. One project in this class concerns the orbital motion of an artificial satellite affected by several important perturbations, like the gravitational field of the oblate Earth, atmospheric drag, third body gravitational perturbations, solar radiation and solar wind. We will show here that precise determination of the effect of these perturbations on the artificial satellite's orbital elements can be used to design particular orbits for intended satellite missions.

Marcus Elia, SUNY Geneseo

Alec Friedman, SUNY Geneseo

Orders of Elliptic Curves over Finite Fields

Abstract: When studying groups of points on non-singular curves of the form $y^2 = x^3 + bx + c$ over F_p , with p prime, it is natural to see what the average group order is. We will present some results on this topic, as well as many conjectures based on patterns we have observed.

Tyler Fedoris, SUNY Oneonta

Computer-Generated Explorations of Orbits Under Polynomials of the Units of the ring $(\mathbf{Z}/n\mathbf{Z}, +_n, \cdot_n)$

Abstract: Let $G = (\mathbf{Z}/n\mathbf{Z})^*$ be the group of units of the ring $(\mathbf{Z}/n\mathbf{Z}, +_n, \cdot_n)$, and suppose that f is a polynomial with integer coefficients. We are interested in exploring the orbits under f , and ask if any algebraic structure is contained in such orbits. In particular:

- When is $Orbit(1)_f$ a cycle?
- If $Orbit(1)_f$ is a cycle:
 - When will the elements of this orbit form a subgroup of G ?
 - What will this orbit look like?
 - What algebraic structure is seen in this orbit and other orbits?

These questions have been examined previously (Robert Sulman-2012) using no more than a hand calculator to facilitate computations. However, larger groups lead to tedious computations if only a calculator is utilized.

Mitchell Holbrook, Alfred University

Statistics and Stock Market Valuation

Abstract: Determining whether a market is overvalued or undervalued is paramount for any investor. Overvalued markets tend to decrease over time, resulting in losses of capital, whereas undervalued markets tend to rise, creating the opportunity for substantial gains in wealth. This talk will focus on a method that any investor could use to potentially enter the market while it is undervalued. Part one will discuss the creation of our model, which utilizes a generalization of the dividend discount approach to stock valuation. Part two will cover the testing of the model which was accomplished through a Monte Carlo simulation study. The presentation will conclude with a discussion on potential weakness of our model and testing procedure, as well as propose avenues for future research.

Alex Jones, Hamilton College*A Mathematical Model for Insect Growth: The Biological Underpinnings*

Abstract: The growth trajectory of the tobacco hornworm, *Manduca sexta*, has been extensively characterized. Indeed, mathematical models have been developed to understand these trajectories. The traditional trajectory, given by Dyar's Rule, indicates that the growth of *Manduca sexta* follows an exponential model with a growth coefficient that remains constant throughout development. However, this model has recently been discredited, as the coefficient has been shown to vary throughout development. Thus, a new model has replaced Dyar's Rule, wherein growth is exponential with a coefficient that itself follows an exponential decay model. Thus, growth can be modeled by the solution to two differential equations. In this model, the growth rate of animals increases throughout development, but at a decreasing rate. The biological reasons for this model include decreased tracheal size throughout development, exoskeletal limitations to size, and diminished transportation capacity of the gut.

Taylor Jones, SUNY Potsdam**Lawrence Wong, SUNY Potsdam***Heronian Arithmetic Progression Triangles*

Abstract: A Heronian Triangle is a triangle with rational sides and also a rational area. A Heronian Arithmetic Progression triangle is a Heronian triangle whose sides are $(b - d, b, b + d)$ for some rationals b and d . Following a proof done by Herb Bailey and William Gosnell, we will be demonstrating how to determine all such Heronian Arithmetic Progression triangles.

Lauren King, Hamilton College*Color Distinguishing of Complete Graphs*

Abstract: A vertex (or edge) labeling of a graph is distinguishing if no nontrivial automorphism preserves the labeling of the graph's vertices (or edges). For any complete graph, G , on n vertices, the minimum r such that G has an r -distinguishing vertex labeling is n . However, we prove that for any complete graph on n vertices, where $n \geq 6$, the minimum number of edge colors needed for a distinguishing edge labeling is 2.

Nathan Lamson, Hamilton College**Steven Stone, Hamilton College***The Quantification of Qualitative Data: How Arbitrary Coding Produces Varying Results*

Abstract: Survey questions that require qualitative answers, such as opinion polls, present unique challenges to statisticians. To apply standard statistical tests to qualitative data, transformations are used to convert the qualitative responses into numbers. However, the arbitrariness of the transformation - the arbitrariness with which numbers are assigned - can affect the conclusions that are drawn. In March 2015, 57 institutions (54 "small" and 3 "large" schools) participated in the Higher Education Data Sharing (HEDS) Consortium's Sexual Assault Campus Climate Survey. We will show some of the limitations of analyzing qualitative data with quantitative means by using the opinion responses in this survey. By varying the arbitrary coding designations of the opinion responses we will show differing statistical conclusions, which in turn will demonstrate the problems of using quantitative tools to analyze qualitative data.

Tianshu Liu, Hamilton College*Confronting Multicollinearity in Multiple Regressions*

Abstract: With advances in computer hardware allowing statistical analysis of larger and larger data sets, multiple regression is being applied in more and more situations. Unfortunately, throwing more variables into a regression may not be helpful. One major problem afflicting multiple regression is the problem of multicollinearity. Multicollinearity can both increase the standard errors of the coefficients and make the coefficients meaningless. In this presentation I will start with the definition, causes, and consequences of multicollinearity. Then I will present ways of detecting and dealing with multicollinearity. In particular, I will present examples of datasets that have multicollinearity problems, and then I will both examine some Stata output to identify the problems and also discuss possible resolutions of the problems.

Justin Mader, Ithaca College*Odd-sided Magic Polygons*

Abstract: Given any odd sided polygon, it is possible to create a magic polygon by assigning the numbers 1 through $2n$, where n is the number of sides, to each vertex and edge of the polygon, such that the sum of each side is the same magic sum. We will show several examples and algorithms for generating odd-sided magic polygons.

Patrick Marris, Hamilton College*A Mathematical Model for Molecular Motion*

Abstract: Creating a computational model that allows for accurate modeling of atomic motion while maintaining a reasonable computational cost is difficult. Multiple methods of simulation exist; some maximize realism at the expense of system size and computational cost. Others compromise on the modeling the true complexity of atomic motion in order to model larger systems over longer time frames. In the arena of drug design and investigation, it is necessary to create large, realistic systems. As such, a method known as molecular dynamics is generally used. Molecular dynamics divides the complex principles that describe molecular motion into constituent parts that are more easily mathematically modelled. We discuss some of the mathematics behind this method of molecular simulation.

Anh Nguyen, SUNY Potsdam**Son Nguyen, Nagoya University***Morley's Miracle*

Abstract: In 1899, Frank Morley - a professor at Haverford College - discovered an incredibly interesting theorem. It is now commonly called Morley's Miracle: The three points of intersection of the adjacent trisectors of the angles of any triangle form an equilateral triangle. Following Charles E. Baker we illustrate the basic trigonometric proof and will also outline a geometric proof by John Conway.

Benjamin Oltsik, Hamilton College*Internal Differential Equations*

Abstract: What started as a mere passing thought at prom night developed into a characterization of solutions to an important class of differential equations. We are calling these internal differential equations because they have the form $y' = y(x-1)(y \text{ OF } x-1)$. In this talk, we will describe a unique approach to solving and generalizing solutions to internal differential equations. We will also discuss why internal differential equations are useful for modeling real world phenomena.

Kenny Roffo, SUNY Oswego*A New Cube*

Abstract: In the early 1980s, Rubik's Cube was at the top in the toy industry. Since then, many inventors have seen this as inspiration to create their own versions of the puzzle, including the megaminx and the Square-1. These puzzles are called twisty puzzles, and they have served as tools to teach group theory to students around the globe both in the classroom and through research projects. We have studied several existing twisty puzzles, and now we have created a new one, which we are attempting to describe with group theory.

Steven Rossi, Utica College*Finding a Unique Solution to Radon-Kaczmarz Puzzles*

Abstract: A 3×3 Radon-Kaczmarz puzzle, or RK puzzle for short, is to find 9 whole numbers between 1 and 9 (repetition allowed) so that when they are arranged in a 3×3 square grid, the sum of each row, column and diagonal is equal to its own prescribed amount. If we do not add new sums as the size of RK puzzles get larger, finding a solution becomes easier, however the uniqueness of a solution is most likely lost. The question that will be addressed in this talk is how we can guarantee that a unique solution exists for an arbitrary $n \times n$ RK puzzle. We will discuss the answer to this question by providing a formula of the total number of sums in terms of the size of the puzzle, and a formula of the size of the puzzle in terms of the total number of sums. The work to be presented has been done in collaboration with Dr. Xiao Xiao (Utica College).

Chen Sitong, Hamilton College*The Simpson's Paradox*

Abstract: This presentation will demonstrate Simpson's Paradox, in which a trend among several data groups disappears or reverses after combining the groups together. Specifically, we will explore the statistical features of the data groups that lead to Simpson's paradox. We will also describe why Simpson's paradox is significant in data interpretations in other sciences and law cases.

Sarah Thomsen, Hamilton College**Ryan McCausland, Hamilton College***The Statistics of Unwanted Sexual Experiences*

Abstract: Hamilton College conducted on-line surveys on alcohol-related behaviors in 2012 and 2015 as part of a larger project. Two questions asked each year were:

1. During the current academic year, how many times have you experienced or engaged in the following due to your alcohol use? - Had an unwanted sexual experience.
2. During the current academic year, how many times have you experienced or engaged in the following due to someone else's alcohol use? - Had an unwanted sexual experience.

The term "unwanted sexual experience" is undefined, so the responder could interpret that as unwanted contact, a mistake, or a more aggressive and forceful experience. Despite the ambiguity, the data supports some interesting conclusions, particularly when factors such as gender and athletic status are taken into account. The talk will present an analysis of the responses.

Daniel Tjie, Ithaca College*Finger Games for Counting by 6*

Abstract: Finger Games, a topic in number theory, study certain one-to-one operations on sequences of 0's and 1's of length $2f$ - viewing the left and right half as fingers of adjacent hands interpreted using what is called Gray Code. An up finger represents a 1 and a down finger represents a 0. In particular, Finger Games involve the operation of counting in Gray Code by an even number C , alternating hands. As the operations are one-to-one, they divide the sequences into orbits. In my research I studied the even parts of orbits for counting by $C = 6$.

Zach Ward, SUNY Oneonta*Inversions and their Applications*

Abstract: Inversions are an important concept within the field of mathematics, particularly in transformational geometry. The goal of this presentation is to give the audience an understanding of the fundamentals and applications of inversions. The definition and proof of the construction of the inversion will be applied to points and lines. In addition, a few shapes and images such as polygons are transformed using inversions about a specific circle of radius r , where most images are symmetric about the center of that circle. In addition, classical proofs and applications such as the Ptolemy-Euler inequality and similarity relationships of triangles formed by using inversions will be investigated. Lastly, the classical physical application of inversions, Peaucellier-Lipkin Linkage Problem, will be investigated.

Charity Willet, Ithaca College*Even-sided Magic Polygons*

Abstract: The idea of the magic polygon comes from the better-known magic square and slightly lesser known magic circle. This idea is simple: take any even-sided polygon and place one number in the middle and three numbers alongside every edge. The catch? Every edge and every diagonal must sum to the same number - the magic sum. The numbers used must live within a variety of parameters, which makes building the polygon more difficult than it appears. Once built, we can explore the many intriguing nuances of the magic polygon: including fascinating symmetries, distinct structures, and predictable patterns. We will dive deep into the mysterious world of the magic polygon, all in pursuit of an elusive beast: the algorithm that builds them all.

Risheng Zeng, Hamilton College*A Probability and Statistics Misconception*

Abstract: One of the common misconceptions in Probability and Statistics is that a probability distribution that has a mean will have a finite variance. This is not true, and we will see why through an examination of the movie industry. The movie industry is a risky business. An inspection of 2015 movies that were released between 1984 and 1996 shows that movie box-office revenue follows a Pareto-Levy distribution. The Pareto-Levy distribution is a positive Levy stable distribution with $1 < \alpha < 2$. Although not all Levy distributions have infinite variance, $1 < \alpha < 2$ does imply that the variance of box-office revenue is infinite. Movie revenues tend to diverge over all values, however the average is skewed toward the upper tail by a few blockbuster movies. It's interesting to note that, since the average of box-office revenue exist and its finite so it can be estimated; however the confidence interval is infinite. This means that the estimate has zero precision and is essentially useless for all things and purposes.