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Editor:
Walden Freedman
Humboldt State University

MINI-FOCUS

THE NEWSLETTER OF THE GOLDEN SECTION OF THE MAA

Serkan Hoşten Wins Section Teaching Award

Serkan Hoşten, of San Francisco State University, won the 2016 MAA Golden Section's Distinguished College or University Teaching of Mathematics Award. The award was presented at the 2016 Golden Section Meeting at UC Davis, California, on February 27, 2016. (Serkan Hoşten's complete award citation can be found online at http://sections.maa.org/golden/Teach.html)

Serkan Hoşten earned his doctorate in operations research with minors in mathematics and computer science from Cornell University in 1997. In Fall 2000, he joined the mathematics faculty at San Francisco State University after an assistant professorship at George Mason University, a visiting scholarship at UC Berkeley, and a post-doctoral fellowship at MSRI.

At SFSU, Serkan has taught a wide variety of courses, ranging from undergraduate courses in calculus and modern algebra to graduate courses in representation

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Martha Shott Wins Section Award for New Teachers

Martha Shott, of Sonoma State University, won the 2016 MAA Golden Section's Distinguished College or University New Teacher of Mathematics Award, and is the first person to receive this award. The award was presented at the 2016 Golden Section Meeting at UC Davis, California, on February 27, 2016. (Martha Shott's complete award citation can be found online at http://sections.maa.org/golden/Teach.html)

Martha Shott earned her doctorate in applied mathematics from UC Davis in 2011. Following that, Martha taught as a lecturer at Indiana University Kokomo, for one year before she arrived at Sonoma State University, also to teach as a lecturer. In 2014, Martha was hired in a tenure-track position in the Mathematics and Statistics Department at SSU, where she is currently.

At SSU, Martha has built an impressive reputation as an excellent teacher. She has taught a wide variety of courses that range from calculus to statistics to

Continued on the next page

Hoşten: Teaching Award

(*Continued from the previous page*)

theory, optimization, and combinatorics. In addition, Serkan has mentored 18 master's thesis students during the last 17 years (one from George Mason University and the rest at SFSU), and he currently has six students who are working on their master's theses and are on track to finish in 2016. Serkan's former students have completed or are completing doctoral programs in mathematics or mathematics education, are working in industry, or are teaching at community colleges and four-year colleges and universities. Serkan has also published over 30 professional papers with various co-authors in a variety of subjects.

Comments from Serkan's student evaluations include: "pretty much the coolest professor ever and should teach everything" and "the best math instructor I have ever had . . . incredibly challenging, stimulating, caring, hardworking and thoughtful . . . notes and assignments are well-crafted and aimed to motivate and push you to make discoveries on your own."

Beyond the classroom, Serkan is co-founder and co-organizer of the weekly *Algebra, Geometry and Combinatorics* (*AGC*) *Seminar* at SFSU. Since 2000, he has been a founding organizer of the semi-annual *Bay Area Discrete Mathematics Day* (*BAD Math Day*). In 2005, he co-organized an *NSF-CBMS Regional Research Conference*. From 2009 to 2014, he served as a faculty mentor to practically all of the 50 graduate students involved in the NSF GK-12 program CM² at SFSU, and he is currently organizing the MAA-sponsored *Mathematics Research Communities Workshop on Algebraic Statistics* for June, 2016.

The Golden Section congratulates Serkan Hoşten, an extraordinarily effective and inspiring teacher.

Shott: New Teachers Award

(*Continued from the previous page*)

mathematical modeling to numerical analysis. For the past three years, as part of an interdisciplinary teaching team, Martha has even taught an innovative *Freshman Year Experience* course that combines precalculus, biology, and critical thinking content. Comments from some of Martha's colleagues include: "It is wonderful to collaborate with Martha, who thinks first about what is best for students to learn and to apply their learning towards academic and personal development", and "Dr. Shott engages her students in educational and research opportunities. She traveled with two of our majors to Thailand for six weeks as one of the faculty mentors in the *Louis Stokes Alliance for Minority Participation* (*LSAMP*) *Global Awareness Program*", and "Dr. Shott has a calm and inspiring style of teaching. The minute she walks into the classroom, her strong effect on her students is immediately obvious."

Comments from some of Martha's students are similarly enthusiastic:

"Martha Shott is an amazing teacher. She's makes learning fun!" and "I have never missed a class, and I almost wish I was a statistics major so I could take more courses with her."

The Golden Section congratulates Martha Shott, an extraordinarily effective and inspiring new teacher.

Ed Keppelmann, John Thoo, and Martha Shott

News from the Section

Compiled by Walden Freedman

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 fall season, or contact a section officer.

Humboldt State University

A number of students and faculty participated in the Forty-Fifth Annual State of Jefferson Mathematics Congress, September 30-October 2, 2016 at Whiskeytown Lake, CA. Students and/or faculty from Chico State, Sonoma State, Sacramento State, and UC Davis also attended. The next State of Jefferson Math Congress takes place October 6-8, 2017.

Professor Martin Flashman recently retired after almost 35 years at HSU.

Saint Mary's College of California

The U.S. Department of Education has awarded Saint Mary's College a $2.7 million Hispanic Serving Institutions STEM and Articulation program grant. The federal grant will support Caminos a Las Ciencias (CALC): Pathways to Science, a new strategic initiative designed to significantly enhance and expand the curriculum and resources offered to Saint Mary's Hispanic and low-income students. The program also features a partnership with Los Medanos College, a two-year community college, and a fellow Hispanic Serving Institution, located in Pittsburg, CA. The partnership includes development of a direct STEM student transfer process, or articulation agreement. Further information at http://www.stmarys-ca.edu/smc-receives-27-million-hsi-federal-grant-to-expand-stem-education-opportunities

San Jose State University

Recent retirements include Roger Alperin and Brian Peterson. Several other faculty are now partially retired. This year, we hired four new faculty members: Daniel Brinkman (Numerical Analysis, Applied Math), Wes Maciejewski (Mathematics Education), Cristina Tortora (Statistics), and Yan Zhang (Combinatorics). We redesigned our master's programs in mathematics. Our MA (Pure) Math and MS (Applied) Math program have thesis and non-thesis options. Our MS Statistics program has grown quickly and is thriving.

Santa Clara University

SCU has received a grant from the Koret Foundation to help introduce lab sections for precalculus, based on active learning methods. There are two new faculty members to augment their offerings in Computer Science: Sukanya Manna (PhD, Australian National University) and Michael Bannister (PhD, UC Irvine). Frank Farris prepared three major exhibitions of his mathematical art this fall at Cornell University, Bowdoin College, and Pacific University. Gerald Alexanderson and Leonard Klosinski are completing their exceptional service to the MAA's Putnam Exam, administering this international competition at SCU for the last time in 2016.

Sonoma State University

The 2017 Northern California Undergraduate Mathematics Conference will take place on March 25, 2017 at Sonoma State. This event will include research talks by area undergraduates as well as a keynote talk by Cornelia Van Cott of the University of San Francisco. Further information at https://sites.google.com/site/nocalumc/

University of Nevada, Reno

The University of Nevada Reno has two new PhD programs, one in Statistics and Data Science and the other in Mathematics. The programs provide training in fundamental methods and concepts of modern mathematics and statistics and the emerging statistical area of Data Science, and emphasize interdisciplinary collaborative research. For more information, visit http://www.unr.edu/math/

Yuba College/Woodland Community College

Yuba College will be hosting the Sacramento Valley Community College Mathematics (SVCCM) Conference on Saturday, February 25, 2017. Woodland Community College hired Lewis Felver in Spring 2016. Yuba College hired Erika Noffsinger and Mukta Sharma in Fall 2016. Talwinder Chetra transferred from

Woodland Community College to Yuba College in Fall 2015. Yuba College lost two faculty members in Spring 2016: Kathryn Boyes left to raise her family's new arrival, and Roger Davidson left to become dean of mathematics at American River College. John Thoo, with co-author Amy Shell-Gellasch (Montgomery College), published *Algebra in Context: Introductory Algebra from Origins to Applications*, Johns Hopkins University Press, 2015.

A Message from the Governor

by Shirley Yap

As the MAA enters its second century, we continue to celebrate its achievements since its humble beginnings as the publishing body of the American Mathematical Monthly. We also task ourselves with keeping up with the times. In particular, the Board of Governors has been thinking about how to better use technology to expand our mission and broaden our audience. We are also brainstorming about ways in which to get and keep younger members involved with the MAA. If you have any suggestions, please feel free to let me know, either in person or via email.

Here are a few opportunities and programs I would like to highlight:

The MAA has a new departmental membership that allows for an unlimited number of student memberships. You can find out more here: http://www.maa.org/membership/membership-categories/departmental-membership-benefits

Leaders from five professional associations in the mathematical sciences AMATYC, AMS, ASA, MAA, and SIAM – came together for a two and a half day workshop to discuss how to modernize mathematical education. See their final report at http://www.maa.org/sites/default/files/pdf/CommonVisionFinal.pdf

Curriculum Inspirations is a multimedia experience for the middle school and high school communities. However, students of all levels can benefit from the modules. I find the "10 Strategies with Examples" particularly helpful. http://www.maa.org/math-competitions/teachers/curriculum-inspirations

MAA members now get a 25% discount on MAA books.

This year, the MAA collaborated with WebAssign to provide an online homework solution for our textbooks. You can view the first titles at https://www.webassign.net/maa

Finally, I'd like to remind everyone about the many activities available for students at the national MAA meetings, including poster sessions, contributed paper sessions, student activities, a grad school fair, a hospitality center, and lectures especially for students. Hope to see you all at the JMM in Atlanta or at our sectional meeting this spring at Santa Clara University.

New Section Policy on Book Sales

In October 2016 it was reluctantly decided that the section will no longer support book displays and sales at our annual section meeting. While for many years in the late 90's and early 2000's the Golden Section sold some of the most books of any of the MAA sections, everything has gone to the internet and we have not done well. Not to worry though! We will still have catalogs at the meeting and we will accept mail-in orders. In addition, for a two-week window around the meeting, be sure to check your email for the announcement of a special discount code for your online orders. The section will still get 10% of all book sale revenues but we are not going to have copies of books on hand (in recent years we were only allowed to have one copy of the new books anyway).

Teaching Awards:
Call for Nominations

2018 MAA Golden Section Distinguished College or University Teacher of Mathematics Award (General)

&

2018 MAA Golden Section Distinguished College or University New Teacher of Mathematics Award

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 Teaching Award (General) is nominated by the Section for the MAA Haimo Award. 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 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 Awards 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, 2017.

Please direct questions to John Thoo, Teaching Awards Committee Interim Chairman, at the Department of Mathematics and Statistics, Yuba College, 2088 N Beale Rd, Marysville, CA 95901-7605, jthoo@yccd.edu.

Interested in serving in a leadership role?
(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!** ⇐⇐⇐⇐

Previous General 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 **Steven Blasberg**, West Valley College
2014 **Duane Kouba**, UC Davis
2015 **Michelle Manes**, University of Hawaii at Mānoa
2016 **Serkan Hoşten**, San Francisco State University

Previous New Teaching Award Winners

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

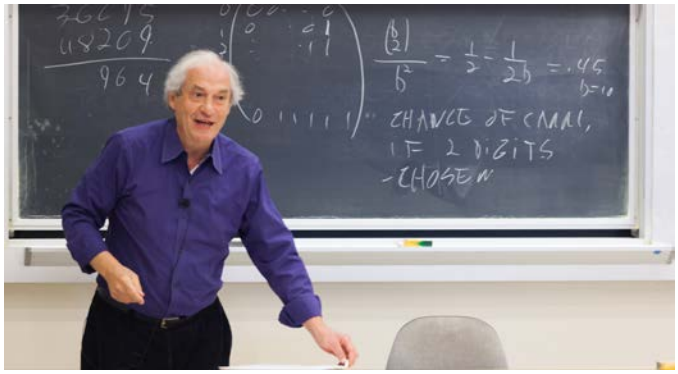
2016 **Martha Shott**, Sonoma State University

Report on the Section Meeting at UC Davis, February 27, 2016

by Ed Keppelmann and Shirley Yap (Mathematical Art Exhibit), photos by Jonathan E. Shapiro

With many many thanks to the incredible work of UC Davis professor Jesus De Loera this meeting was the highest attended ever with 250 total attendees (including 136 students). That is right, almost 55% those in attendance were students! The luncheon buffet at Tercero Dining Commons was a fabulous array of international choices with something for all types of special diets. We probably won't see anything quite like that for many years to come!

Persi Diaconis of Stanford University, the man who brought us great insights in cards shuffling and coin flipping had another gem for the crowd.



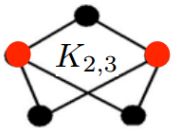
He discussed his work with Xuancheng Shao and Kannan Soundararajan on carries in machine arithmetic and the analogy of this to group theory with widespread applications using additive combinatorics. To get just a tiny glimpse of this, consider a group G with normal subgroup H like the quaternions Q shown below with the subgroup of order 2 generated by -1.

A set of coset representatives for H (color-coded) allows one to compute in the quotient group G/H. However, if you want to work in G itself and you just work with these representatives (which are not a group) you will sometimes get results not in this set. These are essentially "carries" since their computation requires more calculation in G – just as the digits 0, 1, . . . , 9 lead to more work when say 8 + 7 is not one of these representatives. The goal is to find representatives that offer the fewest carries possible.

Rekha Thomas of the University of Washington told us about extremal combinatorics for graphs.

A result of Mantel (1907) says that a graph on n vertices with no triangles can have at most $\frac{n^2}{4}$ edges. The triangle-free graph shown below illustrates how tight the result is in the case of n = 5. Notice that any additional edge will produce a triangle.

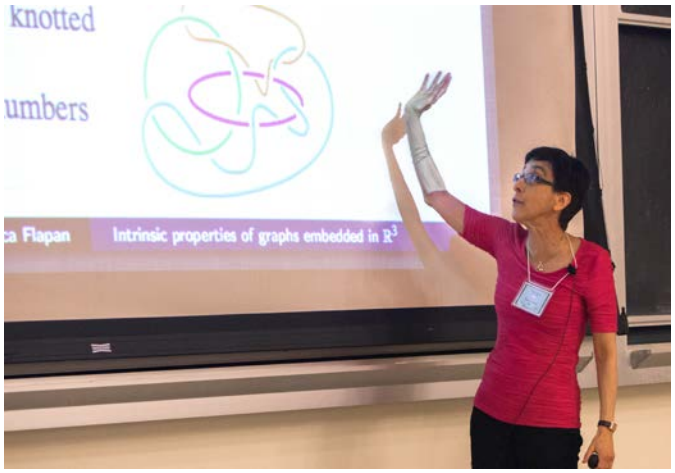
$$\frac{n^2}{4} = \frac{25}{4} = 6.25$$



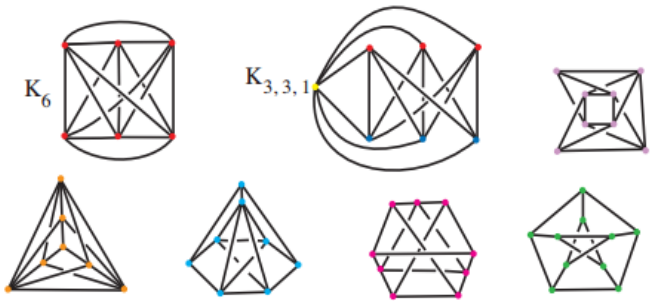
This was generalized by Turán (1941) who showed that if the graph has no complete subgraph on r vertices than the number of edges is at most $\left(1-\frac{1}{r-1}\right)\frac{n^2}{2}$. Thomas then discussed

related work of hers to establish such bounds for hypergraphs (where edges are sets rather than just pairs). We were all delighted by the many interesting adventures into areas such as polynomial optimization and semidefinite programming.

Erica Flapan of Pomona College applied knot theory to the embedding of graphs in $\mathbb{R}^3$.

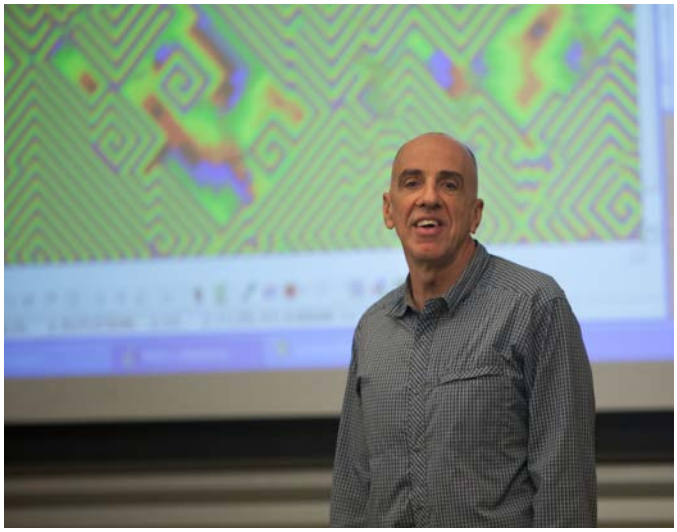


A graph embedding has a link when distinct loops in the graph are forced to cross each other in an essential way. A graph is essentially linked if every embedding in $\mathbb{R}^3$ has a link. A result of Sach's determined that the seven graphs shown below are the only minimally essentially linked graphs. Here, the term minimal means that if we shrink any edge and combine the vertices on either end, then the graph will no longer be essentially linked.



Erica told us about a plethora of her own related results in this area with many collaborators. She has shown for example that for any natural number n there is an m so that the complete graph on m vertices will have links which cross at least n times (no matter how they are embedded). She has shown that no graph is forced to always embed with a composite knot (as opposed to a prime knot). Composite knots are essentially those that can be formed from less complicated knots by tying them together. She has shown that the graph on n vertices is intrinsically chiral (i.e., the knots cannot be formed to their mirror image) iff n is congruent to 3 modulo 4.

Janko Gravner of UC Davis (and an old classmate of this author's from UW Madison) looked at dynamical systems with a tendency to self-organize. This means they follow local rules but there is no global authority. Examples



include voters who poll their neighbor's before deciding which side to support or cars on a linear road. There are many examples and applications to neurology, biology, psychology, financial systems and the social sciences. The most intricate such system must surely be the Gravner-Griffeath snowflake algorithm.

Bernd Sturmfels of UC Berkeley looked at tensors. If you think of these as multidimensional arrays then you can generalize the notions of eigenvectors (for two-dimensional square arrays) or singular values and vectors (for non-square rectangular two-dimensional arrays). For a square symmetric matrix the eigenvectors and eigenvalues will always be real. A symmetric $n \times n$ matrix will have n real eigenvalues but for example, with a 3×3 by 3×3 symmetric tensor there are 13 eigenvalues and 997 quadruples of

singular vectors. In the case of multidimensional arrays with all dimensions equal there is a beautiful correspondence with symmetric polynomials and their gradient as viewed as a self-map of a certain finite-dimensional projective space. In this setting, the eigenvectors become the fixed points of this map.

Bernd argues that engineers and other scientists working with big data (in very large dimensional arrays) could really spice up their toolbox with just a touch of the right kind of algebraic geometry. (See the June-July 2016 Notices of the AMS for more details with a very nice photo of Bernd using a spherical blackboard!).

There were 21 student poster presentations covering the following topics (to see full abstracts please visit our website).

Yuan Zhou of UC Davis developed software to search for extreme functions of the Gomory-Johnson infinite group problem in integer linear programming. His work has already produced record-breaking results!

Joseph Dominic of Saint Mary's College in Moraga looked at the Hopf and Frobenius algebras of 2-dimensional topological quantum field theories.

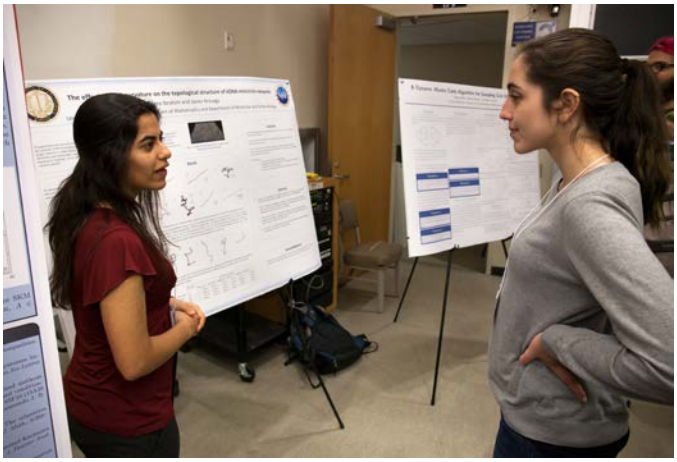
Franciska Domokos of Sacramento State looked at Jacobi type sums of Dirichlet characters. Her methods provided ways to evaluate these multivariate sums across certain powers of odd primes.

Mónica Gómez of UC Davis looked at the enumeration of polytopes in $\mathbb{R}^3$ (with vertices at integer lattice points) according to bounds of certain length measuring linear functionals on these polytopes.

Jamie Haddock of UC Davis combined the methods of Agmon, Motzkin et al and Kaczmarz for solving linear inequalities to outperform both methods in some cases.

Buddy Galletti, **Christopher Hurley**, **Adam Mair** of Cal Poly examined the numerical ranges of composition operators on Hardy spaces.

Lara Ibrahim of UC Davis looked at the curvature of certain DNA lattices called kinetoplast DNA minicircle networks. This will hopefully shed light on the biochemistry of certain nucleic acids in this context.



Nida Kazi of San Jose State looked at the intersection of convex sets in Euclidean space as a means of describing neural codes. These are codes consisting of 0-1 vectors used to model the co-firing of neurons.

Jacob Miller of UC Davis looked at transportation polytopes. These are the heart of linear programming and operations research. Jacob showed that a famous conjecture of Hirsch holds under certain diameter constraints.

Kirill Paramonov of UC Davis looked at a new notion of graded Fibonacci numbers arising from Dyck paths and Catalan numbers. By providing a natural grading to these numbers recursive relations are possible which provide both geometric and algebraic insight.

Carson Rogers of UC Davis looked at special way to decompose Siefert surfaces of knots using bridge spheres. The work provides a new inequality between the bridge number of a knot and its classical genus.

Christian Smith of UC Davis studied singular polynomials in relation to Dunkl operators. Such an operator differentiates and swaps variables and has connections to representation theory, algebraic geometry and physics.

David Klapheck of Cal State Sacramento determined the length of all closed sub-Riemannian geodesics on S^3.

R.N. La Haye, **A. Montejano**, **D. Oliveras**, and **E. Roldan-Pensado** of UC Davis used techniques from the geometry of numbers to generalize a famous Ramsey-type theorem of Rado to a rainbow-type setting.

Bo Lin of UC Berkeley looked at the linear system associated to the divisor of a metric graph. This system is essentially a cell complex and certain anchor divisors provide detailed structural information both for the system and its associated tropical convex hull of rational functions.

Alexander Lowen of St Mary's College used Golay codes and Hexacodes to describe the Leech Lattice used to construct the Monster group via Conway.

Emily McCullough of San Francisco State (with coauthor **Katherina Jochemko** of the Vienna University of Technology) looked at the interplay between the geometry and combinatorics of lattice polytopes using δ-polynomials, (B,l)-Eulerian numbers, and dilates.

Anthony Bardessono, **Donna Martin**, and **Maureen Smith** of Cal Poly used the integrated Post-Secondary Education data system to develop a model for the equitable distribution of a fictional sum of $100,000 based on alumni success, student financial need and demand, and the expected return in investment.

Elijah Soria of St Mary's College found new techniques from linear algebra via generating matrices to analyze Pell sequences.

Shawn Witte of UC Davis invented a Monte Carlo type algorithm to analyze random conformations of knots in grid diagrams.

Anastasia Chavez of UC Berkeley and **Nicole Yamzon** of San Francisco State looked at the combinatorics of simplicial complexes. In particular, by using bases of the Catalan matroid they could determine which partial data on the number of faces of various dimensions determines the entire number of faces in every dimension.

Mathematical Art Exhibit

by Shirley Yap, photos by Jonathan Shapiro

This was the first ever Mathematical Art Exhibit held at a meeting of the Golden Section. There were 19 artists exhibiting their work in a variety of media, including paintings, digital prints, and

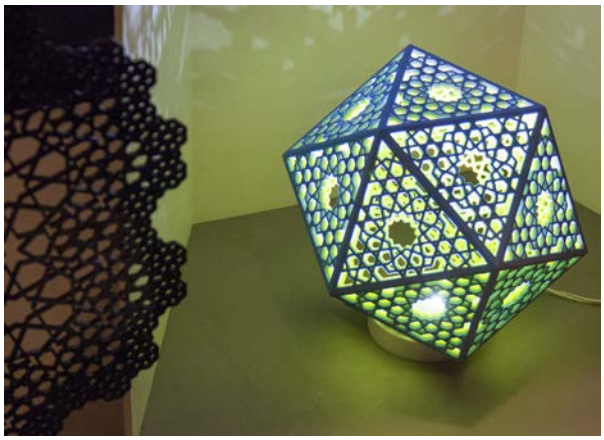
sculptures in wood, metal, and glass. The exhibit was scheduled to start at 1:00 pm and the line of people waiting at the exhibit hall doors at 12:45 was some indication of the level of enthusiasm the conference attendees had for the exhibit.

Inspired by the art exhibit at the JMM, I wanted to organize something more local so that those who are not able to attend the JMM or the Bridges Conference could get a taste of the conceptual and visual beauty of mathematical art pieces. I also thought it was important to give mathematical artists an opportunity to show their work and meet each other. Here are some of their comments about the exhibit:

Maria Trnkova: ". . . participation at Math and Art exhibition was my dream . . . and it stimulated me to work more in this direction."

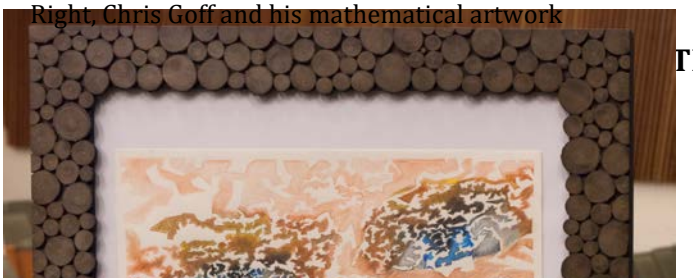
Frank Farris: ". . . there's mathematical beauty in a piece that's at least as wonderful as the surface beauty that everyone can see."

Phil Webster: "I found that the students were especially interested and engaged - they asked tons of questions, and many asked permission to take pictures to share the art with their friends. There are very few venues for the display of mathematical art, so every new opportunity that comes up in this field is exciting to a mathematical artist like me."



Above, Screened Icosahedral Lamp by Phil Webster

Right, Chris Goff and his mathematical artwork



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Saturday, March 4, 2017, at Santa Clara University

Talks in the Recital Hall, Music & Dance Building **Poster Session in the lobby of the Mayer Theatre**

Mathematical Art Exhibit in the Music Rehearsal Hall, Music & Dance Building

Lunch on the lawn area in front of the Mayer Theatre

Registration 8:00—11:00 am	**Refreshments** 8:30—10:30 am
Music & Dance Building	Music & Dance Building Lobby/Entrance

8:45–9:00 **Opening Welcome**
Recital Hall, Music & Dance Building
Presider: **Tom Freeman**

9:00–9:50 **Tim Chartier**, Davidson College
March Mathness
Presider: **TBD**

9:50–10:05 Golden Section Business Meeting and Governor's Report
Recital Hall, Music & Dance Building

10:10–11:05 **Nicolette Meshkat**, Santa Clara University
Parameter identifiability of biological models
Presider: **Shirley Yap**

11:10–12:00 **Sam Vandervelde**, Proof School
It's Not Polite to Point
Presider: **James Smith**

12:00–1:00 **Lunch** (on the lawn area in front of the Mayer Theatre, see map)
Cost: $10 in advance. You must have a ticket to have lunch, tickets to be purchased in advance while registering. Lunch consists of sandwich choice, fruit salad, beverage, cookie. Vegan/gluten-free choice available.

1:00–2:30 **Student Poster Session/Mathematical Art Exhibition**
Mayer Theater Building Lobby/Music & Dance Building, respectively
Organized and curated by Shirley Yap, CSU East Bay

2:40–3:30 **Mariel Vazquez**, UC Davis
Packing, folding and simplifying DNA topology
Presider: **Ed Keppelmann**

3:40–3:55 **Teaching Awards Ceremony**
Recital Hall, Music & Dance Building
Presider: **John Thoo**, Yuba College, Teaching Award Committee Chair

4:00–4:50 **Jill Pipher**, Brown University
Cryptography: from ancient times to a post-quantum age
Presider: **Frank Farris**

The Golden Section thanks Dean Debbie Tahmassebi and the College of Arts and Sciences at Santa Clara University for their support.

Program Abstracts

TIM CHARTIER, Davidson College, *March Mathness*

Abstract: Sports analytics is a growing field. The larger field of data analytics is exploding with its urgent call for skills in mathematics and computer science. Every year, people across the United States predict how the field of teams will play in the Division I NCAA Men's Basketball Tournament, often called March Madness, by filling out a tournament bracket for the postseason play. Dr. Chartier and his students at Davidson College have received national media coverage from such outlets as CBS Evening News, for a ranking method that can help you create your own predictions for the tournament. Learn tips on how to create your own math model to take some of the madness out of the March Madness tournament.

NIKKI MESHKAT, Santa Clara University, *Parameter identifiability of biological models*

Abstract: Models arising in systems biology can be structurally unidentifiable, meaning that some of the parameters in the model can take on an infinite number of values and yet yield the same data. In this case, identifiability approaches can reduce the model and determine combinations of parameters that can be estimated even when individual parameters cannot. I'll discuss a class of unidentifiable models and find conditions to obtain identifiable reparametrizations of these models using techniques from computational algebra and graph theory. In more detail, I'll review an important class of biological models called linear compartmental models and show how identifiability can be determined by simply looking at the graphical structure of these models.

SAM VANDERVELDE, Dean of Mathematics and Head of Proof School, *It's Not Polite to Point*

Abstract: How many ways are there to place up or right arrows on some of the squares within a rectangular grid so that no arrow points at any other? This innocent question will lead us on a merry mathematical adventure that includes something for everyone, from accessible results to clever identities. Along the way we will rediscover the Worpitzky number triangle, a less well-known but nonetheless quite worthy collection of combinatorial numbers. Our presentation will culminate in a proof of the main result in which we learn that it pays to listen to sixth graders.

MARIEL VAZQUEZ, UC Davis, *Packing, folding and simplifying DNA topology*

Abstract: Cellular processes such as replication, recombination, and packing change the topology of DNA. Controlling these changes is key to ensuring genome stability. Techniques from knot theory and low-dimensional topology, aided by computational tools, now make it possible for us to ask questions about the topological state of the genome and to study the specific action of enzymes that control DNA topology. I will illustrate the use of these methods with examples drawn from my ongoing study of unlinking of newly replicated bacterial chromosomes.

JILL PIPHER, Santa Clara Univ., *Cryptography: from ancient times to a post-quantum age*

Abstract: The concept of public key encryption was introduced in the famous 1976 paper "New Directions in Cryptography" by Diffie and Hellman. Within a couple of years, Rivest, Shamir and Adelman produced the first published example of a public key cryptosystem, and RSA encryption is still widely used for secure communication. In this lecture will give some historical background to encryption, both private and public key, and explain some of the mathematical ideas involved in several different encryption systems. In particular, we'll focus on lattice-based encryption schemes, like NTRU, an efficient public key system due to Hoffstein, Silverman and myself, which continue to remain secure against quantum attacks.

How to Register

All participants should first register online on the Golden Section webpage at
http://sections.maa.org/golden/SANTACLARA2017.htm.
Look for the two links at the top of the page. You can then complete the registration by payment with a credit card (with an 11% surcharge) or by regular mail. For the mail option, send a check (arriving no later than February 24, 2017 and made payable to the MAA) to

MAA 2017 Meeting & 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.

General Retired Student (all levels) or unemployed Speaker, poster presenter, student worker	$20 $10 $5 Free (register online with pay by mail option)
Luncheon	$10 (in advance)
Suggested donation to support student members	$10

Please consider sending an extra $10 to support student members.

Mathematical Art exhibition

The Golden Section will again host a mathematical art exhibition. The exhibition will take place in the **Music & Dance Building** during the break between the morning and afternoon sessions (1:00 to 2:30 pm). During that time, the artists will be present to discuss their works with viewers. If you know anyone who produces art with a strong mathematical theme or content, please encourage them to submit their piece for consideration in the exhibit. Artists are expected to register for and attend the meeting. Artists are also responsible for their pieces throughout the meeting. Artist participants may store their pieces in a locked room until the exhibition begins. **Submissions**: Please email at most two photos (< 10 MB each) of each piece you would like to submit, along with a brief description (< 100 words) of the piece, to shirley.yap@csueastbay.edu. **Deadline for submission**: January 25, 2017

Mathematical Art Exhibition at the UC Davis Meeting, February 2016

Directions to Meeting at Santa Clara University

From **U.S. Highway 101:**

- Take the De La Cruz Boulevard/Santa Clara exit.
- Follow De La Cruz Boulevard towards El Camino Real (stay in the right lane).
- When De La Cruz Boulevard splits, follow the right split over the overpass.
- Turn right on Lafayette Street staying in the right turn lane.
- Turn right at El Camino Real.
- The main entrance to Santa Clara University will be on the right-hand side of the road.

From **Interstate 880:**

- Take The Alameda exit.
- Travel north on The Alameda.
- The Alameda will become El Camino Real.
- The main entrance to Santa Clara University will be on the left-hand side of the road.

From **Interstate 280:**

- Take Interstate 880 north toward Oakland.
- Exit at The Alameda.
- Turn left on The Alameda.
- The Alameda will become El Camino Real.
- The main entrance to Santa Clara University will be on the left-hand side of the road.

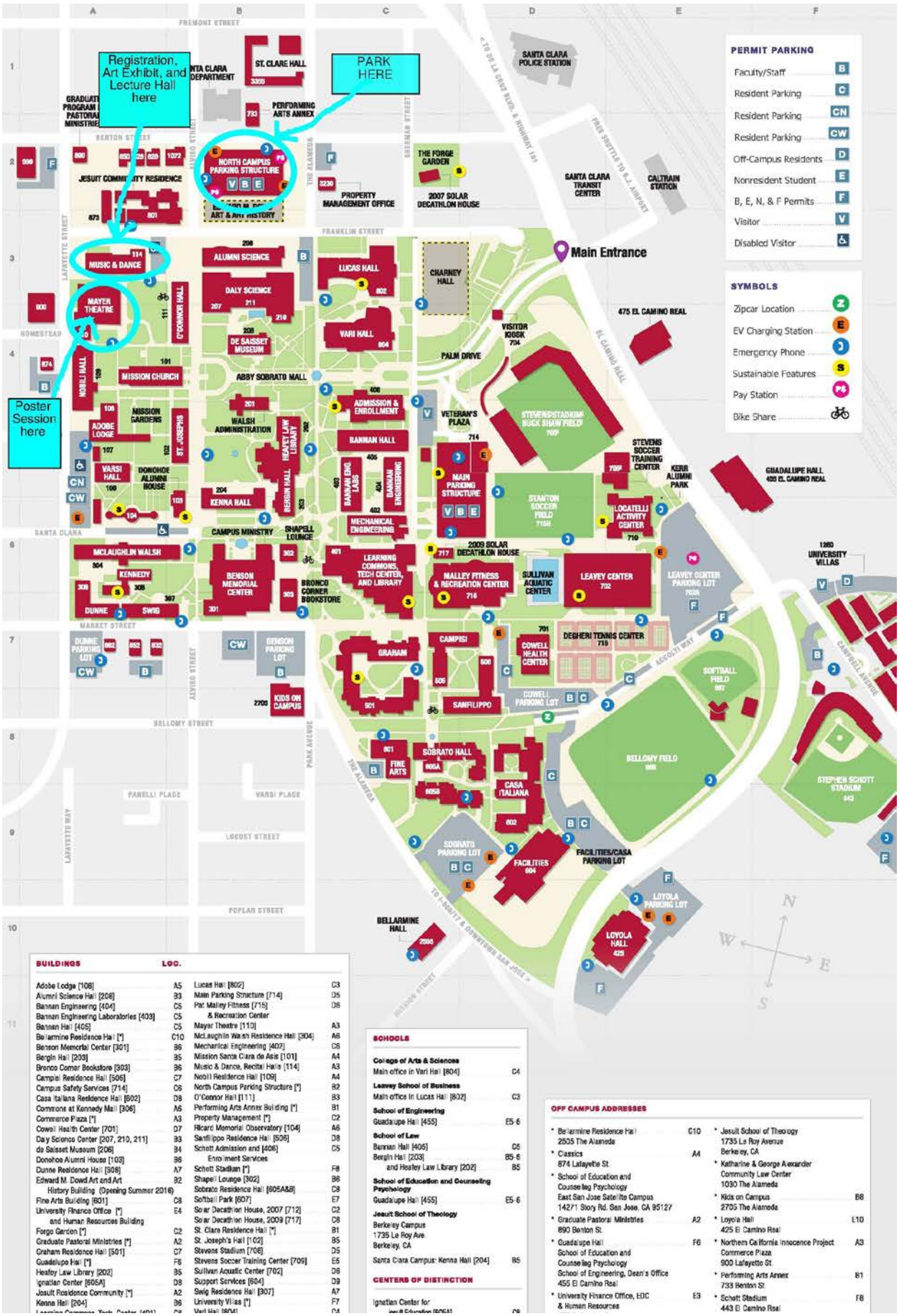
Parking Information and Meeting Location

Please use the **North Campus Parking Structure** (see highlighted campus map) at the intersection of Benton and Alviso streets. No parking permit is required as parking permits are not required on weekends.

Please see the highlighted campus map on the next page to find the meeting buildings. Registration, the mathematical art exhibition, and the main lecture hall will be in the **Music & Dance Building**. The poster session will be next-door in the lobby of the **Mayer Theatre**. Lunch will be on the lawn area in front of the Mayer Theatre. For more details, please visit https://www.scu.edu/aboutscu/our-campus/directions/ and see below for a campus map or visit https://www.scu.edu/map/.

Music & Dance Building

Mayer Theatre


Registration, Art Exhibit, and Lecture Hall here
PARK HERE
Poster Session here
Main Entrance
PERMIT PARKING
Faculty/Staff B
Resident Parking C
Resident Parking CN
Resident Parking CW
Off-Campus Residents D
Nonresident Student E
B, E, N, & F Permits F
Visitor V
Disabled Visitor
SYMBOLS
Zipcar Location Z
EV Charging Station E
Emergency Phone
Sustainable Features S
Pay Station P$
Bike Share
ST. CLARE HALL
PERFORMING ARTS ANNEX
NORTH CAMPUS PARKING STRUCTURE
JESUIT COMMUNITY RESIDENCE
PROPERTY MANAGEMENT OFFICE
THE FORGE GARDEN
2007 SOLAR DECATHLON HOUSE
SANTA CLARA POLICE STATION
SANTA CLARA TRANSIT CENTER
CALTRAIN STATION
MUSIC & DANCE
MAYER THEATRE
ALUMNI SCIENCE
DALY SCIENCE
LUCAS HALL
CHARNEY HALL
VARI HALL
DE SAISSET MUSEUM
MISSION CHURCH
ABBY SOBRATO MALL
WALSH ADMINISTRATION
ADMISSION & ENROLLMENT
VETERAN'S PLAZA
BANNAN HALL
MAIN PARKING STRUCTURE
STEVENS STADIUM BUCK SHAW FIELD
STEVENS SOCCER TRAINING CENTER
KERR ALUMNI PARK
GUADALUPE HALL
475 EL CAMINO REAL
VISITOR KIOSK
PALM DRIVE
MISSION GARDENS
ADOBE LODGE
VARSI HALL
DONOHOE ALUMNI HOUSE
KENNA HALL
CAMPUS MINISTRY
SHAPELL LOUNGE
MECHANICAL ENGINEERING
STANTON SOCCER FIELD
LOCATELLI ACTIVITY CENTER
2009 SOLAR DECATHLON HOUSE
MCLAUGHLIN WALSH
KENNEDY
DUNNE
SWIG
BENSON MEMORIAL CENTER
BRONCO CORNER BOOKSTORE
LEARNING COMMONS, TECH CENTER, AND LIBRARY
MALLEY FITNESS & RECREATION CENTER
SULLIVAN AQUATIC CENTER
LEAVEY CENTER
LEAVEY CENTER PARKING LOT
1280 UNIVERSITY VILLAS
DUNNE PARKING LOT
BENSON PARKING LOT
KIDS ON CAMPUS
GRAHAM
CAMPISI
COWELL HEALTH CENTER
DEGHERI TENNIS CENTER
SOFTBALL FIELD
SANFILIPPO
COWELL PARKING LOT
SOBRATO HALL
FINE ARTS
CASA ITALIANA
BELLOMY FIELD
STEPHEN SCHOTT STADIUM
SOBRATO PARKING LOT
FACILITIES
FACILITIES/CASA PARKING LOT
LOYOLA PARKING LOT
LOYOLA HALL
BELLARMINE HALL
FREMONT STREET
BENTON STREET
FRANKLIN STREET
HOMESTEAD
SANTA CLARA
MARKET STREET
BELLOMY STREET
PANELLI PLACE
VARSI PLACE
LOCUST STREET
POPLAR STREET
PARK AVENUE
THE ALAMEDA
LAFAYETTE STREET
ALVISO STREET
EL CAMINO REAL
BUILDINGS LOC.
Adobe Lodge [108] A5
Alumni Science Hall [206] B3
Bannan Engineering [404] C5
Bannan Engineering Laboratories [403] C5
Bannan Hall [405] C5
Bellarmine Residence Hall [*] C10
Benson Memorial Center [301] B6
Bergin Hall [203] B5
Bronco Corner Bookstore [303] B6
Campisi Residence Hall [506] C7
Campus Safety Services [714] C6
Casa Italiana Residence Hall [502] D8
Commons at Kennedy Mall [306] A6
Commerce Plaza [*] A3
Cowell Health Center [701] D7
Daly Science Center [207, 210, 211] B3
de Saisset Museum [206] B4
Donohoe Alumni House [103] B6
Dunne Residence Hall [308] A7
Edward M. Dowd Art and Art History Building (Opening Summer 2016) B2
Fine Arts Building [601] C8
University Finance Office [*] and Human Resources Building E4
Forge Garden [*] C2
Graduate Pastoral Ministries [*] A2
Graham Residence Hall [501] C7
Guadalupe Hall [*] F6
Heafey Law Library [202] B5
Ignatian Center [605A] D8
Jesuit Residence Community [*] A2
Kenna Hall [204] B6
Lucas Hall [802] C3
Main Parking Structure [714] D5
Pat Malley Fitness [715] & Recreation Center D6
Mayer Theatre [110] A3
McLaughlin Walsh Residence Hall [304] A6
Mechanical Engineering [402] C6
Mission Santa Clara de Asis [101] A4
Music & Dance, Recital Halls [114] A3
Nobili Residence Hall [109] A4
North Campus Parking Structure [*] B2
O'Connor Hall [111] B3
Performing Arts Annex Building [*] B1
Property Management [*] C2
Ricard Memorial Observatory [104] A6
Sanfilippo Residence Hall [505] D8
Schott Admission and [406] Enrollment Services C5
Schott Stadium [*] F8
Shapell Lounge [302] B6
Sobrato Residence Hall [605A&B] C8
Softball Park [607] E7
Solar Decathlon House, 2007 [712] C2
Solar Decathlon House, 2009 [717] C6
St. Clara Residence Hall [*] B1
St. Joseph's Hall [102] B5
Stevens Stadium [706] D5
Stevens Soccer Training Center [709] E5
Sullivan Aquatic Center [702] D6
Support Services [604] D9
Swig Residence Hall [307] A7
University Villas [*] F7
Vari Hall [804] C4
SCHOOLS
College of Arts & Sciences
Main office in Vari Hall [804] C4
Leavey School of Business
Main office in Lucas Hall [802] C3
School of Engineering
Guadalupe Hall [455] E5-6
School of Law
Bannan Hall [405] C5
Bergin Hall [203] and Heafey Law Library [202] B5-6 B5
School of Education and Counseling Psychology
Guadalupe Hall [455] E5-6
Jesuit School of Theology
Berkeley Campus
1735 Le Roy Ave.
Berkeley, CA
Santa Clara Campus: Kenna Hall [204] B5
CENTERS OF DISTINCTION
Ignatian Center for
OFF CAMPUS ADDRESSES
* Bellarmine Residence Hall C10
2505 The Alameda
* Classics A4
874 Lafayette St.
* School of Education and Counseling Psychology
East San Jose Satellite Campus
14271 Story Rd. San Jose, CA 95127
* Graduate Pastoral Ministries A2
890 Benton St.
* Guadalupe Hall F6
School of Education and Counseling Psychology
School of Engineering, Dean's Office
455 El Camino Real
* University Finance Office, EDC & Human Resources E3
* Jesuit School of Theology
1735 Le Roy Avenue
Berkeley, CA
* Katharine & George Alexander Community Law Center
1030 The Alameda
* Kids on Campus B8
2705 The Alameda
* Loyola Hall E10
425 El Camino Real
* Northern California Innocence Project A3
Commerce Plaza
900 Lafayette St.
* Performing Arts Annex B1
733 Benton St.
* Schott Stadium F8
443 El Camino Real

Call for Student Posters

Who, When and Where

All undergraduate and graduate math students, Saturday, March 4, 2017, at Santa Clara University.

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.

Why

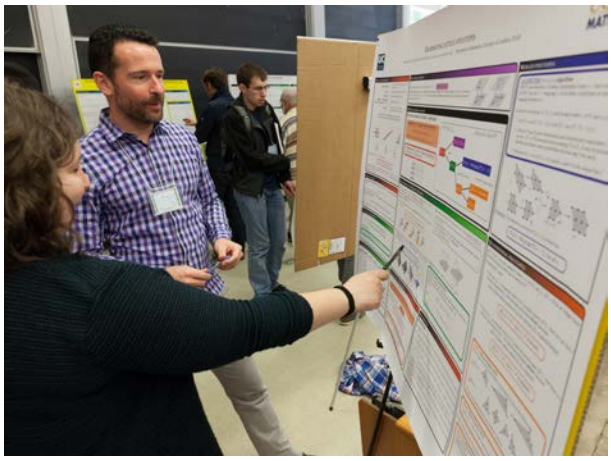
The meeting provides a great opportunity to learn about interesting and entertaining areas of mathematics, as well as to network with other students and professors. Student presenters receive **complimentary registration and Saturday luncheon**, plus a **free one-year membership to the MAA** or (for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

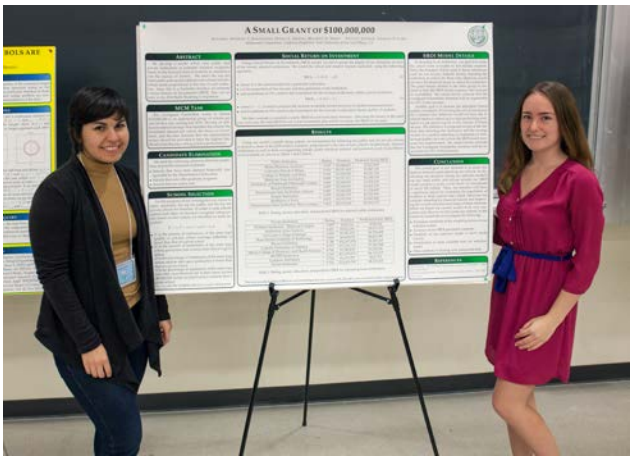
Details

If you wish to participate or have any questions (e.g., whether your idea is appropriate for presentation or what size font to use on your poster), contact Professor Kristen Beck (see contact info below). Participants must have an email address, possibly through a faculty mentor, where they can be contacted. Email your name and an abstract (2-5 sentences, LaTeX typesetting is acceptable), including poster title, name of institution, and name of faculty advisor, to Professor Beck, no later than **Friday, Feb. 17, 2017**. All student posters should be typed, illustrated, and displayed on a board 3 feet tall by 4 feet wide. Posters will be on display throughout the meeting, including during the scheduled poster session from 1 to 2:30 pm. For more information about the 2017 Golden Section Meeting at Santa Clara University, visit http://sections.maa.org/golden/SANTACLARA2017.htm.

Contact

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





Poster Session at the UC Davis Meeting, February 2016