

THE SEAWAY CURRENT

Newsletter of the Seaway Section of the Mathematical Association of America

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Fall 2015

Fall 2015 Meeting to be hosted by St. Lawrence University

Our Fall meeting this year promises to bring the very best in mathematical discussion, exposition, camaraderie, and expertise into the heart of northern New York in the Seaway Section. We have informative workshops, captivating speakers, entertaining games, social events, and fabulous weather (the last one comes with no guarantee).

The meeting will feature an interactive workshop on Inquiry-Based Learning in Calculus facilitated by Ted Mahavier of Lamar University. Those interested in learning more about this rapidly-expanding pedagogical technique and applying it to calculus will learn from an IBL master.

As is customary, there will be a social hour prior to the banquet, to be held on Friday evening, November 6, at The Club in Canton, NY. After the banquet presentation by Rick Cleary of Babson University, there will be a Team Trivia Tournament for students and faculty.

On Saturday, November 7, we welcome three invited morning speakers, described in detail below, including this year's Randolph Lecturer. Saturday afternoon brings us 19 contributed talks and 8 student talks. There will also be plenty of other educational opportunities, including a workshop on Using Simulation Methods to Build Conceptual Understanding in Introductory Statistics, a Seaway NExT Discussion on *The Unexpected Parts of an Academic Career*, a panel on Undergraduate Mathematics Research Experiences, a Workshop on Leadership in the Mathematical Sciences, and an IBL Roundtable Discussion. We hope you take full advantage of all of these opportunities!

More information about the invited speakers, including the abstracts for their talks and their biographical information, is included in the following pages. Also in the subsequent pages of this newsletter is information about the special events mentioned in the previous paragraphs. One can find a copy of the program as it appears at press time as well as the schedule of student presentations attached at the end of the newsletter.

The Speakers

Rick Cleary, Babson University (Banquet speaker)



What Every Mathematician Should Know About Statistics ... and Vice Versa

Abstract:

The first course in statistics is often taught by people whose training is mostly in a different discipline, often mathematics. In this talk we look at some of the ways that mathematics teachers can prepare to teach statistics by adopting some of the essentials of statistical thinking. With a few audience participation examples, we will consider how the statistical thinking approach is sometimes very much at odds with traditional approaches to working on mathematics problems. We will try a few exercises to show how mathematics teachers can use their training to develop fun and effective approaches to teaching statistics. And of course to be

fair we will also consider what statisticians can learn from the mathematics community.

Biography:

Rick Cleary is Professor and Chair in the Division of Mathematics and Science at Babson College in Wellesley, MA. He grew up in the Seaway section in Oneida, NY and was an undergraduate at SUNY Oneonta. He has previously taught at Cornell University (where he earned his PhD), Bentley University, Harvard University and Saint Michael's College in Vermont. He enjoys working on applied problems in mathematics and statistics, and has recent jointly authored papers with colleagues on diverse topics including failure times for hip replacements, fraud detection in accounting, assessment of creativity in marketing, and various questions in modeling sports outcomes. He has been a very active member of the Mathematical Association of America, including serving a six year term on the Executive Committee as Associate Treasurer and Chair of the Budget Committee. Professor Cleary's recreational interests are largely sports related. Running, golf, coaching his sons in baseball and rooting for the Red Sox are among his favorite activities.

Erica Flapan, Pomona College (Polya lecturer) Topological and Geometric Symmetries of Molecular Structures

Abstract:

How does a chemist know that a molecule that he or she has synthesized has the desired form? Most non-biological molecules are too small to see in a microscope or even with the help of an electron micrograph. So chemists need to collect experimental data as evidence that a synthetic molecule has a particular form. One approach to this is to try to match the experimental data about the symmetries of the molecule to the symmetries of a physical model of the desired form. But molecules which are not completely rigid may have symmetries that are absent from the model. In such a case, topology, which is the study of deformations of objects in space, can help interpret the data. In this talk we will explore topological and geometric approaches to studying the symmetries of complex molecular structures.

Biography:

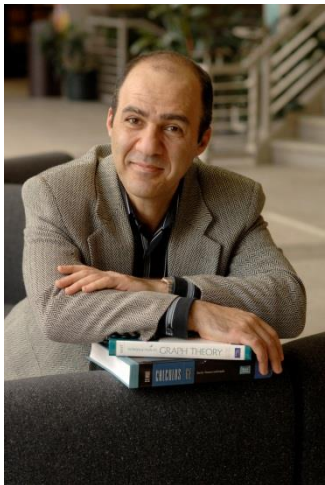
Erica Flapan joined the faculty at Pomona College in 1986. Since 2006, she has been the Lingurn H. Burkhead Professor of Mathematics at Pomona College. In addition to teaching at Pomona College, Flapan has been teaching regularly at the Summer Mathematics Program for freshmen and sophomore Women at Carleton College. In 2011, Flapan won the Mathematical Association of America's Haimo award for distinguished college or university teaching of mathematics. Then, in 2012, she was selected as an inaugural fellow of the American Mathematical Society. She is currently a Polya Lecturer for the MAA.

Erica Flapan is one of the pioneers of the study of the topology of graphs embedded in 3-dimensional space, and has published extensively in this area and its applications to chemistry and molecular biology. In addition to her research papers, she has published an article in the College Mathematics Journal entitled "How to be a good teacher is an undecidable problem," as well as three books. Her first book, entitled "When Topology Meets Chemistry" was published jointly by the MAA and Cambridge University Press. Her second book entitled

"Applications of Knot Theory," is a collection of articles that Flapan co-edited with Professor Dorothy Buck of Imperial College London. More recently, Flapan co-authored a textbook entitled "Number Theory: A Lively Introduction with Proofs, Applications, and Stories" with James Pommersheim and Tim Marks. She has just finished writing a new book that is entitled "Knots, Molecules, and the Universe: An Introduction to Topology," which is intended to introduce first year college students to topology. This book is currently in press with the American Mathematical Society, and should be published in time for the Joint Math Meetings in 2016.



Hossein Shahmohamad, Rochester Institute of Technology



Cancellable Numbers, Poisoned Martini & Suspended Bottle

Abstract:

Following the footsteps of mathematical giants like Martin Gardner, Peter Winkler, Sam Loyd and Henry Dudeney, this talk attempts to bring out the beauty of mathematics in a recreational sense. Our goal is to gain appreciation among the non-mathematical groups. In presenting these puzzles, we intend to promote mathematical interest among school children and in general people of all ages and regardless of their academic backgrounds.

Biography:

Hossein Shahmohamad received his PhD from University of Pittsburgh in 2000 and is currently a Professor of Mathematics at RIT. His original interest lay in Graph Theory and coloring problems. He has been the recipient of teaching awards as a graduate student at Pitt, as a faculty member at RIT and as a member of the Seaway Section. His true passion is in teaching and in improving the academic lives of his students. He is a former Chair of Seaway and is currently the Chair of RIT Academic Senate. His first book of puzzles in the Farsi language will be published soon. Since he is interested in collecting more new puzzles, he offers \$1 to anyone who shares a new interesting puzzle with him.

Laura Person, SUNY Potsdam (Randolph lecturer)



Clearing Obstacles to Student Success

Abstract:

Recognizing potential for mathematical achievement in students is one of the most valuable gifts we instructors can give our students. Sometimes we have difficulty recognizing potential. Even when we do, for it to do any good, we must convince the students that they have mathematical promise, that the hard work necessary to fulfill that promise is worthwhile, and that they hold the key to their own success. It is all too easy for us to inadvertently put needless obstacles in the way of the mathematical progress of our students. I will discuss some of the obstacles to student success I have found in my own teaching, and steps I have taken to remove them.

Biography:

Laura Person is a Professor of Mathematics at SUNY Potsdam with 26 years of teaching experience. She joined the Potsdam faculty directly after receiving her Ph.D. from the University of California at Santa Barbara. She is co-author with Amy Babich of the bridge course textbook *Write Your Own Proofs*. Her teaching awards include the MAA Seaway Section Clarence Stephens Distinguished Teaching Award in 2008 and the SUNY Chancellor's Award for Excellence in Teaching in 2015.

Special Events

IBL Calculus – An Interactive Workshop (Ted Mahavier, Lamar University)

Description: Whether you want to dip your toes gently into IBL Calculus or dive in head first, we have something for you! From references addressing the efficacy of IBL, to sources for materials, to grading, to developing your own materials, to failed techniques, we will do our best to address it all. We will demonstrate via video what an IBL course might look like in real time. We will try to show the excitement that can come

from a successful IBL course and share student comments on IBL courses. We will address the trades in learning outcomes that are made when using IBL over more content-oriented pedagogy. Mostly, we'll just have some fun and think about new way to teach.

TEAM TRIVIA TOURNAMENT (Blair Madore)

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

Using Simulation Methods to Build Conceptual Understanding in Introductory Statistics (Robin Lock, Patti Frazer Lock)

Description: This workshop will give participants hands on experience with activities designed to introduce students to basic ideas of statistical inference using simulation-based methods. These techniques provide an early and intuitive approach to core ideas such as confidence intervals and hypothesis tests that apply to many situations, but don't require a lot of formal algebraic or probabilistic prerequisite knowledge. Participants will use a freely available web package (StatKey) that is designed to give students easy access to these computer-intensive methods on a wide variety of platforms. Examples might address important questions such as "Are mosquitoes more attracted to beer drinkers?" or "Do teams with more malevolent uniforms get more penalties?"

Panel on Undergraduate Mathematics Research Experiences (Elizabeth Wilcox)

Description: Come hear what undergraduates have to say about undergraduate research: the real deal straight from the horse's mouth!

Project NExT Discussion: The Unexpected Parts of an Academic Career (Matt Koetz)

Description: A discussion about things you may not have anticipated when you became a professor, such as choosing a textbook, advising, committee work, and balancing numerous responsibilities.

Reports from the Section

Minutes of the Executive Committee Meeting, April 17, 2015 – Sandeep Bhargava

Present: Charlie Ragozzine, John Maceli, Gary Towsley, Ryan Gantner, Jonathan Cox, Sandeep Bhargava

The Executive Committee Meeting commenced at 3:25 p.m.

Minutes of the Fall 2015 were approved with a spelling correction (*Jon* Kleinberg, not *John* Kleinberg).

Chair's Report: The balance increased from \$16,138 on 9/15/2014 to \$16,710 on 3/1/2015.

First Vice Chair's Report: As of April 17, there were 188 people registered for the meeting, including at least 94 students. A Project NExT Workshop titled "What is Mathematics Now?" was held on Friday afternoon. Elizabeth Wilcox will lead a hands-on sculpture activity prior to the Friday evening banquet. The speaker at the Friday evening Banquet is Gary Towsley who will describe some of the history of the Seaway Section and changes it has undergone over the years. Keynote speakers at the meeting include the past president of the MAA, Robert Devaney, and two MacArthur fellows, Jeffrey Weeks and Jon Kleinberg (Gehman Lecture), the latter also being a Nevanlinna Prize winner. A few large sized posters highlighting some of the section's historical artifacts will be on display. T-shirts that commemorate the 75th anniversary of the section and the 100th anniversary of the national organization were made and will be distributed.

Preliminary information on future sites: The Fall 2015 will be at St. Lawrence University, the Spring 2016 at SUNY Geneseo, and the Spring 2018 will likely be at the University of Toronto, Mississauga.

Treasurer's Report: There was a net gain of \$1,040 from the Alfred University meeting in Fall 2014. Part of the increase in the balance was accounted for by proceedings from book sales and a slightly lower overhead at the Alfred meeting in Fall 2014.

A motion was passed to allow nominations for the Clarence F. Stephens Distinguished Teaching Award to be kept on file and available for consideration for three years. In general, department members were to continue being encouraged to nominate their colleagues and for applications to be well-written.

A successor is being sought to take over the editor responsibilities from Margaret Morrow for the Seaway Current newsletter.

The section Governor provided a report on the Governors' Meeting at the Joint Mathematics Meetings. An increase from \$169 to \$175 would take place for the yearly membership dues. A new kind of departmental membership was being considered involving one free faculty membership, unlimited student memberships, and electronic access to the MAA journals. The MAA president Bob Devaney reported that there was a lot of interest among our South American counterparts in working with the MAA at the Mathematical Congress of the Americas. The Committee on the Undergraduate Program in Mathematics would revisit and update course curricula in a shorter two to three year timeframe. There is also a group looking at rethinking the role of the semi-annual Governors' meeting due to the large cost associated with it. The MAA currently has an operating deficit of about \$500,000.

A motion was passed to match the MAA's funds for the governor to attend the Joint Math Meetings and MathFest and for the section representative to attend MathFest. This amounts to the section spending \$500 for each of the two annual meetings that the section governor attends and \$250 for the summer MAA meeting that the section representative attends.

The session moved without pause to the Extended Executive Committee.

Minutes of the Extended Executive Committee Meeting, Colgate University, April 17, 2015 – Sandeep Bhargava

Also in attendance: Jeff Johannes, Elizabeth Wilcox, Jane Cushman, Matt Koetz

The Program Committee reported on the program at this meeting and went over the venues for the next two meetings (see above).

The Student Program Committee reported that there was an Integration Bee being held on Friday night and 36 student talks in the program on Saturday.

The Randolph Lecturer for the Fall 2015 meeting had not been confirmed yet.

The Gehman Lecture Committee reported that Jon Kleinburg was the Gehman lecturer this meeting.

The Educational Policies Committee had nothing to report.

The Distinguished Teaching Award Committee reported that Margaret Morrow was selected as the recipient of the award.

The Nominations Committee reported that the Jonathan Cox, the Program Chair, must be replaced in another year. Executive Committee members are encouraged to think about who the next Program Chair will be.

The Seaway Current is looking for a new editor to replace Margaret Morrow.

Seaway NExt/PFF held a workshop on Friday afternoon titled, “What is Mathematics Now?” that had 15 participants.

There was no report from the Webmaster.

The extended executive committee was informed about the earlier motions that
(i) extended the pool of candidates for the Clarence F. Stephens Distinguished Teaching Award to three years; and
(ii) matched funds from the National MAA to help the Section Governor attend the Joint Mathematics Meetings and MathFest, and a section representative attend MathFest.

Jeff Johannes reported that the local organizing committee for the Spring 2016 meeting at SUNY Geneseo would experiment with having a plenary speaker at the close of the meeting on Saturday afternoon.

The Extended Executive Meeting adjourned at 5:20pm.

Minutes of the Business Meeting, Colgate University, April 18, 2015

The minutes of the Business Meeting will be published separately.

Treasurer’s Report, Spring 2015 – Gary Towsley

1. Balance as of 9/15/2014	\$16,138.00
2. Fall Meeting at Alfred University	
a) Meeting Receipts	\$5,808.72
b) Meeting Expenses	\$4,667.73
c) Net	\$1140.99
3. Speakers Expenses, Honoraria	\$390.28
5. MAA – Proceeds of Book Sale	\$71.58
6. Travel Support for Section Officer	\$250.00
7. Balance as of 3/01/2015	\$16,710.29

Note: The Section paid \$382.80 for the expenses of the IBL meeting and \$505.25 for book orders placed by the IBL group. The Section was reimbursed fully {\$888.05} from the grant funds of the IBL group.

Governor’s Report, Fall 2015 – Gary Towsley

Governor’s Report – Fall 2015

I attended the Board of Governor’s meeting on August 4, 2015 at MathFest in Washington, D. C. There were two major items to report upon that were discussed at the meeting 1) the continuing budget deficit, and 2) the plan to change the governance structure of the MAA.

The Budget Deficit

The MAA has been running an operating deficit for the past ten years, usually to more than \$200,000 per year. At MathFest in 2012, the board of governors approved a plan to remedy the situation. Several changes have been made in the operation of the MAA pursuant to that plan. The operation of the AMC (American Math Competition) has been moved from being outsourced to being managed by the MAA itself. After the changeover costs, this change has helped decrease the deficit. The MAA is aggressively pursuing funds from many more outside sources than previously. The staff in Washington has been reduced in size and has been focused on reducing the deficit through expanding the publication of MAA books and on increasing the membership of the organization.

The range of the recent deficits is given below:

2014 - \$585,000

2015 - \$98,000

2016 - \$47,000 (projected)

This looks good but one must factor in a gift of \$750,000 from the Simon Foundation for the three year period 2014-2016.

The Governance Structure of the MAA

The Board of Governors (BOG) of the MAA, a group of about 40 members (counting section governors and at-large governors) is the body with ultimate fiduciary responsibility for the organization. Since the BOG meets twice a year and must approve all major decisions of the MAA, it is sometimes difficult for the staff of the MAA to respond quickly to the changing environment for non-profit organizations. Also the twice yearly meetings of the board (which are attended by most of the staff of the MAA also) are rather expensive to hold. At JMM in San Antonio, the BOG charged a small task force with developing some alternative forms of governance for the organization, forms that would be less expensive, and more agile. Three models of governance were presented at MathFest, with the clear indication that the models were to illustrate the range of options rather than to be the choices before the BOG. The three models were:

Model I

Small Board with 15 voting members, no larger advisory body

Membership of the Board

1. President, elected as now, serving on the Board for four years (one as President - Elect, two as President, one as Past- President). The President serves as Chair of the Board.
2. Nine Directors, elected to three - year terms, with three Directors elected annually through a general election.
3. Additional members include a Secretary, Treasurer, and Associate Treasurer, with these members elected on a staggered basis by the Board to three – year terms.
4. With the exception of the President, who is limited to a single term, all other members of the Board may be elected to at most three consecutive terms.
5. The Board would elect an Associate Secretary to oversee the scientific program of MAA national meetings. As is currently the case, the Associate Secretary would be a voting member of the board.

Model II

Small Board with 8 voting members, and a larger advisory body (an Assembly) drawn from existing constituencies.

Membership of the Board

1. President, elected as now, serving on the Board for four years (one as President - Elect, two as President, one as Past - President). The President serves as Chair of the Board.
2. Three Directors, elected to three - year terms, with one Director elected annually from the Assembly.
3. Additional members include a Secretary, Treasurer, and Associate Treasurer, with these members elected on a staggered basis by the Board to three - year terms.
4. With the exception of the President, who is limited to a single term, all other members of the Board may be elected to at most three consecutive terms.
5. The Board would elect an Associate Secretary to oversee the scientific program of MAA national meetings. However, the Associate Secretary would not be a voting member of the board.

The Assembly and its duties

1. Members of the Assembly would be drawn primarily on ex officio basis from the volunteer leadership of SIGMAAs, Council chairs, chair of the Committee on Sections, regional representatives, and other identified constituencies.
2. The Assembly will convene at an annual meeting at least once a year.
3. The Assembly serves to train leaders, test policy ideas, articulate membership concerns, and respond to strategic proposals. The Assembly will be the primary source for task force leadership of the association.
4. The Assembly might take a role in selection of, e.g., the Board Secretary, as well as identifying members of particular constituencies to serve on the Assembly.

Model III

Small Board with 12 voting members, and a larger advisory body (an Assembly) elected by Sections.

Membership of the Board

1. President, elected as now, serving on the Board for four years (one as President- Elect, two as President, one as Past - President). The President serves as Chair of the Board.
2. Three Directors, elected to three - year terms, with one Director elected annually through a general election.
3. Three council chairs, selected by the Board for staggered three - year terms.
4. Additional members include a Secretary, Treasurer, and Associate Treasurer, with these members elected on a staggered basis by the Board to three - year terms.
5. The Chair of the Assembly serves ex- officio.
6. With the exception of the President, who is limited to a single term, all other members of the Board may be elected to at most three consecutive terms.
7. The Board would elect an Associate Secretary to oversee the scientific program of MAA national meetings. However, the Associate Secretary would not be a voting member of the board.

The Assembly and its duties

1. The Assembly consists of 29 members, one elected from each section. It forms the primary mechanism for communication between the sections themselves and between sections and the Association.
2. The Assembly will convene at the two annual meetings of the Association.
3. The Assembly serves to train leaders, test policy ideas, articulate membership concerns, and respond to strategic proposals. The Assembly will be the primary source for task force leadership of the association.

The BOG considered the three models, first in small groups and then in the full body. The board came to a consensus that model 3 was preferable with some support for model 1. It was the general opinion that model 2 was not representative enough of the various constituencies of the MAA. Taking this discussion under consideration, the task force will present a plan for adoption at JMM at Seattle. If the BOG accepts the plan put forward by the task force, then the plan will be put forward for adoption by the entire membership of the MAA through voting.

The BOG meeting at JMM in Seattle should be very interesting.

Respectfully submitted by Gary Towsley, Seaway Governor 2012-2105.

Section Notes

Rault Delivers Alder Award Talk



Patrick Rault of SUNY Geneseo received the Henry L. Alder Award for Distinguished Teaching from the MAA. He delivered his acceptance talk at the 100th anniversary Mathfest meeting in Washington, D.C. in August. His talk, titled “A taste of research,” explored the way which he uses the way he understands how students learn mathematics to frame how he teaches, how he does research, and how he asks students to investigate problems. Rault is the fifth Alder award winner from the Seaway section in the past 9 years. Other Alder award winners from the section include Sam Vandervelde (St. Lawrence University, 2011), Kathleen Fowler (Clarkson University, 2010), David Brown (Ithaca College, 2008), and Darren Narayan (Rochester Institute of Technology, 2007). Photo courtesy SUNY Geneseo.

Muench Begins 50th Year



The 2015 – 2016 academic year marks Don Muench’s 50th year as a faculty member at St. John Fisher College in Rochester, NY. Muench, who is a graduate of St. John Fisher’s inaugural graduating class, is also celebrating 60 years in the MAA Seaway section. He reports to have been to upwards of 50 Seaway section meetings and looks forward to coming to more, though he will not be able to make this fall’s meeting. Photo courtesy St. John Fisher College.

Upstate New York IBL Consortium Promotes Inquiry-Based Learning in Section

Through a generous grant from the Educational Advancement Foundation, five professors from five institutions in the Seaway Section were able to form the Upstate New York IBL Consortium for the purpose of building and maintaining a network of instructors who practice Inquiry-Based Learning techniques in their mathematics classrooms. They are able to offer support through workshops, mentoring, and networking. Travel support and informal meetings are also available. For more information, visit <http://citadel.sjfc.edu/faculty/rgantner/ibl>.

Committee Members, Volunteers, and New Ideas Needed

Volunteers are continually needed to continue the work of the MAA at the regional level, either on various committees, by hosting meetings at your institutions, by coming up with new and creative ideas, by running workshops at our meetings, by organizing outreach opportunities, or in other capacities. If you have ideas, are interested in volunteering, or think you know someone who should become more involved (!), please contact Ryan Gantner at rgantner_at_sjfc_dot_edu. In particular, we are looking for a new Editor of this publication, the Seaway Current.

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. 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.

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Abstracts, Contributed talks for Fall 2015 Seaway Section Meeting

1. **Anurag Agarwal, RIT**

Special matrices applied to both cryptography and solving polynomial equations.

It is well known that the polynomial equations beyond the fourth degree do not have a general solution (using radicals) but solutions for quadratics, cubics and quartics are well known. These solutions are complicated and the methods seem ad hoc. Is there a unified approach for all equations through degree four?

In cryptography there is a well known problem called the discrete log problem (DLP). The usual groups in which DLP is proposed are the group of units of a finite field and the group of rational points of an elliptic curve over a finite field. Is there a group other than these where we can propose DLP and also implement it securely?

We will answer both the questions posed above by means of a special group of matrices.

2. **Hossein Behforooz**, Utica College

From Melencolia I to Calendarical Magic Squares

In this short talk we will go over from the 500th birth year of Melencolia I masterpiece engraving (from Albrecht Durer, a German renaissance painter, graphic artist and mathematician) to the Yang Hui-Durer magic square with amazing and interesting properties, then from Durer Conjecture to Anti Durer Conjecture. Finally, if time permits, we will finish this talk with the construction of Calendarical Magic Squares by using the Yang Hui-Durer magic square. Some historical notes will be discussed. We know that the magic squares are fun topics of recreational mathematics, so, join us and enjoy and have fun. ☺

3. **David Clark**, SUNY New Paltz

Real Analysis for Preservice Teachers

This talk will describe new guidelines from the CBMS (Conference Board for the Mathematical Sciences) for real analysis courses for preservice teachers. It will then outline an active learning (IBL) text authored by the speaker that was designed to meet those guidelines and is currently available for pilot testing. The CBMS 2012 guidelines differ sharply from the previous CBMS 2001 guidelines on this issue. We quote here the relevant paragraph.

“The Real Number System and Real Analysis.”

“It is an often unstated assumption of high school mathematics that the real numbers exist and satisfy the same properties of operations as the rational numbers. Teachers need to know how to prove what is unstated in high school in order to avoid false simplifications and to be able to answer questions from students seeking further understanding. Thus, a construction of the real numbers, a proof that they satisfy the properties of operations (the CCSS term for the field axioms), and a proof that they satisfy the Completeness Axiom are necessary for teachers. A definition of continuity for a function of a real variable and a proof of the Intermediate Value Theorem provide the underpinnings of the graphical methods for solving equations that are taught to high school students. Thus, they are needed ingredients in teachers’ backgrounds. A treatment of the real numbers can also include a treatment of their representation as infinite decimals, including an understanding of decimal expansions as an address system on the number line and an analysis of the periods of decimal expansions of rational numbers using modular arithmetic.”

The Mathematical Education of Teachers II, CBMS: Issues in Mathematics Education, Volume 17, Chapter 6, page 60, published jointly by the AMS and MAA (2012).

4. **Charlie Jacobson**, Elmira College

A Flipped Statistics Course: Two-Year Report

A ‘flipped’ instructional model significantly changes the way that students spend their course-related time. Homework consists of listening to lectures, reading relevant text selections, and doing other preparatory activities. Class time is then devoted to problem-solving.

In the fall of 2013, the author flipped all his sections of MAT 2090, Statistical Methods, and continues to utilize this model. The organizational details of the flipped course will be presented, along with several outcomes, including increases in both student exam performance and course engagement, and a much better feedback loop to assist in course improvement.

5. **Keith Jones**, SUNY Oneonta

Routes to Infinity: Asymptotic Behavior in the Lamplighter Group

Imagine a person, a “lamplighter”, tasked with patrolling an infinitely long straight road with lamps placed at regular intervals. The lamplighter has two possible actions at a given point in time: step from one lamp to the next in one direction or the other, or toggle a lamp on or off.

Hidden inside this scenario is a group known as the “Lamplighter Group” L_2 , which records all possible (finite) sequences of actions the lamplighter may take. When one sequence of actions is followed by another, they combine to form a third, and this provides a group operation. One way to understand this group is by representing in the form of a graph, called a Cayley graph. In general, a group has many Cayley graphs, but a particularly nice Cayley graph for the Lamplighter Group is known as the Diestel-Leader graph, $DL(2,2)$, an important and beautiful mathematical object in its own right.

My Colleague, Dr. Gregory Kesley of Bellarmine University, KY, and I have studied ways of “finding infinity” in this group. More technically, we’ve found natural topological spaces associated to this group, called the visual boundary and the horofunction boundary, which provide two different ways of thinking about asymptotic properties of this group.

6. **Nicole Juersivich**, Nazareth University

Inquiry and Technology in Calculus I

Technology is a natural cognitive support for inquiry because it provides students with a tool to guide their experimentation, conjecturing, and communication. After teaching Calculus I for a year using a modified Moore method, I decided to incorporate structured inquiry workshops employing technology into the course as well. Using the National Research Council’s components of mathematical proficiency as a standard, I created three workshops addressing common misconceptions in differential calculus. In this presentation, I will discuss the creation, implementation, and informal evaluation of these workshops.

7. **Joseph Kolacinski**, Elmira College

Equilibriums for Approval Voting: A Preliminary Report

Using a one-dimensional model of voter behavior, the Median Voter Theorem tells us that the ideal position of a candidate in a two-candidate election is the position of the median voter.

In 1984, Gary Cox argued, from a set of assumptions about voter behavior, that Approval Voting also has an analogue of the Median Voter Theorem and that the preferred position of any candidate in an AV election is also at the position of the median voter.

Using a different set of assumptions about voter behavior, we develop a broader equilibrium for an approval voting election.

8. **Natasha Komarov**, St. Lawrence University

Cycles in Tournaments

We will discuss a bit of the motivation for and history of the problem of computing the number of k -cycles in tournaments, as well as some new results. Specifically, we will see that while the maximum number of directed 3-cycles in a tournament is asymptotically equal to the expected number, this is not true for 4-cycles. The natural extensions (to the cases where $k > 4$) have largely remained open for decades. We will compute a formula for the number of 5-cycles in any tournament, and use it to show that the number of 5-cycles in a tournament cannot exceed the expected number. Time permitting, we will conclude with a summary of some results that are known for $k > 5$ and some open problems.

9. **Heather Lewis**, Nazareth College

Changing Calculus

In the past three years, our department has made two significant changes to our calculus sequence. The first was reordering the topics in the second and third semester so that students covered differentiation and integration of multivariable functions in Calculus II and series in Calculus III. The second was teaching our entire calculus sequence through inquiry-based learning. This talk will cover the initial decision to reshape our calculus courses, and the challenges and benefits that have arisen as a result.

10. **Benjamin Levy**, University of Tennessee

Modeling Feral Hogs in Great Smoky Mountains National Park to Evaluate Control Efforts and Analyze the Population's Niche.

Feral Hogs (*Sus scrofa*) are an invasive species that have occupied the Great Smoky Mountains National Park since the early 1900s. Recent studies have revitalized interest in the pest and have produced useful data. Two models were created and analyzed using detailed data on vegetation, mast and harvest history. The first model is discrete in time and space and was formulated to represent hog dynamics in the park. The second is a spatial model of the niche of the population that relates known presence locations to environmental predictors. Together these projects assess the importance of the existing control program and predict suitable locations for hog presence in the Park.

11. **Daniel M Look**, St. Lawrence University

Stylometry and the Seldon Crisis: Using Statistics to Categorize Novels in Asimov's Foundation Universe

Stylometric authorship attribution uses statistical methods applied to the written language to add evidence in cases of contested authorship. However, by “authors” we really mean “narrative voices.” Hence, stylometry can theoretically be used to distinguish a work written by an author in their 20s from one written by the same author in their 50s. We will introduce the field of stylometric authorship attribution and apply the techniques to the Foundation Universe of Isaac Asimov.

Over the course of almost 60 years, Asimov published a total of 14 books (depending on how you count his earlier serialized works) in his Foundation Universe. These books are separated into three sub-series (Foundation, Empire, Robot), with publication dates for these works primarily in the 1950s and the 1980s, with a break from 1954 until 1982. Due to the multiple narrative voices of Asimov over time and among series, this collection makes for an excellent case study.

12. James Marengo, RIT

The Conditional Poisson Process and the Gamma and Negative Binomial Distributions

Consider a counting process which has the property that it's *conditionally* a Poisson process given its rate, and suppose the rate is a random variable which has a gamma distribution. It is shown by way of an easy calculation with the law of total probability that the number of events that have occurred in the process up to a fixed time is *unconditionally* negative binomial. This calculation appears in many books on stochastic processes, but it doesn't explain intuitively just *why* the result should be true. Could we have *guessed* this result without this calculation? It's the purpose of this talk to present an alternative proof which *does* explain just *why* the result works. This proof, which doesn't appear in any text with which the speaker is familiar, uses the memoryless property of the exponential distribution and interchanges the role of the *rate* and the *time* in another Poisson process.

This talk should be accessible to any student who has taken a solid course in probability.

13. Sam Northshield, SUNY Plattsburgh

ReReRecounting the rationals

In 1999, Neil Calkin and Herbert Wilf wrote their paper "Recounting the rationals" which gave an explicit bijection between the positive integers and the positive rationals. Their result leads to the following reformulation: For $f(x) := 1 + 1/x - 2\{1/x\}$ where $\{x\}$ denotes the fractional part of x , the sequence $1, f(1), f(f(1)), f(f(f(1))), \dots$ is a list of all of the positive rationals. I recently discovered the surprising fact that the iterates of $2 + 2/x - 4\{1/x\}$ starting at 2 also cover the positive rationals as do the iterates of $3 + 3/x - 6\{1/x\}$ starting at 3. That is, the iterates of $cf(x)$, starting at c , cover the positive rationals for $c = 1, 2, 3$. Even more surprisingly, $c = 1, 2, 3$ are the only numbers such that the iterates of $cf(x)$ cover the positive rationals. I'll try to sketch some of the proofs; they involve, among other things, "negative" continued fractions, Chebyshev polynomials, Euler's totient function, arrangements of circles, and variants of Stern's diatomic sequence.

14. Mitchell Phillipson, SUNY Oswego

Counting Foldings in RNA

Everyone is familiar with DNA, the double stranded helix that makes us who we are. However, you may be less familiar with RNA. RNA is the single stranded cousin of DNA, responsible for many actions within cells. Because RNA is single stranded, it tends to fold onto itself; these foldings can potentially change the function of the RNA. Given an RNA sequence, it is possible that the sequence can fold in a variety of ways. An interesting combinatorial question is, how many ways can an RNA sequence fold onto itself? Further, are there RNA sequences that have a unique folding? If so can we classify them? In this talk we'll work to answer these questions in a manner that is accessible to all levels, especially undergraduate.

15. Gregory Quenell, SUNY Plattsburgh

Variations on the Birthday Problem

How many students do you need in your introductory probability class in order to have a better-than-even chance that two of them share a birthday? A familiar counting argument tells us that the answer is 23. How many do you need if you're just looking for adjacent birthdays, or birthdays within the same week? What's the probability of finding a 3-way or 4-way coincidence? These variations on the Birthday Problem lead to

counting arguments that are slightly less familiar, but still straightforward enough to use in an introductory probability class.

16. **Robert Reams**, SUNY Plattsburgh

Exceptional copositive matrices

I will introduce copositive matrices, and state some facts known about them from a to-be-published paper. Let A be an n -by- n symmetric matrix with real entries, and x a vector with n real entries. A matrix A is said to be copositive if $x^t A x \geq 0$ (t denotes transpose), for any vector x with real nonnegative entries. If you have an n -by- n positive semidefinite matrix B (in other words, $x^t B x \geq 0$, for any vector x with real entries), and an n -by- n symmetric nonnegative matrix C (in other words, all entries of C are nonnegative), then it is clear that $B + C$ is copositive. One well-known interesting fact is that there are copositive matrices which are not of the form $B + C$, with B positive semidefinite and C nonnegative, although they only exist for $n \geq 5$. When A is invertible we will give sufficient conditions, based on the entries of the inverse of A , for a matrix A not to be of the form $B + C$, where B is positive semidefinite and C is nonnegative.

17. **Joanne Redden**, Elmira College

Teaching Calculus using Maple labs

At Elmira College many of our Mathematics course require a laboratory component. For our Calculus sequence our students have a lecture component on MWF and a computer lab component on TTh. We use computer algebra system, Maple, to explore calculus in our labs. This model straddles traditional method of classroom lecture with a form of inquiry based learning. In this presentation I will talk about how I balance the lab experience with the classroom and why I love this model for teaching calculus.

18. **Robert Rogers**, SUNY Fredonia and **Eugene Boman**, Penn State Harrisburg

Flipping the Calculus Course (Not the Class)

The teaching of Calculus has been discussed at length for many years with no real consensus having been reached. We suggest that simply changing the order of the topics would be an improvement. We will present one possible reordering that mirrors the historical development of the topic. We believe this will feel more natural to students, but will still cover the same traditional topics by the end of the course.

19. **Tamas Wiandt**, RIT

Are all inequalities created equal?

Inequalities are organic ingredients of some deep analytical results as well as mainstays of elementary problem solving. I give a short survey of the connections among some of the well-known inequalities. We are interested in the question of whether all these inequalities originate from the same basic idea.

Student Speakers and Titles, Fall 2015 Meeting

Panel on Mathematics Research Experiences for Undergraduates

Ryan Bianconi, Ithaca College

Zachary Brehm, SUNY Potsdam

Emily Cunningham, SUNY Potsdam

Montana Earle, SUNY Potsdam

Ioherase Ranson, SUNY Potsdam

Kenneth Roffo, SUNY Oswego

Student Presenters

- 2:30 - 2:42 Nanjiang Liu, St. Lawrence University
Comparing Methods for Constructing Confidence Intervals
- 2:45 - 2:57 Courtney Burris, Elmira College
Exploring Sampling Strategies Using the Marvel Comic Book Universe
- 3:00 - 3:12 Sijia (Scarlett) Qi, St. Lawrence University
Shiny Bayes: Developing an App to Illustrate Bayesian Inference
- 3:15 - 3:27 Son Vuong, St. Lawrence University
Haggle with Google Flight: Predicting Flight Prices
- 3:30 - 3:42 Linh Nguyen, Elmira College
An Interactive Representation Triangle for a Three-candidate Election
- 3:45 - 3:57 Danielle Petkovsek, Elmira College
Impact of a Third-Party Candidate and the 2014 Maine Gubernatorial Election
- 4:00 - 4:12 Janelle Fredericks, St. Lawrence University
Carbon Density Loss in the Pantropical Forests
- 4:15 - 4:27 Meghan Cornforth, Elmira College
Playing with Cayley Graphs and Mathematica

Program of Fall 2015 Meeting (Following Page)

Current as of press time

SEAWAY SECTION
MATHEMATICAL ASSOCIATION
OF AMERICA

2015 FALL MEETING

November 6-7

ST. LAWRENCE UNIVERSITY

PROGRAM

Friday afternoon, Valentine 104

12:00 – 5:00 IBL Calculus – An Interactive Workshop facilitated by Ted Mahavier, Lamar University

Friday afternoon, Valentine 107

3:00 – 6:00 Meeting of the Executive Committee

Friday evening, The Club, Canton NY

6:00 – 7:00 Social Hour (cash bar)

7:00 – 8:30 Banquet

8:30 – 9:30 Rick Cleary, Babson University

What Every Mathematician Should Know About Statistics ... and Vice Versa

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

Saturday afternoon, Valentine 105

1:30-1:55 James Marengo, RIT

The Conditional Poisson Process and the Gamma and Negative Binomial Distributions

2:00-2:25 Natasha Komarov, St. Lawrence University

Cycles in Tournaments

2:30-2:55 David Clark, SUNY New Paltz

Real Analysis for Preservice Teachers

3:00-3:25 Tamas Wiandt, RIT

Are all inequalities created equal?

Saturday afternoon, Valentine 107

1:30-1:55 Hossein Behforooz, Utica College

From Melencolia I to Calendarical Magic Squares

2:00-2:25 Daniel M Look, St. Lawrence University

Stylometry and the Seldon Crisis: Using Statistics to Categorize Novels in Asimov's Foundation Universe

2:30-2:55 Benjamin Levy, University of Tennessee

Modeling Feral Hogs in Great Smoky Mountains National Park to Evaluate Control Efforts and Analyze the Population's Niche.

Saturday morning, Bloomer Auditorium

8:40 – 8:45 Welcome address by Daniel Look, Chair, Department of Mathematics, Computer Science, and Statistics, St. Lawrence University

8:45 – 9:35 Erica Flapan, Pomona College

Topological and Geometric Symmetries of Molecular Structures

9:45 – 10:35 Hossein Shahmohamad,

Rochester Institute of Technology

Cancellable Numbers, Poisoned Martini & Suspended Bottle

10:35 – 11:00 Business Meeting

11:10 – 12:00 Randolph Lecture: Laura Person, SUNY Potsdam

Clearing Obstacles to Student Success

GROUP PHOTO

Lunch: 12-1:30, Eden Holden, Lee Hall

Saturday afternoon, Valentine 103

1:30-1:55 Charlie Jacobson, Elmira College

A Flipped Statistics Course: Two-Year Report

2:00-2:25 Robert Rogers, SUNY Fredonia and Eugene Boman, Penn State Harrisburg

Flipping the Calculus Course (Not the Class)

3:00-3:25 Gregory Quenell, SUNY Plattsburgh

Variations on the Birthday Problem

3:30-3:55 Joseph Kolacinski, Elmira College

Equilibriums for Approval Voting: A Preliminary Report

Saturday afternoon, Valentine 124

1:30-2:25 Using Simulation Methods to Build Conceptual Understanding in Introductory Statistics

Workshop organizers: Robin and Patti Lock, St. Lawrence University

2:30-3:25 Seaway NExT Discussion

The Unexpected Parts of an Academic Career

Facilitator: Matt Koetz, Nazareth College

Saturday afternoon, Valentine 106

1:30-2:25 Panel on Undergraduate Mathematics Research Experiences

Organizer: Elizabeth Wilcox, SUNY Oswego

2:30-3:25 Workshop on Leadership in the Mathematical Sciences

Faculty Annual Report, Evaluation, Plan of Work; Departmental Annual Report; Developing a Departmental Strategic Plan

Organizer: Mihail Barbosu, RIT

2:30-2:55 Heather Lewis, Nazareth College

Changing Calculus

3:00-3:25 Nicole Juersivich, Nazareth University

Inquiry and Technology in Calculus I

3:30-3:55 Joanne Redden, Elmira College

Teaching Calculus using Maple labs

Saturday afternoon, Valentine 104

1:30-1:55 Robert Reams, SUNY Plattsburgh

Exceptional copositive matrices

2:00-2:25 Sam Northshield, SUNY Plattsburgh

ReRecounting the rationals

2:30-2:55 Anurag Agarwal, RIT

Special matrices applied to both cryptography and solving polynomial equations.

3:00-3:25 Keith Jones, SUNY Oneonta

Routes to Infinity: Asymptotic Behavior in the Lamplighter Group

3:30-3:55 Mitch Phillipson, SUNY Oswego

Counting Foldings in RNA

3:30-4:25 IBL Roundtable Discussion

Facilitators: David Clark, SUNY New Paltz, and Ted Mahavier, Lamar University

Saturday afternoon: Student Talks

Organizer: David Brown, Ithaca College

The schedule can be found on the green sheet in your folder.

Registration, Meals, and Refreshments

Registration will take place in the The Club in Canton, NY, on Friday evening during the social hour from 6:00 to 7:00, and on Saturday morning from 8:00 in Valentine 125. Lunch will be served in Eden Holden in Lee Hall. Beverages and snacks will be served on Saturday morning at 8:00 and on Saturday afternoon at 3:00 in Valentine Hall.

Accommodations

The meeting has a block of rooms reserved at the Comfort Suites in Canton, NY. Conference rates are \$124.99 per room. For reservations call 1-315-386-1161 – Request SLU-Math conference.

Meeting Website

<http://myslu.stlawu.edu/~ltorrey/seaway/>

NEXT MEETING:

APRIL 15-16, 2016

SUNY GENESEO