

THE SEAWAY CURRENT

Newsletter of the Seaway Section of the Mathematical Association of America

Volume 34, Number 3

Spring , 2011

Spring Meeting at Nazareth College – April 1-2, 2011

This Spring's meeting of the Seaway Section will be held at Nazareth College in Rochester. Friday night's Banquet will feature Greg Hartvigsen and Chris Leary of SUNY Geneseo speaking about adventures in Biomathematics. Saturday morning's lineup is Maria Terrell, last year's winner of the Clarence Stephens Award, Richard Cleary, and Allan Greenleaf, this year's Gehman Lecturer. Project NeXT has a full afternoon of activities on Friday. Several important issues will come up for a vote at the Business meeting on Saturday.

The Speakers:

Friday Evening – The Banquet

Greg Hartvigsen and Chris Leary - *Don't Make Me Sick: Adventures in Biomathematics (Making the World Safe for E. Coli)*

Gregg and Chris began their collaboration in biomathematics 12 years ago at SUNY Geneseo. We will discuss the importance of blurring the boundaries between mathematics and biology to better understand and predict the dynamics of biological systems. We also will chat about how our students have benefited from our interdisciplinary work. Despite this abstract, we hope the talk will be fun and interesting.



Saturday Morning

1. Maria Terrell, Cornell University

Teaching by Asking: Good Questions: A Case Study

Maria will discuss how Just-In-Time Teaching and Peer Instruction with Good Questions can be used to promote inquiry based learning in first semester calculus. Just-In-Time Teaching encourages students to read ahead and to prepare for class. Peer Instruction is fostered during class through concept- driven “good questions” that engage students in conversations about key concepts. Maria will share what she learned through an NSF funded project NSF (DUE-CCLI #0231154) to develop and implement these tools in freshman calculus.



2. Rick Cleary, Bentley University

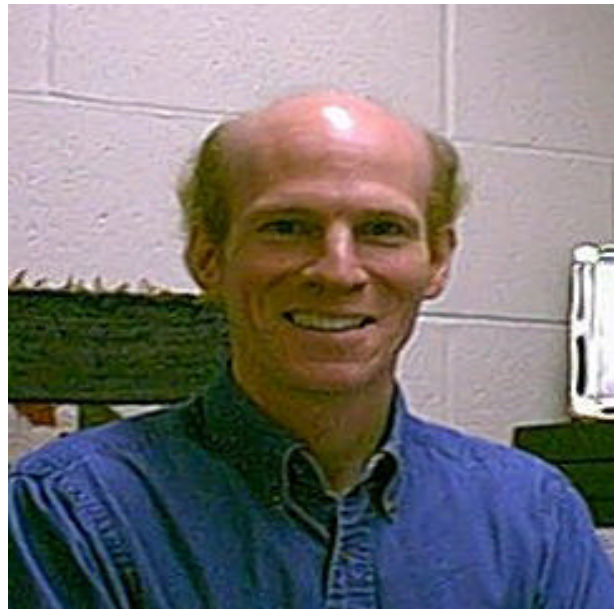
Some Non-standard Applications of Mathematics to Sports

Thanks to the popularity of books like "Moneyball" by Michael Lewis, there has been a great increase in public awareness that statistical analysis has become a vital and accepted tool in sports applications. We present some examples in which other branches of mathematics can be used to consider sports related questions. We will investigate several of these less well known applications. Specific instances include: using probability to model rare events; some graph theory and operations research to consider a scheduling question; an optimization problem involving a basketball pool; and maybe even some elementary topology related to the rules of several sports.



3. Gehman Lecture: Allan Greenleaf, University of Rochester *The Mathematics and Physics of Invisibility Cloaks*

In 2005-06, several (serious!) proposals were made in the physics literature for the creation of invisibility cloaks, previously the stuff of science fiction. The intervening years have seen an explosion of research (theoretical, numerical and experimental) testing the validity of these ideas. The approach that has received the most attention is based on what is now called *transformation optics*. It turns out that transformation optics-based cloaking is closely related to some 2003 counterexamples in the mathematical literature concerning Calderon's inverse problem. I will discuss the connections between these, and the current state of invisibility research.



The SEAWAY SECTION of the MATHEMATICAL ASSOCIATION OF AMERICA Spring 2011 Meeting – Nazareth College Program

GAC=Golisano Academic Center

Friday afternoon, Project NExT, GAC 21

12:00 –12:15 Welcome

12:15 –1:15 Lunch

1:15 – 3:15 Discussion on a second calculus course

3:15 – 3:30 Short break

3:30 – 4:30 Q&A session on tenure application

4:30 –5:00 Discussion of plans and ambitions for Seaway NExT/PFF and closing

Friday afternoon, GAC 51

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

Friday Evening, DoubleTree Hotel

6:00 – 7:00 Social Hour (cash bar)

7:00 – 8:30 Banquet and Call for Nominations:

Clarence Stephens Distinguished Teaching Award'

8:30 – 9:30 **Chris Leary, Gregg Hartvigsen, SUNY Geneseo**

Don't Make Me Sick: Adventures in Biomathematics

9:30 –10:30 Math Jeopardy

Patrick Rault, SUNY Geneseo

Saturday morning,

Linehan Chapel, 1st Floor, GAC

08:40 – 08:45 Welcome address

Daan Braveman

President

Nazareth College

08:45 – 09:35 **Maria Terrell,**

Cornell University

Teaching by Asking: Good Questions: A Case Study

09:45 – 10:35 **Rick Cleary,**
Bentley University
*Some Non-standard Applications
of Mathematics to Sports*

10:35 – 11:00 Business Meeting

11:10 – 12:00 Gehman Lecture:
Allan Greenleaf
University of Rochester
*The Mathematics and Physics of Invisibility
Cloaks*

12:00 – Group photo

Lunch: 12-1:30, Sorelle's Cafe,
Basement Level, GAC

Saturday afternoon, GAC 51
1:30 – 3:00 **Stephen West and Patrick Rault**
TI-Nspire
CAS Workshop
*The Role of Handheld Technology in the
Mathematics
Curriculum*

3:00 – 3:25 **Nicole Juersivich, Nazareth College**
*Using Motion Detectors and the Nspire to Create
and Analyze Graphs in Calculus*

3:30 – 3:25 **Hatesh Radia**
Corning Community College
A Digital Pen with Lots of Promise

4:00 – 4:25 **Paul Seeburger, MCC**
*Visually Verifying Homework Problems in
Multivariable Calculus*

Saturday afternoon, GAC 38
1:30 – 1:55 **Daniel Look,**
St. Lawrence University
A Visual Introduction to Complex Dynamics
2:00 – 2:25 **Aaron Luttmann,**
Clarkson University
*An Introduction to Understanding the Structures of
Vector Spaces*
2:30 – 2:55 **Joel Dreibelbis,**
Rochester Institute of Technology
Bounds on Zeroes of Polynomial-Exponential Sums

using p-adic Analysis
3:00 – 3:25 **Nathan Reff, SUNY Binghamton**
Spectral Properties of Signed Graphs

3:30 – 3:55 **Kalyani Madhu,**
University of Rochester
The Periodic Points of a Polynomial in $\mathbb{F}_p[x]$

4:00 – 4:25 **Matt Koetz, Nazareth College**
Low Density Parity Check Codes from Graphs

Saturday afternoon, GAC 131

1:30 – 1:55 **Antonio Tortora,**
University of Salerno, Italy
What are Bell and Kappe groups

2:00 – 2:25 **Rachel Roe-Dale,**
Skidmore College
*A mathematical model of cell cycle effects in
gastric cancer chemotherapy*

2:30 – 2:55 **Tamas Wiandt,**
Rochester Institute of Technology
*Notions of Attraction Intensities for Closed
Relations*

3:00 – 3:25 **Tony Mastroberardino,**
**Penn State Erie, The Behrend
College**
Harvester of joy: A simple fishery model

3:30 – 3:55 **Gabriel Prajitura,**
SUNY Brockport
Linear chaos

Saturday afternoon, GAC 135

1:30 – 1:55 **Gerald R. Rising,**
SUNY Buffalo
*Math for Humanities Students: A New
Approach*

2:00 – 2:25 **Joseph F. Kolacinski,**
Elmira College
*Arrow's Theorem and its Presentations in
Undergraduate Textbooks*

2:30 – 2:55 **Dawn M. Jones,**
SUNY Brockport
Mathematics Hybrid Courses

3:00 – 3:25 **Joseph A. Petrillo,**
Alfred University
*How to Turn Calculus Inside Out and Upside
Down*

3:30 – 3:55 **Olympia Nicodemi,**
SUNY Geneseo
Aristotle's Wheel

4:00 – 4:25 **Elizabeth Wilcox,**
Colgate University
Turning the Tables, Part I

Saturday afternoon, GAC 133

1:30 – 1:55 **Yozo Mikata, Bechtel**
*Mathematical Problem Arising From CNT
Application
as an Electron Emitter*

2:00 – 2:25 **Wondimu Tekalign,**
Rochester Institute of Technology
*Evolution Equation for a thin epitaxial film on a
deformable substrate*

2:30 – 2:55 **Chulmin Kim,**
Rochester Institute of Technology
*A brief statistical analysis of line-up in the
Major league baseball*

3:00 – 3:25 **Linlin Chen,**
Rochester Institute of Technology
*Multilayer Correlation Structure of Microarray
Gene Expression Data*

3:30 – 3:55 **David Farnsworth,**
Rochester Institute of Technology
Highest Density Regions

Saturday afternoon, GAC 221, 233, 235

*Student Program will be available on
separate green sheet in conference folders.*
Organizer: Ryan Gantner, St. John Fisher
College

Registration, Meals, and Refreshments

Registration will take place in the **DoubleTree Hotel**, 1111 Jefferson Rd, Rochester, NY 14623 on Friday evening during the social hour from 6:00 to 7:00 and on Saturday morning from 8:00 until 11:00 in **Linehan Chapel, GAC, first floor.**

Refreshments

Breakfast (8:00 to 11:00) - First Floor, GAC, outside Linehan Chapel

Lunch (12:00 to 1:30) - Sorelle 's Café, GAC, basement level

Snack and Departure (4:30 to 5:00) -

Sorelle 's Café, GAC, basement level

Accommodations

Blocks of rooms are being held at: **Best Western** (\$79 per night) and **DoubleTree Hotel** (\$119 per night) until March 1, 2011. When making reservations, ask for a room in the MAA Seaway Section block.

Meeting Website

<http://www.naz.edu/math/SP-11-MAASeaway-Section-Meeting>

NEXT MEETING:

OCTOBER 14-15, 2011

ST. BONAVENTURE UNIVERSITY

REPORTS

1. Chair's Report Robert Rogers February 8, 2011

There will be a couple of items for voting during the business meeting at the upcoming spring section meeting at Nazareth College on Saturday, April 2, 2011. The first pertains to a bylaw change to add an at large member to the executive board. The rationale is to help provide more continuity to the executive board, especially in instances such as the most recent one in which a number of members of the executive board could not attend a recent meeting due to coincidental health reasons. The specific change is as follows:

Article III

Officers and Executive Committee

1. The officers of the Seaway Section shall be the Chair, the First Vice-Chair, the Second Vice-Chair, the Secretary, the Treasurer, the Governor, and the Immediate Past-Chair or Chair-Elect.
2. The Executive Committee of the Seaway Section shall consist of the officers of the section and one at-large member elected at the Spring meeting of the section in even years.

Currently, John Maceli was serving in an interim role as this at-large member, appointed by the executive board, due to the unexpected turnover in the executive committee.

The second item is to vote on endorsing a resolution approved by the Section's Educational Policies Committee regarding dual enrollment courses in high school. Specifically, it is the following.

Be it resolved that the Seaway Section of the Mathematical Association of America opposes the awarding of college credit for courses taken in high school that are below the level of precalculus. In particular, high school students in New York State should not receive college credit for courses in the standard high school mathematics curriculum (Integrated Algebra, Geometry, Algebra 2/Trigonometry), nor for courses such as business math. In general, a high school mathematics course should be considered for dual enrollment college credit only if it has Algebra 2/Trigonometry as a prerequisite.

Further, be it resolved that the Seaway Section affirms resolutions adopted by the Board of Governors of the Mathematical Association of America that university mathematics departments have oversight of

dual enrollment courses in terms of syllabi, textbooks, examinations, and choice of instructors, to the same degree that such oversight exists for mathematics courses taught at the university by adjunct faculty.

2. Treasurer's Report Gary Towsley March 17, 2011

Treasurer's Report – Seaway Section of the Mathematical Association of America
Spring 2011

Balance as of 08/31/2010	\$10,443.56
Fall Meeting Costs	
1. Lodging, Honoraria etc. for Saturday Speakers	\$296.40
2. General Meeting Expenses	\$3,388.20
Total	\$3,684.60
Fall Meeting Income (Registration etc.)	\$3,837.00
Fall Meeting Total	\$152.40
Balance after Fall Meeting 10/10.2010	\$10,595.96
Expenses:	
Banquet deposit for Spring Meeting	\$500.00
Checks	\$20.96
Deposits:	
Subvention 11/18/2010	\$1,433.00
Balance as of 03/16/2011	\$11,508.00

3. Minutes of the Business Meeting – Fall 2010 – Gary Raduns

Seaway Section of the Mathematical Association of America
Minutes of the Business Meeting held a SUNY at Plattsburgh
Saturday, October 16, 2010 at 10:55 a.m.

The minutes of the previous business meeting were approved as reported and the agenda adopted by consent. The members of the Section heard the Chair's report of the Executive Committee meeting. Significant points included in this report include:

1. The Executive Committee has increased the registration fee for future meetings to \$20 (remains \$10 for retired members, \$0 for students).
2. The Seaway Current will be reporting two items for a vote by the membership at the next meeting: the addition of an "at-large" member to the executive committee, and a resolution from the Educational Policies Committee. The full text of both proposals will be distributed in the Seaway Current later this fall or early winter.

Additional Reports

1. The Governor's report from the MAA Governor's meeting at MathFest
 - a. By-laws of the Association were amended to restructure governance of the Association.

- b. Interim strategic planning reports were received from Publications and Communications, Books, and SIGMAAs.
 - c. The Association has put out an RFP to redesign the website.
 - d. Electronic memberships have had a good initial response with 17% of the membership choosing this option. The Association is considering the impact that electronic publication for libraries might have on membership in the Association.
 - e. Electronic options for other MAA publications are forthcoming.
2. The treasurer's report included a statement of a balance on hand as of 2/5/2010 of \$10368.61 and as of 8/31/2010 that balance was \$10443.56.
 3. The Program Committee announced the location and dates of the next three Section meetings:
 - a. April 1-2, 2011 at Nazareth College.
 - b. October 14-15 at St. Bonaventure University.
 - c. April 13-14 at Hamilton College.
 4. The Nominating Committee presented Gary Towsley for nomination as treasurer. With no nominations from the floor, Gary Towsley was elected treasurer of the Seaway Section.

Old Business

1. Voluntary donations. Voluntary donations are requested with the registration form.
2. Request students home institutions pay for student lunches. Registration forms now indicate the cost of student lunches with a clear indication that if a student's home institution does not pay for the lunch, then the Section will absorb the cost.

New Business

1. Increase in registration fee. As announced in the Report of the Executive Committee, regular registration for Section meetings will increase to \$20 beginning with the April 2011 meeting.
2. Resolution from the Educational Policy Committee. The resolution will be published in the Seaway Current and be presented for adoption at the next meeting.
3. Creation of an at-large member on the Executive Committee. Reported in the Executive Committee report. Vote will occur at next meeting.

Respectfully submitted,

Gary L. Raduns, Jr.
Executive Committee Secretary

4. Minutes of the Executive Committee Meeting – Friday, October 15, 2010

Amnesty Room, Angel College Center, SUNY at Plattsburgh

1. Minutes of the Spring 2010 Executive Committee Meeting were accepted as distributed.
2. Reports
 - a. Chair
 - i. Reviewed list of committees with dates of service and chairs
 - ii. A new chair of the nominating committee will need to be selected in April
 - iii. A discussion of succession of committee chairs followed the report.
 - b. Treasurer's Report (A)
 - i. The treasurer distributed a report noting an opening balance of \$10368.61 on 2/6/2010 and a closing balance of 10443.56 as of 8/31/2010 .

- ii. The treasurer noted a discrepancy of \$0.50 in our favor between bank statement and checkbook ledger. This discrepancy can probably be attributed to changes in exchange rates.
 - c. Governor's Report. Highlights of the Governor's Report
 - i. New By-Laws were approved by the Association membership at the Summer Math Fest. The primary change is a restructuring of councils and committees.
 - ii. Strategic planning committees continue to work.
 - iii. The Association has issued a RFP for redesign of the website.
 - iv. 17% of Association members have selected electronic membership.
 - v. Work is ongoing with the Basic Library List
 - vi. Carriage House is earning money for the Association.
 - vii. The Association lost approximately \$225,000 in 2010 and expects around \$18,000 in 2011.
 - viii. The Association is currently hosting websites for 11 of the 28 Sections. The Association is interested in promoting consistent branding in Section websites.
 - ix. Speakers from the Association
 - 1. Polya visitors every fifth year (this meeting for Seaway)
 - 2. Journal editors two years after Polya lecture.
 - 3. Section Visitors annually (Association officers)
 - d. Secretary's Report
 - i. Attended the Section Officer's Meeting at Math Fest. Any items to report have already been reported by the Governor.
 - e. Treasurer's Report (B)
 - i. Balance report
 - ii. Working on getting appropriate signators on the account
 - iii. Questions regarding book sale—no sale at this meeting because of questions related to tax collection.
 - iv. The treasurer now has 5 boxes of book sale books, and two boxes of archival documents from the previous secretary-treasurer.
 - f. First Vice Chair
 - i. Speakers are set for the Spring Meeting: Allan Greenleaf (Gehman Lecture), Rick Clearly (Association Officer), Maria Terrell (Clarence Stephens awardee).
 - ii. Progress on speakers for Fall 2011 at St. Bonaventure University includes Ivars Peterson.
- 3. Old Business
 - a. The Executive Committee resolved to amend the by-laws to allow for one at-large member on the executive committee. This proposal will be presented to the membership at the Business Meeting and brought for a vote at the April 2011 Business Meeting.
 - b. Continuing discussion of the cost of providing student lunches.
- 4. New Business
 - a. The Executive Committee resolved to increase meeting registration to \$20 beginning with the April 2011 meeting.
 - b. Outside fundraising—formed an ad hoc committee consisting of Darren Narayan and Hossein Shamohammad to make recommendations
 - c. Reorganization of book sale
- 5. Adjourned at 5 pm to the Extended Executive Committee Meeting.

Respectfully Submitted,

Gary L Raduns, Jr.
Seaway Section Secretary

News from the Departments

1. Ithaca College

Aaron Weinberg was recently awarded tenure and promotion.

2. SUNY Fredonia

The Kasling Award is one of the highest honors that SUNY Fredonia bestows for research and/or creative excellence. The winner of the award presents a lecture to a campus audience. Harris Kwong was chosen as the 2010 Kasling Lecturer. On Oct. 5, 2010 he presented the lecture, The Magical World of Graph Labeling. It is always a challenge to give a mathematics talk to a general audience. Harris did a fine job explaining some of the questions he is interested in and results he has obtained, while also talking about how mathematicians go about their research.

3. Binghamton University

Professor Erik Pedersen retired at the end of the 2009-2010 academic year. He has moved to Copenhagen, Denmark.

Professor Pat McAuley retired at the end of the 2009-2010 academic year. She remains in Binghamton and visits the department regularly.

The Department of Mathematical Sciences at Binghamton University hired Eric Swartz for a Post-doctoral position, Fall 2010.

He comes from Ohio State University where he got his Ph.D. in mathematics.

The Department of Mathematical Sciences at Binghamton University hired Xingye Qiao for a Tenure-track position, Fall 2010. He comes from Chapel Hill, NC, where he got his Ph.D. in statistics.

The Department of Mathematical Sciences at Binghamton University hired Andrey Gogolev for a Tenure-track position, Fall 2011. He comes from U. of Texas at Austin, where he holds a Post-doctoral position. He got his Ph.D. in mathematics from Pennsylvania State University in 2009.

4. SUNY Plattsburgh

Two members of the department, Margaret Morrow and Greg Quenell, are on sabbatical for the 2010-11 academic year.

The teaching load here has been bumped up from 3/3 to 4/3 for those engaged in research and 4/4 for those not (don't know if that's "news" but it might be of interest to the readership)

5. St. John Fisher College

In November 2010, St. John Fisher College math students, accompanied by Dr. Ryan Gantner, attended the third annual St. Lawrence Valley Mathematics Symposium at Clarkson University. Students JenAlyse Arena ("Enumerating Motzkin Paths of Lengths n with p Plateaus") and Richelle Jones ("The River Crossing Game") presented their research projects. The Fisher Math Jeopardy team placed second in the competition, one point behind Clarkson. The team consisted of JenAlyse Arena, Richelle Jones, Forrest Smith, and Michelle Beeman.

Abstracts of the Contributed Talks

1. **Linlin Chen**, Rochester Institute of Technology

Multilayer Correlation Structure of Microarray Gene Expression Data

In this project, we focus on possible causes of between-gene dependencies and their effects on the performance of gene selection procedures. We show that there are at least two “noise-type” reasons for high correlations between gene expression levels. First is of technical character, and is connected to a random character of the number of cells used to prepare microarray. Another reason is the heterogeneity of cells in a tissue. Both reasons allow one to make some predictions, which are verified on real data.

2. **Joel Dreibelbis**, Rochester Institute of Technology

Bounds on Zeroes of Polynomial-Exponential Sums using p -adic Analysis

Polynomial-Exponential Sums, sums of exponentials with polynomial coefficients, occur naturally in many settings. One common setting is in studying linear N -ary recurrences and their closed form expression. Understanding the zeroes of a polynomial-exponential sum is crucial to answering the most common questions (such as the number of times a recurrence takes on a specific value like 0 or 1). In some cases, these polynomial-exponential sums are differentiable (and so Rolle’s Theorem may be employed to give an upper bound on the number of zeroes). In other cases, these sums involve complex valued parameters (upper bounds are known due to Schlickewei but are expected to be significant over-estimates). Using p -adic analysis, one may find much better upper bounds for specific sums. After a brief background on these sums, this talk will focus on explaining a p -adic algorithm, with examples, for finding an upper bound on the number of zeroes of certain polynomial-exponential sums.

3. **David Farnsworth**, Rochester Institute of Technology

Highest Density Regions

The 100p% highest density region for a univariate probability density function is the narrowest interval that supports 100p% of the probability or area. These regions are easily interpreted, yield intervals that are competitors of the usual confidence intervals for parameters, and have been suggested for various uses. Some of their properties will be discussed and derived.

4. **Dawn M. Jones**, SUNY Brockport

Mathematics Hybrid Courses

Hybrid courses are courses in which a portion of the learning activities are online, and time traditionally spent in the classroom is reduced but not eliminated. In this talk I will discuss my experiences in moving to a hybrid course for History of Mathematics and give examples of the activities and preparation needed to create and manage such a course.

5. **Nicole Juersivich**, Nazareth College

Using motion detectors and the Nspire to create and Analyze Graphs in Calculus

This talk will detail both calculus and secondary mathematics methods students' use of the TI Nspire and Calculator-Based Ranger to collect, display, transform, and analyze data of a bouncing ball with regards to time, height, velocity, and acceleration. Discussion will follow on the benefits of the linked representations of the data, possible student misconceptions on derivatives based on graphical appearance, questions for classroom use, and ways to enhance student understanding through connection of the 4 representations.

6. **Chulmin Kim**, Rochester Institute of Technology

A brief statistical analysis of line-up in the Major league baseball

The line-up or the batting order in the baseball is the designated order in which the batters for a given team will bat.

In the modern era of the Major league baseball, it has become more important to arrange the players into the right spots to produce offensive runs more efficiently. Even with the same nine batters for a given team, different batting order can make very different result. How the managers construct the batting order? There is no universal rule to determine a batting order however teams tend to place their best batters at the beginning of the line-up to give them more opportunities and leave the worst ones at the end of the order. Kim (2008) proposed a single offensive statistic K which measures a player's overall batting ability. We study the relationship between the standardized K 's in the each line-up of a given teams and the team's winning percentage. And we characterize the line-up empirically based on the data for the Major league baseball from the years 2001 to 2010 to use K and some other statistics. The Wilcoxon-based rank statistics are used to analyze the line-up in the Major league baseball.

7. Matt Koetz, Nazareth College

Low Density parity Check Codes from Graphs

In this talk we will define low-density parity check (LDPC) codes and their associated Tanner graphs, describe algebraic methods for constructing LDPC codes from arbitrary graphs, and provide one measure of their performance.

8. Joseph F. Kolacinski, Nick Mercier, Elmira College

Arrow's Theorem and its Presentations in Undergraduate Textbooks

There is a central, startling idea in the study of voting theory, that finding a perfectly fair and democratic system for conducting elections, one that satisfies a list of seemingly obvious properties, can be impossible. The first theorem of this kind was developed by Kenneth Arrow in the early 1950's and has come to be considered the most important result in the field. Because of this, Arrow's work and the idea of impossibility loom large over the presentations of voting theory in undergraduate textbooks. As the study of voting theory becomes increasing prevalent in Liberal Arts Mathematics courses, it becomes interesting to look at these courses to see how these ideas are presented. In this paper we first attempt to give a straightforward overview of Arrow's work. We then look at three popular texts for this type of class, *Excursions in Modern Mathematics* by Tannenbaum and Arnold, *The Heart of Mathematics* by Burger and Starbird and *For All Practical Purposes* by the Consortium for Mathematics and its Applications (COMAP), consider how Arrow's theorem and the idea of impossibility is presented in each one and how the individual versions relate to each other.

9. Daniel Look, St. Lawrence University

A Visual Introduction to Complex Dynamics

Complex Dynamics deals with the behavior of functions under repeated application, or iteration. The most memorable aspect of this field are the beautiful fractal images representing locations where the function behaves "chaotically". We will introduce basic terms and describe the mathematics behind the images. As examples, we will explore the family of maps $z \mapsto z^2+c$ and its associated parameter plane, the Mandelbrot Set, as well as a family of maps arising from geometric circle inversion.

10. Aaron Luttman, Clarkson University

An Introduction to Understanding the Structures of Vector Spaces

A normed vector space X is a set that is endowed with four layers of structure. On the base level, it has the structure of a set, which just means that it has a fixed number of elements. On a slightly higher level, X has an additive structure – i.e. we are allowed to add vectors to get another vector – and a scalar multiplicative structure – i.e. we can multiply a vector by a scalar to get another vector. The final layer of structure is the norm structure, which just means that there exists a method for determining the distance between two vectors x and y , namely $\|x-y\|$. In the 1930's Mazur and Ulam proved the remarkable fact that for normed vector spaces with real scalars, knowing only the norm and set structures is enough to completely determine the additive and scalar structures. This is surprising, because there is no obvious reason why measuring distance would teach you how to add! The study of when two vector spaces are the same and how the different structures of a vector space interact are commonly referred to as *preserver problems*, and in this presentation we'll look at a few classical and a few very recent results that explain

when certain kinds of vector spaces are the same and how the structures on these vector spaces interact. We'll also discuss how these two seemingly distinct problems are actually the same. This work lies at the intersection of analysis, abstract algebra, linear algebra, and topology, tying together many of the most fundamental areas of mathematics, but knowledge of these fields will not be assumed.

11. Kalyani Madhu, University of Rochester

The Periodic Points of a Polynomial in $\mathbf{F}_p[x]$

Let $f(x) = x^m + c$ be a polynomial in $\mathbf{F}_p[x]$. Let $f_0(x) = x$, and $f_n(x) = f(f_{n-1}(x))$. We say a $\alpha \in \mathbf{F}_p[x]$ is periodic if $f_k(\alpha) = \alpha$ for some $k \in \mathbf{Z}$. We consider the proportion of periodic, $\alpha \in \mathbf{F}_p[x]$ and show that, for certain classes of primes $p \in \mathbf{Z}$, the proportion tends to zero as p becomes arbitrarily large. Our technique is to identify the Galois group of successive splitting fields of $f_n(x) - t$ over $\mathbf{F}_p[x]$ and to draw conclusions using the Chebotarev Density Theorem for function fields similar to the technique used by Jones for quadratic polynomials over \mathbf{Z} and Odoni for generic polynomials over number fields.

12. Tony Mastroberardino, Penn State Erie, The Behrend College

Harvester of joy: A simple fishery model

In this talk, we will analyze a very simple model describing the effects of harvesting or fishing on a fish population. This model provides very interesting dynamics that are of fundamental importance in the study of dynamical systems and applied mathematics. We will compare various methods of solution for the case of constant harvesting. We will also discuss various extensions to the model that incorporate more realistic assumptions.

13. Yozo Mikata, Bechtel

Mathematical Problem Arising From CNT Application as an Electron Emitter: 1D Heat Transfer Problem with Conduction and Radiation

This paper will discuss a 1D transient heat transfer problem with both conduction and radiation, which is a mathematical model for a CNT used as a field electron emitter. CNT has attracted an increasing attention as a potentially excellent material for an electron emitter since around mid-90's. Predicting the current density and the temperature profile of CNT caused by the Joule heating associated with the current density, is the key to understanding the physics of CNT as a field electron emitter. This is the focus of the paper.

14. Olympia Nicodemi, SUNY Geneseo

Aristotle's Wheel

Paradoxes like the famous ones of Zeno are fun. Today, we usually give them a supercilious look and somehow resolve them. But in their time, these paradoxes prompted some serious thinking. In this talk, we will take a look at a paradox called Aristotle's Wheel and the thinking it provoked about the nature of the continuum. This talk should be comfortably accessible to undergraduates.

15. Joseph A. Petrillo, Alfred University

How to Turn Calculus Inside Out and Upside Down

The Alfred University mathematics faculty is developing a new approach to calculus in order to address a variety of issues ranging from poor pre-calculus skills of incoming students, to a lack of time for meaningful applications. We are planning to assign video lessons for homework and to replace in-class lectures with active learning experiences. We are also planning to rearrange the calculus curriculum so that it follows natural function threads rather than the traditional order of topics. In this talk, we will outline our plan to turn calculus inside out and upside down!

16. Gabriel Prajitura, SUNY Brockport

Linear chaos

We will present a comparison of the main ideas in linear dynamics as opposed to the more popular nonlinear case.

17. Hatesh Radia, Corning Community College

A Digital Pen with Lots of Promise

The Echo pen by Live Scribe is a very useful tool for both teachers and students. In this talk I will display the basic capabilities of the pen. The pen allows one to take notes directly on to the computer, hold virtual office hours, record audio, convert handwritten notes to text and create videos efficiently. The most extraordinary feature of the pen is that it allows one to synchronize the audio with the handwritten notes.

18. Nathan Reff, SUNY Binghamton

Spectral Properties of Signed Graphs

Recently there have been studies of eigenvalue bounds for the Laplacian matrix of a signed graph. While previous work has generalized many known eigenvalue bounds of unsigned graphs to signed graphs, there are no bounds which depend on edge signs. We will discuss some new bounds which depend on the edge signs and other results on signed graph eigenvalues.

19. Gerald R. Rising, SUNY Buffalo

Math for Humanities Students: A New Approach

Rethinking our teaching of this important population had led to the development of a new text. Examples will illustrate how this approach differs from traditional instruction.

20. Rachel Roe -Dale, Skidmore College, David Isaacson, Michael Kupferschmid, Rensselaer Polytechnic Institute

A mathematical model of cell cycle effects in gastric cancer chemotherapy

Several experimental and clinical studies have documented that the order in which chemotherapy drugs are administered affects the outcome of cancer treatment. We present a brief discussion of a simple mathematical mechanism to explain this order dependence. We then present a more detailed model to investigate the relationship between drug order and treatment response in gastric cancer chemotherapy involving a taxane coupled with flavopiridol. To model treatment effects, we simulate treatment by bolus injection and employ a pulsing condition to indicate cell kill as well as instantaneous changes to the cell's transition rates. Cell population growth is described using an ordinary differential equation model whereby we examine the treatment effects upon cells in various stages of the cell cycle. Ultimately the results generated support prior clinical investigations which indicate that for an enhanced synergistic effect, flavopiridol must be administered following taxane therapy.

21. Paul Seeburger, MCC

Visually Verifying Homework Problems in Multivariable Calculus

Multivariable Calculus involves many concepts that require three-dimensional visualization to fully understand. Using CalcPlot3D, an online applet, students can view & print visual verifications for a variety of multivariable calculus homework problems. Examples include the plane determined by three points, the intersection of two surfaces, contour plots, directional derivatives, tangent planes, level surfaces, Lagrange multiplier optimization, and Riemann sums of rectangular prisms. CalcPlot3D is part of an NSF-funded grant project called Dynamic Visualization Tools for Multivariable Calculus (DUE- CCLI #0736968). See <http://web.monroecc.edu/calcNSF/>

22. Wondimu Tekalign, Rochester Institute of Technology

Evolution Equation for a thin epitaxial film on a deformable substrate

I consider a continuum model for the evolution of an epitaxially strained dislocation free thin solid film on a deformable substrate. Using thin film approximation I will derive a nonlinear evolution equation and use it to perform linear stability and numerical analyses.

23. Antonio Tortora, University of Salerno, Italy

What are Bell and Kappe groups

Groups of finite exponent play a central role in the Theory of Groups. For this reason many generalizations have been considered and investigated. One of these is the concept of a Bell group. L.C. Kappe introduced Bell groups in 1986. They are modeled after a ring theoretic concept introduced by Howard Bell earlier. Kappe groups were introduced by P. Moravec in 2005. In this talk we will present Bell groups and will show their connection with Kappe groups.

24. Tamas Wiandt, Rochester Institute of Technology

Notions of Attraction Intensities for Closed Relations

We give an overview of possible extensions of two different notions of intensity of attraction for closed relations on Hausdorff spaces. These notions were introduced originally for maps, but through similar constructions they can be generalized for the wider setting of relations. We prove that the two different approaches to intensity ultimately yield the same result.

25. Elizabeth Wilcox, Colgate University

Turning the Tables, Part I

One of the things I experienced when I took Calculus 2 ten years ago was an extended problem set done in groups of three. What I remember most about Calculus 2 is how much I hated these "EPS"s -- working with others, extra work, being graded together, the whole nine yards. As a professor looking back, though, I now appreciate the assignment so much that I've even assigned a "partner project" in my own Calculus 2 classes this spring. In fact, my poor students will suffer through two partner projects this semester, each worth 10% of their grade. This talk will discuss the first part of my experiment in taking group work outside of my classrooms. We'll talk about how the first project went for my students, how the project went for me, what the grading was like, how much my students complained, and all of the honest incidentals. With the second partner project, a student survey, and my student evaluations of teaching still yet to follow, this talk will most likely resume at the fall 2011 Seaway Section meeting

Matters to be Acted Upon at the Business Meeting

1. Amendment to the By-Laws

It will be moved at the Spring Meeting that the section's bylaws be amended to create an at-large position on the Executive Committee.

The proposed change is:

Article III

Officers and Executive Committee

1. The officers of the Seaway Section shall be the Chair, the First Vice-Chair, the Second Vice-Chair, the Secretary, the Treasurer, the Governor, and the Immediate Past-Chair or Chair-Elect.

2. The Executive Committee of the Seaway Section shall consist of the officers of the section and one at-large member elected at the Spring meeting of the section in even years.

2. A Resolution from the Educational Policy Committee.

The Educational Policy Committee brought a resolution concerning “dual enrollment” courses to the Executive Committee at the Fall Meeting, 2010. The Executive Committee endorsed the resolution and will present it to the section membership at the business meeting in the Spring. The resolution reads:

"Resolved: That the Seaway Section of the Mathematical Association of America opposes the awarding of college credit for courses taken in high school that are below the level of precalculus. In particular, high school students in New York State should not receive college credit for courses in the standard high school mathematics curriculum (Integrated Algebra, Geometry, Algebra 2/Trigonometry), nor for courses such as business math. In general, a high school mathematics course should be considered for dual enrollment college credit only if it has Algebra 2/Trigonometry as a prerequisite.

Further, be it resolved that the Seaway Section affirms resolutions adopted by the Board of Governors of the Mathematical Association of America that university mathematics departments have oversight of dual enrollment courses in terms of syllabi, textbooks, examinations, and choice of instructors, to the same degree that such oversight exists for mathematics courses taught at the university by adjunct faculty."

Some Important Links

Seaway Section Website:

<http://people.rit.edu/maacway/>

Governance:

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

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 on paper, by e-mail or on CD. Presently, this newsletter is produced using Microsoft Word, which can import plain text files or files produced by most standard word-processing software.

