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University of the Pacific

MINI-FOCUS

THE NEWSLETTER OF THE GOLDEN SECTION OF THE MAA

Duane Kouba Wins Section Teaching Award

Duane Kouba, of the University of California, Davis, won the 2014 MAA Golden Section Award for Distinguished College or University Teaching of Mathematics, which was presented at Sonoma State University on February 22, 2014. The following is adapted from the citation presented to Professor Kouba. (See website for complete citation.)

Duane Kouba earned his doctorate from Colorado State University in 1982.

Since then, he has been teaching mathematics at UC Davis, where he has a well-deserved reputation for being a highly effective teacher who not only presents lectures that are crystal clear, but also challenges his students to reach mathematical heights. He brings out the best in people, whether or not they are naturally gifted in mathematics. Student comments about Kouba include: "challenging but motivating"; and "first time I've understood math in years." He is also is known to be tireless when it comes to helping students learn mathematics, holding office hours every day and extra office hours when needed, even on weekends and even staying "until 8pm because there were still a lot of students with unanswered questions."

Kouba's impact goes beyond the classroom, and even beyond mathematics. Among his many contributions, he has served as director of the Emerging Scholars Program for students from underrepresented groups (1989–2005). Kouba has also volunteered as an Assistant Coach and Administrative Assistant for the UC Davis men's basketball team (1995–2013, including the 1997–1998 Division II National Championship team).

The Golden Section congratulates Duane Kouba, an extraordinarily effective and inspiring teacher!

Seeking Newsletter Editor

The Golden Section thanks Jim Sauerberg of Saint Mary's College for his many years of service (even beyond his original term) as the editor of this Mini-Focus newsletter. If you are interested in serving the Section as its Newsletter Editor, please let one of the officers know. ***We could use your help!***

Golden Section Bylaws Approved

The Bylaws of the Golden Section were approved by the Section membership at our 2014 meeting at Sonoma State University, and were subsequently approved by the MAA's Board of Governors at their August 2014 meeting at Mathfest in Portland, OR. The current Bylaws can be found on the section website.
http://sections.maa.org/golden/

Two Tributes to Dr. Ion Georgiou

Math Instructor, Foothill College

On April 3, 2014, Ion Georgiou (pictured here), a

passed away unexpectedly in his office. Planning for the upcoming section meeting at Foothill was underway, and Ion had been playing a key role. We offer remembrances from two of his colleagues below.

A Tribute to My Mentor

by Jeff Anderson

I was hired at Foothill in September 2013, having just finished my graduate student career at UC Davis. This was my first full-time job out of graduate school and I had spent the last six months cooped up in a small room, editing my PhD thesis. I was nervous about transitioning to this new phase of life and I had a ton of questions about Foothill College.

Ion Georgiou was one of the first math faculty members that I met on campus. He welcomed me to Foothill College and took it upon himself to guide me as I became accustomed to my new position. During my first month, he stopped by my office multiple times a week, treated me to lunch and called me on the days I didn't see him. He genuinely cared about how I was doing and made it part of his job to help me adapt. He sat close to me during department meetings, answered my silly questions about Foothill's internal systems and gently advised me on important aspects of my job.

Because he was already playing the part, I asked Ion to be my faculty mentor and to help me navigate the tenure process at Foothill College. From the moment I met him until the moment he passed away, Ion was part of my daily life. In our many conversations, Ion was kind to me, supportive of my work and he made me feel important. Out of all the things I learned about Ion, there are a few that will stay with me for the rest of my life.

Ion inspired me to strive for excellence as a math teacher. He suggested that I search for grants to improve Foothill's

math program, he kept me informed of coming conferences, and he invited me to get involved with professional mathematical societies. He was ebullient about his career in mathematics and he brought that passion to work.

I imagine that much of Ion's drive came from his background. Ion began his life as a mathematician on an academic scholarship to the Eastern Illinois University (EIU). He graduated magna cum lade in June 1991 with a B.S. in Mathematics and a minor in Physics. Ion often spoke about the immense pressure he felt as an international student on an academic scholarship. He said that it was at EIU that he learned the importance of hard work and determination in achieving his education in mathematics. Ion went on to earn an MS with a specialization in Dynamical Systems at EIU in December 1993. He then spent seven years at UC Santa Cruz earning his PhD in June 2000.

After his career as a student, Ion applied his mathematical training to solve problems in industry. He had spent two years working a consultant for Onward Inc. and then another year working as a Manager for Blue Pumpkin Software. In these capacities, Ion used mathematical tools to implement solutions for customer interactions with company call centers. While he loved the challenge of technical work in Silicon Valley, he missed working with students.

In September 2004, Ion was hired to teach basic skills as a mathematics professor at Foothill College. He talked about designing support systems for students as part of his teaching practice. He created the MathCap program, which was designed to support students in Beginning Algebra. He then leveraged his experience on MathCap to become CO-PI of the STEMWay project, an NSF grant focused on improving student success in the Calculus series at Foothill. Ion also volunteered his time to organize and proctor the AMATYC and Putnam exams at Foothill. Ion loved his job and dedicated his professional life to teaching mathematics.

A Tribute to Dr. Georgiou

by Young Hee Park Lee

In addition to his professional interests and achievement, Dr. Georgiou was known for his initiative, curiosity, and above all, his warm heart. He always wanted to know how others were doing. I remember all the times he stopped by my office just to talk and share the day's stories; I greatly miss his random visits. When he said not to worry, I knew I really didn't have to worry. Dr. Georgiou was trusted due to his approachability and open-mind; he encouraged others to speak without reservation.

Dr. Georgiou went out of his way to experience new things and see the beauty in learning. At the beginning of our friendship, he was always asking about my culture and language, eager to learn something new. That enthusiasm transferred to his learning and teaching. His mother told me how eager he was to learn when he was young, and the adult Dr. Georgiou was much the same. He was always sharing anything he found that might aid students in their success. His excitement was contagious and I was convinced to try new things in my teaching due to him.

And of course, we all knew his funny and adorable side as well. From his attire, we knew his favorite colors to be yellow, green and orange, because those were the pants he wore. His sense of style was unique—apparently, he wore mismatching shoes. I have seen people wear different socks, but not shoes. He was, in every sense of the word, a creator, and innovator, someone who tried to make everything special.

Ion was a family man. Last December, he was ecstatic to invite his brother's family over his house. It had been six years since they got together and he told me all about what he was going to cook for his brother, and what he planned to do with his family. I could see the joy in his eyes. Ion recently told me that how much he loved his family and that he was planning to

spend more time with his buddies, Axel and Cornell. He treasured every moment with them, Axel dangling from one arm and Cornell from the other. Luckily, he had twins, not a trio. He was so proud of them, relating all of their swimming exploits to his friends. It was so obvious that he loved them.

We all remember his big mischievous grin. He was everywhere at Foothill, and is greatly missed. So many students were influenced by him, and they know how lucky they are to have had such a dedicated teacher.

When I recall him, I hear Ion's mellow voice saying, "Hi! I want you to be happy, to try new things, and to enjoy life to the fullest." I am so sure that even when he is away from us, he would want us all to be happy and enjoy our lives to the fullest. He was a great man, and lives in us at Foothill!

News from the Section

Compiled by Frank Farris and Chris Goff

Editor's Note: News is included from institutions who replied before the deadline. To avoid being left out next year, please watch for the call for news each October, or contact a section officer.

College of San Mateo

Bob Hasson reports, "Here at the College of San Mateo we have two new full-time faculty members in Mathematics, Christopher Walker, and Shawn Westmoreland."

CSU, East Bay

The Mathematics Department will split off from Computer Science and CSU, East Bay will transition from a quarter to semester system.

Foothill College

The big news from Foothill is STEMWay, a National Science Foundation funded project that started in fall 2012, led by Lori Silverman. STEMWay's main goal is to increase completion rates in college math, whether students complete associate degrees or transfer to a 4-year STEM program. For the last two years, STEMWay has developed pedagogical tools, including in-class activities and low-stakes assessments for self-regulation, and has improved content delivery (using, for instance, online videos). It also focuses on the social/psychological aspects of students, including mindset, belonging, and self-regulation. Preliminary results show that students who take advantage of our out-of-the-classroom support structure are more successful than those who do not.

One aspect of STEMWay involves major improvements to Foothill College's PSME Center (PSME: Physical Sciences, Mathematics, and Engineering). The Center's goal is to boost student success in STEM courses, especially the gateway courses of intermediate algebra and first quarter calculus. Starting in September 2013, we hired Eric Reed to direct the center. The PSME Center offers one-on-one tutoring, auxiliary workshops for STEM course work, group tutoring, internet access, guest lectures from professionals in industry, and other events focused on STEM students. The center is entirely staffed by Foothill faculty, primarily adjunct instructors, and is open six days a week. Student use of the center has nearly doubled over the past year, and we now serve almost 2000 students each quarter.

Proof School

Proof School, opening Fall 2015 in downtown SF, is an exciting new venture in our section. Planned for grades 6-12, the school will begin with about 15 students in each of grades 6-9 only. Envisioned as a comprehensive school for kids who love math, Proof School offers an intensive math and computer science curriculum, with afternoons entirely devoted to math (2.5 hours per day). Sam Vandervelde will serve as dean of mathematical sciences; the

board includes Ravi Vakil, Paul Zeitz, Francis Su, Mark Saul, James Tanton, Brian Conrey, David Eisenbud, and Melanie Wood. So far, over 100 students have applied. A recent, very generous, anonymous gift, earmarked exclusively for financial aid, promises to make the school affordable for all.

Proof School is **for** kids who love math. Its goal is not to produce miniature mathematicians but instead give mathematically passionate children the best possible education across the board. (They can even study Latin and ASL!) For more information, see proofschool.org.

Saint Mary's College

Saint Mary's College has been awarded a five year National Science Foundation grant, the largest from the organization in the College's history, to help recruit and provide scholarship support for 24 academically talented, low-income students majoring in STEM fields. The College will provide career placement services to better prepare these students to enter the STEM workforce or attend graduate school upon graduation from Saint Mary's. The program, titled "Mentored Access to Programs in Science," or MAPS, will be led by Professor and Math Department Chair Chris Jones. The first MAPS program students will receive awards in Fall 2015.

Saint Mary's will also host the 2015 Northern California Undergraduate Mathematics Conference on March 14, 2015. *(Editor's note: That's Super Pi Day!*)

Santa Clara University

Glenn Appleby has begun a three-year term as the new chair of the department. Leonard Klosinski was recognized for 50 years of service at SCU. He and Jerry Alexanderson continue to administer the Putnam Exam. Jean Pedersen is working to energize the AWM student chapter on campus. Materials from the "Celebration of Mind" honoring Martin Gardner's hundredth birthday were used for activities at an AWM pizza party. Rick Scott received a Simon's Collaboration Grant to continue several geometric group theory projects. With the help of a few mathematics majors, he has also started a weekly math circle at a local middle school. Ed Schaefer spent part of his sabbatical at the University of Bayreuth, Germany, working with his frequent co-author Michael Stoll. Frank Farris has a book coming out from Princeton University Press in June 2015, called "Creating Symmetry: The Artful Mathematics of Wallpaper Patterns." It outlines the content of a course by the same name he developed when visiting Carleton College.

Santa Rosa Junior College

We are sorry to report that Patrick Boyle passed away about this time last year. Important upcoming retirements include Terry Shell and Warren Ruud. (Fortunately, John Martin is not retiring yet!)

Fortunately, there have been additions to the department in the last few years. New this year is Tim Melvin. Last year, Sara Jones, John Kwon and Ivana Gorgievska were new additions. The year before that Santa Rosa hired Mark Ferguson and Jennifer Carlin-Goldberg, a former student of Dean Gooch.

UC Davis

Chair Dan Romik reports hiring four new faculty members: Javier Arsuaga, Michael Friedlander, Mariel Vazquez, and Eugene Gorsky (who will arrive later this year). Professor Jesus De Loera and Emeritus Professor Arthur Krener, were named as part of the 2014 class of AMS Fellows, and lecturer Duane Kouba was awarded the MAA Golden Section Distinguished Teaching Award. Check out their departmental brochure at https://www.math.ucdavis.edu/files/1214/1624/9296/newsletter_2014-rev1-4-final.pdf
(Editor's note: Join us at UC Davis for the 2016 Golden Section Meeting!)

University of Hawaii

Mitchell Anderson, Diane Barrett, and Dr. Roberto Pelayoat the University of Hawaii at Hilo have written entirely new and comprehensive high school common core curriculum for the

whole state Department of Education. The curriculum includes day by day student handouts, teacher lesson plans, homework, quizzes, and assessments. Anderson reports, "Last year, when the new material was introduced, the scores went up 10% across the state for both Algebra I and II, even though only about half the teachers had adopted the material during the first year."

University of San Francisco

USF has added a data analytics major to their offerings. Paul Zeitz will be starting Proof School in downtown San Francisco next fall. (See separate entry under Proof School.) USF welcomed a new tenure track professor this year, Mario Micheli, previously in a postdoctoral position at the University of Washington.

University of the Pacific

Pacific has just begun the second year of partnering with the San Joaquin County Office of Education to organize the San Joaquin Math Teachers' Circle. In general, Math Teachers' Circles offer middle school math teachers a way to engage in open-ended problem-solving activities with their peers and with professional mathematicians.

Interested in serving in a leadership role (Newsletter Editor, Chair cycle, Book Sales, Teaching Award Committee, etc.)?

Interested in hosting the section meeting?

Please contact one of the officers listed on the cover for more information.

— We want you! —

Teaching Awards: Call for Nominations

2016 MAA Golden Section Distinguished College or University New Teacher of Mathematics Award
&
2016 MAA Golden Section Distinguished College or University Teacher of Mathematics Award (General)

The MAA has two awards for distinguished college or university teaching of mathematics: the Deborah and Franklin Tepper Haimo Award (instituted in 1991) and, for beginning college or university teachers of mathematics, the Henry L. Alder Award (instituted in 2003). The recipient of the Golden Section New Teaching Award is nominated by the Section for the MAA Alder Award if the recipient holds a Ph.D. The recipient of the Golden Section Teaching Award (General) is nominated by the Section for the MAA Haimo Award.

The Golden Section has a two-step nomination process that consists of (i) the initial nomination, and (ii) the full nomination. The initial nomination is very simple, and requires the filling out of a one-page form together with a one-page summary that supports the nomination. After screening the initial nominations, the Teaching Award Committee will invite the nominators of clearly competitive nominations to submit full nominations.

Members of the Golden Section are encouraged to nominate their exceptional colleagues for the two Golden Section Distinguished Teaching Awards (New Teacher and General). The formal Call for Nominations and the Nomination Form files are available at http://sections.maa.org/golden/Teach.html. These files describe the award and eligibility requirements. The initial nomination deadline is **April 30, 2015.** Please direct questions to John Thoo, Teaching Award Committee Interim Chairman, at the Department of Mathematics and Statistics, Yuba College, 2088 N Beale Rd, Marysville, CA 95901-7605, jthoo@yccd.edu.

Previous Teaching Award Winners

An asterisk precedes names of those who went on to win a national Haimo Award.

1992 **G. D. Chakerian**, UC Davis
1993 ***Paul R. Halmos**, Santa Clara University
1994 **Jane Day**, San José State University
1995 ***Edward M. Landesman**, UC Santa Cruz
1996 **G. Thomas Sallee**, UC Davis
1997 **Jean J. Pedersen**, Santa Clara University
1998 **Donald C. Pfaff**, University of Nevada, Reno
1999 ***Leonard F. Klosinski**, Santa Clara University
2000 ***Evelyn Silvia**, UC Davis
2001 **Wade Ellis, Jr.**, West Valley College
2002 ***Paul Zeitz**, University of San Francisco
2003 **Peter Tannenbaum**, Fresno State
2004 ***Gerald L. Alexanderson**, Santa Clara Univ.
2005 **Russell Merris**, Cal State East Bay
2006 **Tatiana Shubin**, San José State University
2007 **William Fisher**, Chico State University
2008 **John B. Thoo**, Yuba College
2009 ***Allan J. Rossman**, Cal Poly San Luis Obispo
2010 **Dennis Smolarski**, Santa Clara University
2011 **Joseph Conrad**, Solano Community College
2012 ***Matthias Beck**, San Francisco State University
2013 **Steve Blaserg**, West Valley College
2014 **Duane Kouba**, UC Davis

A Message from the Governor

by Shirley Yap

Greetings, MAA members! I'm happy to give my first newsletter message as your new section Governor. The Governor represents the section on the Board of Governors of the MAA - the main policy-making and governing body of the organization. We also inform our sections of things going on at the national level. To that end, I'll share with you some facts about the MAA as well as national news from Mathfest in Portland this summer.

First, let's talk about a very important birthday - the MAA turns 100 in 2015! So consider attending Mathfest 2015 in Washington D.C., August 5-8. It promises to be a spectacular celebration of the centennial year of the organization. You can find out more about the MAA's beginnings by reading David Ziteralli's article (found on the front page of the MAA's website).

Another important event of 2015 is the rolling out of the Curriculum Guide, created by the Committee on the Undergraduate Program in Mathematics. This document could aid departments in curriculum development, departmental reviews, and departmental restructuring. Some things about the new guide that stood out for me is the increased presence of mathematical applications, computer literacy, collaboration with other disciplines, and broader outreach and inclusivity.

The MAA membership is currently around 12,000 and the national leadership is discussing new membership structures that could increase membership, such as a potential departmental membership structure. While the current deficit is $98,000, the Financial Report to the Board of Governors indicates that the MAA expects to be to be operating on a surplus by 2016 for the first time in a decade. Towards the goal of fiscal responsibility, the MAA will cancel the sparsely attended "Short Courses" program that regularly occurred two days before the national meetings. However, funds for that program may be used towards other professional development programs.

Finally, the Board of Governors is reviewing its own charges and considering some changes to its structure. A major discussion item is whether or not the Governors should be voting on many of the financial and other business matters of the MAA.

Report on the 2014 Section Meeting

by Ed Keppelmann (photos by Brigitte Lahme)

In one of our favorite and historically significant northern locations the MAA enthusiasts of the Golden section met on February 22, 2014 at Sonoma State University.

(Program Chair Brad Chin and Vice Chair Chris Goff)

It was at Sonoma State in 1979 that Sherman Stein presented a talk entitled "From Tiling to Algebra and Combinatorics." Perhaps Steiner systems or their precursors were discussed that day? Alon Amit of Origami Logic and now on the board of directors of San Francisco's new Proof School had us captivated as he related a new proof (at that time just 40 days old) by Peter Kevash on Generalized Steiner systems. Until this accomplishment the essence of the problem had been open since 1835. Abandoning traditional analytic techniques the solution breaks new ground by using arguments of randomness and probability. This shows that not only does a solution exist but in fact in the set of all possibilities, solutions are far far far more likely than not.

To illustrate, suppose that we create a massive tournament of 128 teams and ask if it could ever happen that no team would dominate? Here we have in mind no simple single elimination scheme where seeding would be important but rather we shall arrange that every team plays every other team exactly once. So let's put this tournament, (it will only take 8,128 matches!), and carefully record the outcomes.

In this context, the famous Steiner question roughly asks if the outcomes could ever be such that for any subset of n teams (say with ≤ 3) there would always be another team that beats them all? If one imagines the simple situation where every match is nothing more than a fair coin flip then each subset of three corresponds to a one in eight chance for a given other team to accomplish this feat. Among the remaining 125 teams this will happen at least once with probability greater than $1 - 6 \times 10^{-8}$.

(Edie Mendez of Sonoma State and Diane Resek of SFSU)

Bin Yu of UC Berkeley told us how a special algorithm (which at its heart is really just least squares fitting) can be used to read minds. From TIME magazine's 50 best inventions of 2011 issue, we have the following:
"What if I couldn't just guess what you were thinking but could actually see it? Scientists at the University of California, Berkeley, have developed a system that uses fMRI (a specialized MRI scan) to model what we're thinking while awake and even what we see in our dreams. In experiments, subjects watched random clips of Hollywood movies, and the system reconstructed their brain activity through a process called quantitative modeling. The images from the subjects' minds bore incredible similarities to the ones they were watching. The fMRI technology has been around for about two decades, but the breakthrough came in a smaller form. 'The real invention was entirely software,'

Professor Jack Gallant tells TIME. 'It is a new way to model the brain, which allows one to build a much better brain decoder than could be done in the past.'"

Christos H. Papadimitriou of the UC Berkeley computer science department gave a delightful luncheon talk account of his work on the comic book *Logicomix*. With Bertrand Russell as narrator, this is a unique (yet certainly effective) graphic novel presentation of the foundational quest of mathematics featuring the great minds of the twentieth century: Georg Cantor, Ludwig Wittgenstein, G. E. Moore, Alfred North Whitehead, David Hilbert, Gottlob Frege, Henri Poincaré, Kurt Gödel, and Alan Turing. This worldwide best-seller has been acclaimed for its account of the hubris of Rationalism that can be, if one is not careful, an inevitable path to madness.

After lunch we were treated to a delightful account by Phil Daro of his work in writing the Common Core math standards. He points out that the US math educational system is not terrible, just typical, and we can do better by looking to those at the top. Despite a huge pushback the committee wrote standards for students and teachers, rather than, as is traditional, standards for test writers. This means there is so much more of a conversation that needs to and is currently taking place. He reminds us that this was not a political solution but rather an educational one so surely it will take time for the public to understand.

For so many years and in so many ways, some subtle and some not, teachers have erroneously thought that if you get the right answer, you completely understand and if you get the wrong answer you know nothing. That's not how (for example) a Japanese classroom works where teachers might spend up to 30 minutes after a problem is solved looking at many different solution strategies and techniques.

The day closed on a high point when two time MAA award winning teacher (once as the new teacher Alder winner and once as a Haimo winner) and renowned math circle presenter Zvezdelina Stankova of Mills College told us all about the Wilf classification system for restricted patterns. To illustrate consider the following three permutations on the sets
$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $B = \{1, 2, 3, 4, 5\}$, and
$C = \{1, 4, 6, 7, 9\}$,
and let τ be a permutation on A, and β a permutation on B.

x	$\tau(x)$	y	$\beta(y)$	z	$\alpha(z)$
1	3	1	5	1	9
2	9	2	1	4	1
3	1	3	3	6	6
4	8	4	4	7	7
5	6	5	2	9	4
6	7				
7	4				
8	5				
9	2				

The above gives an example of what it means for τ to contain β. This is depicted by the existence of α which has the same order as β and occurs as a subsequence of τ. The Wilf class of a permutation σ consists of those permutations which avoid (i.e. do not arise as subsequences) within σ. Two permutations are Wilf equivalent when the size of the set of permutations that avoid them are equal. While in general Wilf classes and Wilf-equivalence is an unsolved problem, discussions surrounding these issues from the field of enumerative combinatorics have applications to the Catalan Numbers, Fibonacci numbers, Dyck paths, Young diagrams, generating trees, and Chebychev polynomials.

Our 15 great student poster contributions are summarized below:

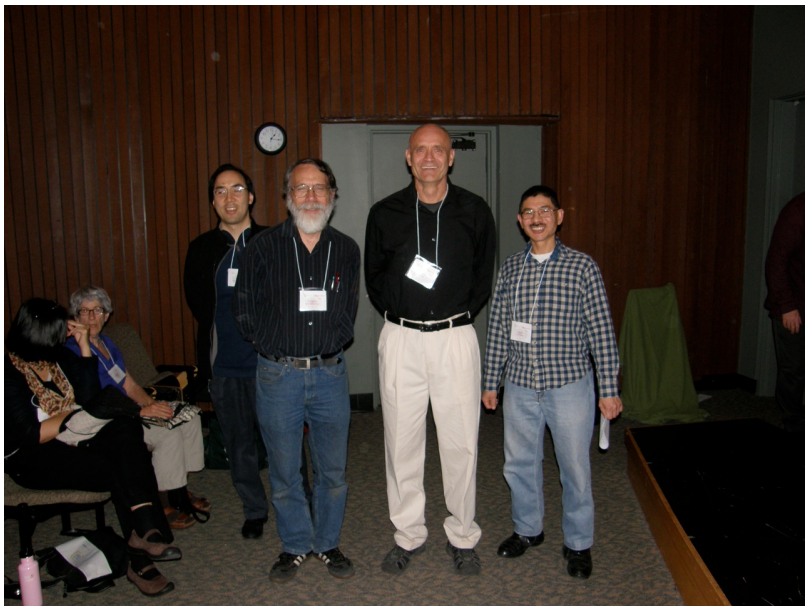
- Spencer Bowen of San Francisco State used special data analysis techniques including LASSO logistic regression to analyze glycoproteins in breast cancer as a means of identifying subtypes of the disease for differentiating treatments.
- Miguel Cardoso, Robin Decker, and Hunter Mills of Sonoma State University expanded on a 2014

COMAP problem to look at the effects of average speed and safety of 5 possible traffic rules on circular and linear freeways with varying numbers of lanes. They used cellular automata to simulate the traffic flow with varying densities.

- Trevor Chan, Jason Goss, Shengqiao Luo, Melody Molander, Hannah Polterock, and Brendon Verissmo of UC Davis analyzed the differences between the usual majority voting of someone for president and preferential voting where each voter orders the candidates from best to worst. They also incorporated Kemeny rankings which choose winners from every subset of candidates of size two. (*picture below*)

- Brian Davis of San Francisco State used the techniques of Ehrhart theory and group actions to find counting formulas for unlabeled chromatic polynomials. Chromatic polynomials count the number of various coloring schemes (such as vertex, edge or face where adjacent objects must have different colors) that are possible for a given graph with a fixed number of colors.
- Tanner Gibson of Cal Poly used a new technique called Empirical Mode Decomposition (EMD) to analyze two new ocean sediment data sets. This data contains proxies for global temperature and ice volume (in a non-linear non-stationary setting) and revealed the existence of two global glacial cycles. One of these had a period of 100,000 years occurring about 1.25 million years ago and the other was about 40,000 years long and existed throughout the Pleistocene era.
- Amandeep Gill and Sean Smith of Sonoma State University developed an unbiased, objective scheme for analyzing the performance of college athletic coaches. They used this to look at all college football coaches from 1881 to the present. The best 3 coaches were determined to be (1st) Bob Pruett of Marshall University Thundering Football, (2nd) Larry Kehres of the Mount Union Purple Raiders, and Walter C Camp who coached the Yale and Standford football teams during the years of 1888-1895.
- Lilyana Gross of CSU Monterey Bay developed two deterministic models to predict, evaluate and simulate methamphetamine use in urban and rural populations. Borrowing techniques from infectious disease modeling the schemes analyze interactions between susceptible, using, and recovered individuals. This fills a big gap as the use of these drugs (unlike say Cocaine or Heroin which are on the decline) continues to rise.
- Brett Hancock of CSU Sacramento developed a theoretical model for computation with real numbers as opposed to just the rationals which is standard in any numerical computation. The technique used involves placing a topology (called the Scott Topology) on partially ordered sets which is akin to working with intervals of the form (a,∞) in the real numbers. The model essentially validates working with finite intervals of reals when doing computations.
- Paul Hundal and Jared Rohe of the University of San Francisco worked with spectral clustering techniques to analyze stock returns for Standard and Poor's 500 index from 2007-2012. These techniques reduce the dimensionality of a matrix model by replacing the matrix with one having just one eigenvalue in each cluster. Using two different techniques to identify the clusters it is curious how their schemes aligned closely with the SIC codes currently maintained by OSHA.

- Anthony Kling of Cal Poly looked at Bisimple ω-Semigroups and their perfect congruences. A semigroup is a set with an associative binary multiplication and these semigroups are a special case of where the idempotent elements (these are x such that for some finite n, $x^n g = x$) form a chain. A congruence is a type of equivalence relation and perfect congruences are those where the semigroup multiplication is well defined.
- Kyle Kucker, Martine Miller and Sarah Whitaker of Sonoma State University analyzed the keep-right-except-to-pass rule for highway driving. This rule says that cars are to stay in the right hand lane except when passing. The model developed looked at situations of light and heavy traffic and measured safety under varying assumptions of driver compliance. They compared results with the situation where all vehicles were automated.
- Donna Martin and Maureen Smith of Cal Poly also analyzed this keep-right-except to pass rule. They were able to show that as long as the speed limit is obeyed there is no trade-off between speed and safety. They also looked at the case where there are no passing rules and what happens in countries where driving is on the other side of the road.
- Alyssa Pedersen of CSU Chico tackled the problem of estimating the quantity of biofuel in various environments. This is essential to fire-science applications in knowing where, how hot, and for how long, uncontrolled fires will burn. She used Bayseian techniques to compare existing data-sets.
- Mike Pierce of CSU Chico analyzed minor minimal non-apex (MMNA) graphs. These graphs have the properties that the removal of any vertex results in a non-planar graph but additionally this property does not hold for the proper-minor subgraphs. (A Minor subgraph is anything obtained by removing edges, isolated vertices, and contracting some edges and merging the associated vertices.) From a result by Robertson and Seymour in 2004 it is known indirectly that this collection of graphs is finite. Mike looked among classes of disconnected, one-connected, and bounded numbers of vertices and/or edges to find more than 60 examples of these graphs.
- Robert Stolz of San Francisco State University looked at DNA recombination in a family of enzymes related to the Escherichia Coli Bacteria. These circular DNA molecules use a technique called site-specific recombination which has been completely characterized. The analysis done here will allow researchers to analyze the biological implications of each topology that is formed as these chains link and unlink in the process of copying themselves during reproduction.



Standing: Brad Chin with three Section Teaching Award Winners: Steve Blasberg (2013), Duane Kouba (2014), and John Thoo (2008)

In total, we had 188 in attendance with 93 students. With the exception of the 2013 meeting at UOP where registered students made over 54% of those in attendance, this is the largest percentage we have ever seen and it did not come at the expense of other attendees. This was the fourth largest overall attendance in the past 10 years – extremely impressive for this northern location. Our future looks very bright!

THE MATHEMATICAL ASSOCIATION OF AMERICA – GOLDEN SECTION
Saturday, February 28th, 2015, at Foothill College

The conference will be held in the Smithwick Theatre (Building 1000) and the Foothill Café Dining Room (Building 2200).

8:30–9:30 **Registration**, Coffee Hour, Book Sales
Registration Fee: $20 (Retired $10, Students and Unemployed $5)

9:30–9:40 **Linda Thor,** Chancellor, Foothill-De Anza Community College District
Opening Welcome

9:40–10:30 **Michael McGinnis**, Santa Rosa Junior College
Journey of Perplexus
Presider: TBD

10:30–10:50 **MAA Section Business Meeting and Governor's Report**
Presiders: **Chris Goff,** University of the Pacific, Section Chair
Shirley Yap, Cal State East Bay, Section Governor

11:00–11:50 **Gunnar Carlsson**, Stanford University
The Shape of Data
Presider: **Shirley Yap**, Cal State East Bay

11:50–1:05 **Student Poster Session and Luncheon**
Advance reservation for luncheon ($20.00) is required.
(Note: There are no other dining options on campus that day.)

1:05–1:15 Presentation of the 2014 Section Award for Distinguished Teaching of Mathematics
John Thoo, Yuba College, Teaching Award Committee Chair

1:15–2:00 Speaker: **Dan Meyer**, Stanford University; *Beyond Relevance & Real World: Stronger Strategies for Student Engagement in Challenging Mathematics*
Presider: **Brigitte Lahme**, Sonoma State University

2:10–3:00 **Karen Saxe**, Macalester College and MAA Second Vice President
On Function Approximations
Presider: **Frank Farris**, Santa Clara University

3:10–4:00 **Angela Hicks**, Stanford University
Formidable Symmetries: Combinatorial Challenges from the q,t Catalan and Beyond
Presider: **Chris Goff**, University of the Pacific

4:10–5:00 **IGNITE** talks

Frank Farris, Santa Clara University	**Ed Keppelmann**, University of Nevada, Reno
Tatiana Shubin San Jose State University	**Karen Saxe**, Macalester College and MAA 2nd Vice President

PROGRAM ABSTRACTS

MICHAEL MCGINNIS, Santa Rosa Junior College, *Journey of Perplexus*

Abstract: Michael McGinnis, creator of the award-winning Perplexus games – often called "the world's smartest toys" – will speak about his remarkable journey from an artistic idea to Game of The Year. Michael's work is a metaphor for itself, where tenacity, a desire to learn, and a sense of adventure pay off with a lifetime of passion. His talk will discuss the successes, failures, and influences that have shaped this 35-year odyssey.

GUNNAR CARLSSON, Stanford University, *The Shape of Data*

Abstract: There has been a lot of attention paid to the idea of "Big Data," but often the problem isn't so much the size as the complexity of the data. In order to make best use of data, one needs useful ways of representing the complexity within the data. It turns out that the mathematical notion of shape, as defined in the subfield called topology, gives a useful way to organize and understand complex data sets. We will discuss these ideas with examples.

DAN MEYER, Stanford University, *Beyond Relevance & Real World: Stronger Strategies for Student Engagement in Challenging Mathematics*

Abstract: Highlighting relevance and connections to the real world are often seen as the most effective strategies for engaging students in difficult mathematics, but both strategies are limited and can fail in crucial ways. We'll locate some stronger strategies, based in research and experience.

KAREN SAXE, Macalester College, *On Function Approximations*

Abstract: Function approximation pervades much of mathematics and applied mathematics. In our first calculus course we discuss Taylor polynomial approximations; in our first statistics course we talk about least squares approximations. These are just two examples from a long list of approximation methods. This talk will give an overview of various types of approximations, how and when they can be constructed and used, with reference to historical origins.

ANGELA HICKS, Stanford University, *Formidable Symmetries: Combinatorial Challenges from the q,t Catalan and Beyond*

Abstract: A frequent problem in combinatorics is to demonstrate the equidistribution of two or more statistics on a set of combinatorial objects. We consider combinatorial sets S with two statistics, call them a and b, that are known (or sometimes conjectured) to together form a symmetric polynomial in t and q, where $\sum_{s\in S} t^{a(s)}q^{b(s)} = \sum_{s\in S} q^{a(s)}t^{b(s)}$ but for which there is no known combinatorial proof. Examples include statistics on Dyck paths, parking functions, and (as more recently discovered) stable configurations on sandpile models. For the unfamiliar, we'll define some of these objects and discuss why they are known (or thought) to be symmetric.

How to Register

Register online at http://sections.maa.org/golden at the top of the page. Regular registration costs $20; Retired $10; Students and unemployed $5. Lunch is $20. Please consider sending an extra $10 to support student members. *Note: there are no other dining options on or near Foothill College on Saturdays.*

Pay by sending a check (arriving no later than February 21, 2015) payable to the MAA to
MAA 2015 Luncheon
Department of Mathematics and Statistics MS084
University of Nevada Reno
Reno, NV 89557

If you experience any problems, contact Ed Keppelmann at keppelma@unr.edu or 775-722-0658.

Innovations for the 2015 Section Meeting

Themed Lunch Tables

In the interest of promoting networking and conversation, some tables will be labeled with specific topics so that attendees who are interested in such topic can sit with other attendees with similar interests. Topics are subject to change, but may include: Recreational Math; Learning more about the MAA; Math and Industry/Big Data; Becoming involved in the Northern California Undergraduate Mathematics Conference; Centennial of the MAA; Progressive Calculus Pedagogies; etc.

IGNITE Talks

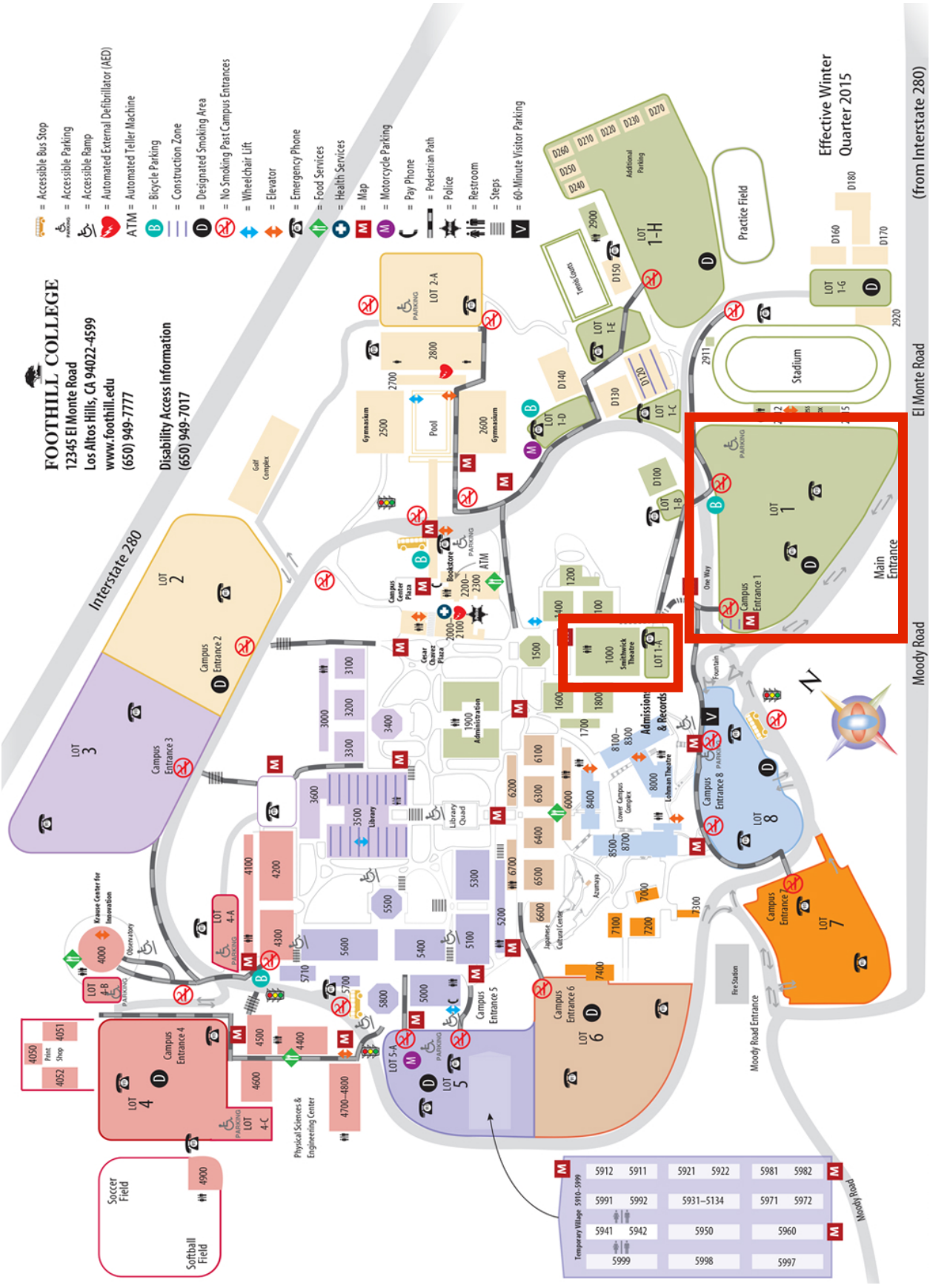
The conference will conclude with several IGNITE talks. Each IGNITE talk is a five-minute presentation where the speaker uses 20 slides that automatically advance every 15 seconds. Audiences should pay attention, because things happen pretty fast! Some talks will be mathematical; others may be more informational or even historical in nature. (*It is the MAA Centennial after all!*) If you are interested in giving an IGNITE talk at a future section meeting, please let one of the organizers know.

Conference Location and Parking Information

The conference will be held at the **Smithwick Theater, Building 1000**. Please park in **Lot 1**. Purchase day-use permits ($3 each) from vending machines in student parking lots. The machines accept $1 bills, nickels, dimes, quarters, and credit cards. The day-use permit is valid on the date of purchase only. Before purchasing a daily permit, always find a legal parking space first. Park in marked spaces only!

Directions

See http://www.foothill.edu/news/transportation.php for full directions and see http://www.foothill.edu/news/maps.php for a campus map, or see the map on the next page.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= Accessible Bus Stop
= Accessible Parking
= Accessible Ramp
= Automated External Defibrillator (AED)
ATM = Automated Teller Machine
= Bicycle Parking
= Construction Zone
= Designated Smoking Area
= No Smoking Past Campus Entrances
= Wheelchair Lift
= Elevator
= Emergency Phone
= Food Services
= Health Services
= Map
= Motorcycle Parking
= Pay Phone
= Pedestrian Path
= Police
= Restroom
= Steps
= 60-Minute Visitor Parking
Interstate 280
El Monte Road
(from Interstate 280)
Moody Road
Moody Road Entrance
Main Entrance
Practice Field
Stadium
Tennis Courts
Additional Parking
Golf Complex
Gymnasium
Pool
Bookstore
ATM
Campus Center Plaza
Gear Chaser Plaza
Smithwick Theatre
Fountain
Admissions & Records
Lohman Theatre
Lower Campus Complex
Library
Library Quad
Observatory
Krause Center for Innovation
Japanese Cultural Center
Physical Sciences & Engineering Center
Fire Station
Soccer Field
Softball Field
Temporary Village 5910–5999
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Campus Entrance 8
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Call for Student Posters

When
Saturday, February 28, 2015

Where
Foothill College, Los Altos Hills CA

What
Presentations of research, new approaches to old problems, solutions to problems from mathematics journals, results of class projects or mathematical modeling contests, historical investigations in pure and applied mathematics, mathematical topics outside the standard curriculum, or mathematical investigations arising from internship experiences.

Who
Open to all undergraduate and graduate mathematics students.

Why
The meeting provides a great opportunity to learn about interesting and entertaining areas of mathematics, as well as to network with other students and professors. Student presenters receive **complimentary registration and Saturday luncheon**, plus a **free one-year membership to the MAA** or (to those who are already MAA members) a **free book**.

Details
All posters should be typed, illustrated, and displayed on a board 3 feet tall by 4 feet wide. Posters will be on view throughout the meeting, including the scheduled poster session.

What to do
Email your name and abstract (2 to 5 sentences), including poster title, name of institution, and name of faculty advisor, to Professor Kristen Beck (contact info below), by **Friday, February 13, 2015**. If you wish to participate or have any questions (*e.g.*, whether your idea is appropriate for presentation, what size font to use in your poster) contact Professor Beck.

Contact
Kristen Beck, Department of Mathematics, Saint Mary's College of California, Moraga CA 94575
(925) 631-6298 (Office), kab24@stmarys-ca.edu.

Bonus Conference in honor of the MAA's Centennial!

Keep an eye out for information regarding an upcoming joint conference with the MAA's Southern California section. The date will likely be in early November 2015 at a central California location still to be determined. Keep checking the section website for details: sections.maa.org/golden.